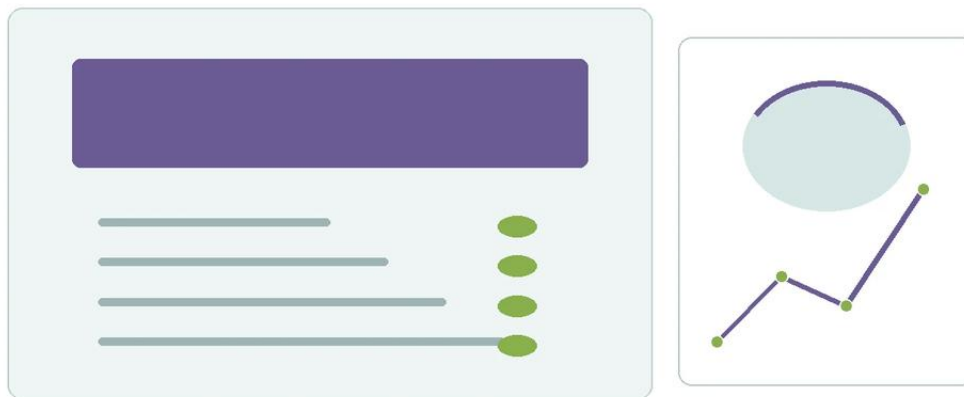


Mobrey Magnetic Vertical Level Switches

A practical guide to mobrey magnetic vertical level switches, covering the reader intent, the relationship to mobrey magnetic vertical level switches, key evaluation criteria, common risks, and the information the intended project audience should confirm before taking the next step.



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Main topic: Level Switches

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In the landscape of industrial process control, the ability to accurately detect liquid levels is fundamental to safety, efficiency, and environmental compliance. Among the various technologies available, magnetic vertical level switches have long been regarded as a gold standard for reliability in harsh environments. Specifically, Mobrey magnetic vertical level switches are recognized for their robust construction and unique glandless design, which eliminates the risk of leaks associated with mechanical seals. This article provides a comprehensive technical overview of these instruments, their operating principles, selection criteria, and practical installation guidance for engineering professionals.

| Understanding the Measurement Principle

The core functionality of a magnetic vertical level switch relies on the interaction between a float containing a permanent magnet and a switch mechanism housed within a separate, sealed chamber. Unlike standard float switches that may use a mechanical linkage or a flexible cable, the magnetic design utilizes magnetic coupling to transmit the float's movement to the switch contact.

| The Glandless Design

The defining characteristic of high-quality Level Switches is the glandless construction. In this design, the switch mechanism is completely isolated from the process media by a non-magnetic stainless steel or alloy diaphragm or wall. As the liquid level rises, the float moves vertically. The magnet attached to the float (the "primary magnet") approaches the switch housing. Inside the housing, a "secondary magnet" of opposing polarity is positioned.

When the primary magnet reaches a specific point, the magnetic field penetrates the housing wall and repels or attracts the secondary magnet. This force triggers a snap-action switch (typically a microswitch). Because there is no physical connection between the wetted parts and the electrical components, there are no seals to wear out, perish, or leak, making them ideal for high-pressure and hazardous chemical applications.

| Snap-Action Mechanism

One of the critical advantages of mobrey magnetic vertical level switches is the snap-action switch mechanism. In many low-cost level sensors, the contact transition can be slow, leading to "arcing" or "chatter" if the liquid surface is turbulent. The snap-action design ensures that once the magnetic threshold is reached, the contacts move instantly to their new position with high contact pressure. This provides a clean electrical signal and extends the operational life of the switch contacts.

| Key Evaluation Criteria for Selection

Selecting the correct level switch requires a detailed analysis of the process environment. While magnetic vertical switches are versatile, their performance is dictated by the physical properties of the media and the vessel's operating parameters.

| 1. Specific Gravity (Density)

The float must be buoyant enough to displace the liquid. Standard floats are typically designed for liquids with a specific gravity (SG) of 0.7 or higher. For lighter liquids, such as liquefied gases or certain hydrocarbons, specialized high-buoyancy floats made of thin-walled titanium or stainless steel are required. If the SG of the liquid is lower than the float's design limit, the switch will fail to trigger.

| 2. Operating Pressure and Temperature

Mobrey designs are often favored for extreme conditions. Standard models can handle temperatures from -50°C to +400°C (-58°F to 752°F) and pressures up to 200 bar (approx. 2900 psi). When selecting a switch, it is vital to confirm that the float can withstand the external pressure without collapsing. Welk and other professional manufacturers provide pressure-rating charts that correlate temperature with maximum allowable pressure for various materials like 316L stainless steel, Monel, or Hastelloy.

3. Wetted Materials and Corrosion Resistance

For general water treatment or oil applications, 316 stainless steel is the industry standard. However, in the presence of aggressive acids or seawater, exotic alloys or plastic coatings (such as PTFE) may be necessary. The choice of material affects not only the longevity of the switch but also the weight of the float, which in turn influences the minimum required specific gravity.

Technical Comparison: Level Switch Technologies

To assist in the selection process, the following table compares magnetic vertical switches with other common level detection technologies used in industrial automation.

Technology	Operating Principle	Best For	Limitations
Magnetic Vertical Switch	Magnetic coupling / Float	High pressure, high temp, clean liquids	Not for heavy slurries or coating liquids
Ultrasonic Level Switch	Sound wave reflection	Non-contact, corrosive liquids	Sensitive to foam and heavy vapors
Capacitance Switch	Change in dielectric	Powders, granulates, liquids	Requires calibration; affected by coating
Vibrating Fork	Frequency dampening	General purpose, turbulent surfaces	Mechanical wear in abrasive media
Hydrostatic Pressure	Liquid column weight	Continuous level in vented tanks	Density must remain constant

Installation Considerations and Best Practices

Correct installation is paramount to ensuring the long-term reliability of mobrey magnetic vertical level switches. Even the most robust instrument can fail if environmental factors are ignored.

| Orientation and Alignment

As the name suggests, vertical level switches must be installed perfectly upright. A tilt of more than a few degrees can increase friction between the float and the guide tube, potentially causing the float to stick. If the tank is subject to vibration, the mounting should be reinforced to prevent mechanical fatigue at the flange or thread connection.

| Turbulence and Stillwells

In tanks with agitators or high-velocity inflow, the liquid surface may be turbulent. This turbulence can cause the float to bounce, leading to rapid cycling of the switch. In such cases, a "stillwell" or "stilling pipe" should be installed. This is a vertical pipe with vent holes that surrounds the float, providing a calm liquid surface for accurate measurement. The diameter of the stillwell must be large enough to allow the float to move freely without capillary action interference.

| Magnetic Interference

Because the switch operates on magnetic principles, it should be kept away from strong external magnetic fields, such as large electric motors or high-current power lines. Additionally, if the liquid contains ferromagnetic particles (e.g., iron filings in a machining coolant tank), these particles can accumulate on the float magnet, eventually increasing its weight and causing it to sink.

| Common Risks and Limitations

While highly reliable, magnetic vertical switches are not "set and forget" devices in all applications. Engineers should be aware of the following risks:

Media Buildup: In applications involving waxes, heavy oils, or crystallizing liquids, material can build up on the float or the guide rod. This increases friction and can eventually jam the mechanism. Regular inspection intervals should be established for such media.

Mechanical Wear: Although the magnetic coupling is non-contact, the float still moves along a guide or pivots on a hinge. Over millions of cycles, mechanical wear can occur. High-quality switches use hardened materials for pivot points to mitigate this.

Switch Rating Overload: It is common to see switch failures caused by electrical overloading. If the switch is used to drive a high-power motor directly, the contacts may weld together. Always use an interposing relay for high-current loads.

| Maintenance and Troubleshooting

One of the standout features of the Mobrey design is the ability to test the switch without removing it from the process. Many models include a manual testing lever or a magnetic test point. By applying an external magnet or moving the internal test linkage, maintenance personnel can verify that the electrical circuit is functioning correctly.

Troubleshooting Steps:

1. **Switch does not trigger:** Check for float buoyancy (is the SG correct?), check for internal obstructions or buildup, and verify the electrical continuity of the microswitch.
2. **Intermittent signal:** Often caused by turbulence or a loose electrical connection. Check the mounting stability and the integrity of the wiring terminals.
3. **False triggers:** Inspect for external magnetic interference or iron particle accumulation on the float.

| Why Engineering Professionals Choose Welk Solutions

As a professional manufacturer, Welk provides a range of industrial level measurement instruments that complement or serve as high-performance alternatives to traditional brands. Our focus on advanced technology and strict quality control ensures that every level switch meets the rigorous demands of water treatment, chemical processing, and oil and gas industries.

Whether you require a standard magnetic vertical switch or a customized OEM/ODM solution for a specific industrial automation challenge, our engineering team provides the technical support necessary to select the right instrument for the job. We emphasize cost-effective reliability without compromising on the accuracy required for critical safety interlocks.

| Frequently Asked Questions (FAQs)

Q: Can magnetic vertical switches be used in hazardous areas?

A: Yes, most high-end magnetic switches are available with ATEX, IECEx, or UL certifications for use in explosive atmospheres. They can be supplied as intrinsically safe or flameproof (explosion-proof) versions.

Q: What is the minimum differential between the 'on' and 'off' points?

A: This depends on the specific model. Standard vertical switches often have a fixed differential of approximately 10mm to 25mm. However, some designs allow for adjustable set points by moving the switch housing along the guide tube.

Q: Are these switches suitable for food and beverage applications?

A: Yes, provided they are specified with 316L stainless steel and hygienic connections (like Tri-Clamp). The glandless design is particularly advantageous here as it prevents process contamination.

Q: How do I handle liquids with high viscosity?

A: For high-viscosity liquids, a larger float with higher buoyancy is typically used, and the clearance between the float and the guide rod is increased to prevent sticking. In extreme cases, a different technology like a vibrating fork may be more appropriate.

For more information on selecting the right technology for your application, you can [Review product options and application support](#) to ensure your system operates with maximum safety and precision.