

Wellmark Level Switch 790

A practical guide to wellmark level switch 790, covering the reader intent, the relationship to wellmark level switch 790, key evaluation criteria, common risks, and the information the intended project audience should confirm before taking the next step.



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In the demanding environments of oil and gas production, chemical processing, and heavy industrial automation, the reliability of point-level detection is paramount. The Wellmark Level Switch 790 stands as a standard-setting instrument for high-pressure liquid level control. Designed primarily for use in scrubbers, separators, and storage tanks, this float-operated displacement switch provides a mechanical or pneumatic response to level changes, ensuring process safety and automation efficiency.

This article serves as a technical reference for engineers and procurement specialists evaluating the Wellmark Level Switch 790, detailing its operational principles, selection criteria, and installation requirements within the broader context of industrial Level Switches.

| Measurement Principles of Float-Operated Switches

Before selecting a specific model like the Wellmark 790, it is essential to understand the underlying physics of float-actuated measurement. The device operates on the principle of buoyancy, as defined by Archimedes' principle: an object submerged in a fluid experiences an upward force equal to the weight of the fluid it displaces.

| Mechanical Linkage and Actuation

In the Wellmark Level Switch 790, a float is suspended within the process vessel or an external cage. As the liquid level rises, the buoyant force acts upon the float, causing it to move vertically. This movement is transferred through a robust pivot and rod assembly to the switch head located outside the pressurized environment.

Unlike continuous level transmitters that provide a 4-20mA or digital signal proportional to the level, the 790 is a point-level device. It is designed to trigger a discrete action—such as opening a dump valve or sounding an alarm—once a specific set point is reached. The "snap-acting" nature of the switch ensures that the transition between states is immediate, preventing "chattering" or rapid cycling of valves that can occur with turbulent fluid surfaces.

| Pneumatic vs. Electric Output

The 790 series is typically available in two primary configurations:

1. **Pneumatic (Series 790P):** Uses a pilot valve to control instrument air or gas pressure. When the float reaches the set point, the pilot either opens or closes the supply to a pneumatic actuator.
2. **Electric (Series 790E):** Utilizes a microswitch to open or close an electrical circuit, making it suitable for integration into PLC (Programmable Logic Controller) or SCADA systems.

| Technical Specifications and Material Selection

The durability of a level switch depends heavily on its construction materials and their compatibility with the process media. The Wellmark 790 is engineered to withstand high-pressure environments often found in upstream oil and gas applications.

| Pressure and Temperature Ratings

Standard units are designed to operate at pressures up to 138 bar (2,000 psi). This makes them ideal for high-pressure separators where lower-rated instruments would fail. Temperature ratings typically range from -29°C to 204°C (-20°F to 400°F), depending on the seal materials and switch configuration chosen.

| Material Options

Body/Housing: Usually constructed from LCC (Low Carbon Steel) or 316 Stainless Steel for corrosive environments.

Float and Trim: 316 Stainless Steel is the standard for the float and internal wetted parts to ensure resistance to H₂S (Hydrogen Sulfide) and CO₂ (Carbon Dioxide) commonly found in sour gas applications.

Seals: Viton or Buna-N O-rings are selected based on the chemical composition of the liquid and the operating temperature.

Practical Selection Table

When specifying a Wellmark Level Switch 790, use the following table to align the instrument with your application requirements:

Feature	Specification (Metric)	Specification (Imperial)	Application Note
Max Operating Pressure	138 bar	2,000 psi	Suitable for high-pressure vessels.
Process Connection	2" NPT or Flanged	2" NPT or Flanged	NPT is standard for scrubbers.
Temperature Range	-29°C to 204°C	-20°F to 400°F	High-temp options available for steam.
Output Type	Pneumatic or SPDT Electric	Pneumatic or SPDT Electric	Choose based on available power.
Specific Gravity	Min 0.5	Min 0.5	Ensure float buoyancy matches liquid density.

Installation Considerations

Proper installation is critical to the longevity and accuracy of the Wellmark Level Switch 790. Failure to follow engineering best practices can lead to premature wear or false triggering.

Mounting Orientation

The 790 is designed for horizontal mounting through the side of a vessel or into an external float cage. It is imperative that the device is installed level. If the switch body is tilted, the internal pivot mechanism may experience increased friction, leading to a delayed response or a stuck float.

| Clearance and Turbulence

The float requires sufficient clearance within the vessel to move through its full range of motion. In vessels with high turbulence or internal agitators, a stilling well (a perforated pipe surrounding the float) should be used to protect the float from mechanical stress and to provide a stable liquid surface for measurement.

| Connection Types

While 2" NPT threaded connections are common for their ease of installation, flanged connections (ANSI/ASME) are recommended for high-pressure or hazardous chemical services where a leak-proof metal-to-metal or gasketed seal is required for safety compliance.

| Limitations and Common Risks

While the Wellmark Level Switch 790 is a robust instrument, it is not universal. Engineers must recognize its limitations:

1. **Build-up and Fouling:** In applications with heavy paraffin, waxes, or scale, the float and pivot mechanism can become coated. This increases the mass of the float and can eventually seize the movement. Regular inspection is required in "dirty" services.
2. **Specific Gravity Sensitivity:** The float is calibrated for a specific range of liquid densities. If the process fluid changes significantly (e.g., switching from oil to a lighter condensate), the float may no longer provide the necessary buoyant force to actuate the switch.
3. **Mechanical Wear:** As a mechanical device with moving parts, the 790 will eventually experience wear at the pivot points. This is in contrast to non-contact technologies like radar or ultrasonic sensors, which have no moving parts.

For applications involving high solids or extremely corrosive acids where mechanical floats are unsuitable, exploring alternative Level Switches such as tuning fork (vibrating) or ultrasonic gap switches may be necessary.

| Maintenance and Troubleshooting

A proactive maintenance schedule ensures the Wellmark 790 remains operational for its intended lifespan, which can exceed a decade in well-maintained systems.

Monthly Visual Inspection: Check for leaks at the process connection and the switch housing. For pneumatic models, ensure the exhaust ports are not blocked by insects or debris.

Functional Testing (Proof Testing): Periodically manually lift the float (if safe and accessible) or manipulate the liquid level to ensure the switch triggers and resets correctly.

Pilot Cleaning: For pneumatic units, the internal pilot orifice is small. Ensure the supply gas or air is dry and filtered to prevent clogging.

| Frequently Asked Questions (FAQs)

Q: Can the Wellmark 790 be used for interface detection (e.g., oil/water)?

A: Yes, but it requires a weighted float calibrated to the specific gravity of the lower liquid (water) while remaining heavy enough to sink through the upper liquid (oil). This is a specialized configuration.

Q: Is the 790 suitable for hazardous areas?

A: The pneumatic version is inherently safe as it uses no electricity. The electric version (790E) must be equipped with an explosion-proof housing and certified (ATEX/IECEX/UL) for the specific zone or division where it is installed.

Q: What is the minimum specific gravity the 790 can detect?

A: Standard floats typically require a minimum specific gravity of 0.5. For lighter liquids, oversized or high-buoyancy floats may be required.

Q: How does the snap-action mechanism benefit the process?

A: The snap-action mechanism uses a spring or magnetic latch to ensure that once the trip point is reached, the switch moves fully to the new position. This prevents the valve from partially opening or "hunting," which extends the life of downstream control valves.

| Conclusion

The Wellmark Level Switch 790 remains a cornerstone of industrial level control due to its simplicity, high-pressure capability, and reliability in harsh conditions. By understanding the mechanical principles of displacement and selecting the appropriate materials and output types, engineers can implement a solution that provides years of trouble-free service. For more complex applications or to compare these mechanical units with electronic alternatives, reviewing the full range of Level Switches is recommended to ensure the optimal technology is applied to the specific process challenge.