

EI19

A practical guide to EI19, covering the reader intent, the relationship to EI19, 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 field of industrial process control, the accurate detection of liquid levels is fundamental to operational safety and efficiency. Among the various technologies available for point level detection, conductive level probes, specifically the EI19 series, remain a preferred choice for applications involving conductive liquids. This article provides a comprehensive technical overview of the EI19 probe, its operating principles, selection criteria, and practical installation guidelines for engineering professionals.

| Measurement Principles of Conductive Level Probes

Conductive level measurement is based on the electrical conductivity of the medium being monitored. The EI19 probe functions as a part of a low-voltage electrical circuit. The system typically consists of the probe (electrode), a reference electrode (or the metallic tank wall), and a level controller (relay unit).

| The Conductive Circuit

When the liquid level rises and comes into contact with the EI19 electrode, a circuit is completed between the sensing electrode and the reference electrode. The liquid acts as the conductor. The level controller detects the resulting change in resistance. To prevent electrolysis and the subsequent buildup of ions or corrosion on the electrode surface, these systems utilize a low-voltage Alternating Current (AC) rather than Direct Current (DC).

| Sensitivity and Conductivity

The effectiveness of the EI19 depends on the conductivity of the liquid, measured in Siemens per meter (S/m) or microsiemens per centimeter ($\mu\text{S}/\text{cm}$). Most industrial conductive probes require the medium to have a minimum conductivity of approximately 5 $\mu\text{S}/\text{cm}$ to 10 $\mu\text{S}/\text{cm}$. This makes the technology ideal for water, wastewater, acids, alkalis, and various chemical solutions, but unsuitable for non-conductive liquids like oils, hydrocarbons, or pure deionized water.

Technical Specifications and Construction of EI19

The EI19 is designed for durability in harsh industrial environments. Its construction typically involves high-grade metals and robust insulation materials to ensure long-term reliability.

Material Composition

Electrodes: Usually manufactured from Stainless Steel 304 or 316L. For highly aggressive chemical environments, specialized alloys or titanium may be used.

Insulation: The electrode rods are often partially or fully insulated with materials such as Polypropylene (PP), Polytetrafluoroethylene (PTFE), or Polyvinyl Chloride (PVC). This prevents false triggering caused by moisture or foam at the top of the tank.

Process Connection: Common connections include threaded fittings (e.g., G1/2", G1", or NPT) or flanged connections, depending on the pressure requirements of the vessel.

Mechanical Limits

The EI19 series is engineered to withstand varying process conditions. Standard models typically support temperatures up to 100°C (212°F) and pressures up to 10 bar (145 psi), though specialized high-pressure variants are available for boiler applications. The length of the rods can vary from 100 mm to 3000 mm, allowing for flexible configuration in different tank depths.

Selection Criteria for EI19 Probes

Selecting the correct EI19 configuration requires an analysis of the chemical properties of the medium and the physical constraints of the installation site. The following table outlines key selection factors:

Feature	Specification/Option	Application Context
Number of Electrodes	1 to 5 rods	Single point detection vs. multi-point (High/Low/Alarm)
Electrode Material	SS316L / Hastelloy	General water vs. corrosive chemicals
Insulation Material	PTFE / Polypropylene	High temperature vs. standard chemical resistance
Connection Type	Threaded / Flanged	Small tanks vs. large industrial pressurized vessels
Operating Temp	Up to 100°C (Standard)	Standard process vs. high-temp cleaning cycles
Max Pressure	10 bar to 40 bar	Atmospheric tanks vs. pressurized reactors

When evaluating hardware for complex automation systems, it is essential to consult comprehensive technical resources. For detailed product specifications and integration support, engineers should refer to the Main Page of the manufacturer's technical catalog.

| Installation and Engineering Considerations

Proper installation is critical to the performance of the EI19 conductive probe. Incorrect placement can lead to false readings or premature sensor failure.

| Positioning and Mounting

1. **Avoid Turbulence:** Probes should not be installed directly in the path of incoming fluid or near agitators. If turbulence is unavoidable, a stilling well should be used to protect the electrodes and ensure a stable liquid surface.
2. **Vertical vs. Horizontal:** While EI19 probes are primarily designed for vertical installation from the top of the tank, some variants can be side-mounted. Vertical installation is generally preferred to prevent liquid from pooling on the insulation and causing "bridging."

3. Distance from Walls: Electrodes must be positioned at a sufficient distance from the tank walls (at least 20 mm) to prevent accidental contact or capacitive interference, especially in non-metallic tanks.

| Grounding and Reference

In metallic tanks, the tank wall itself can serve as the reference electrode (ground). In plastic or lined tanks, a dedicated reference electrode (the longest rod in the EI19 assembly) must be provided to complete the circuit. Ensuring a common ground between the probe and the level controller is vital for signal integrity.

| Wiring and Cable Runs

Standard unshielded cable is often sufficient for short distances, but for cable runs exceeding 50 meters, shielded cable is recommended to protect against electromagnetic interference (EMI) from nearby pumps or heavy machinery.

| Limitations and Environmental Constraints

While the EI19 is a versatile and cost-effective solution, it has specific limitations that must be acknowledged during the design phase:

Coating and Buildup: If the medium is prone to leaving conductive deposits (e.g., heavy sludge or crystallizing salts), the electrodes may remain "connected" even after the liquid level has dropped. Regular cleaning or the use of probes with smoother PTFE coatings can mitigate this.

Non-Conductive Media: As noted, the EI19 cannot detect oils, fuels, or pure solvents. In such cases, hydrostatic or ultrasonic sensors are required.

Foam Interference: Heavy foam can trigger conductive probes if the foam itself is sufficiently conductive. Adjusting the sensitivity on the level controller can sometimes solve this, but in extreme cases, non-contact radar may be a better alternative.

| Comparison: EI19 vs. Other Level Technologies

Choosing between conductive probes and other technologies often comes down to a balance of cost, complexity, and media characteristics.

| EI19 vs. Ultrasonic Sensors

Ultrasonic sensors are non-contact and ideal for corrosive liquids where probe contact is undesirable. However, they are more expensive and can be affected by steam, dust, or heavy foam. The EI19 is significantly more affordable and is unaffected by vapor or dust within the tank headspace.

| EI19 vs. Float Switches

Float switches are mechanical and prone to jamming if the liquid contains solids or high viscosity. The EI19 has no moving parts, making it much more reliable in wastewater or applications where mechanical failure is a risk. However, float switches do not require a separate controller, whereas the EI19 does.

| Maintenance and Troubleshooting

The EI19 is largely maintenance-free due to its lack of moving parts. However, a periodic inspection schedule should be implemented:

Electrode Cleaning: In applications with high mineral content, calcium or scale buildup can insulate the probe. Cleaning with a mild descaling agent or a wire brush (for stainless steel rods) will restore conductivity.

Insulation Integrity: Check the PTFE or PP coating for cracks or wear. If the insulation is compromised, the probe may trigger prematurely due to condensation.

Controller Calibration: Periodically test the relay output by manually bridging the electrodes to ensure the control logic (e.g., pump start/stop) is functioning correctly.

| Frequently Asked Questions (FAQs)

Q: Can the EI19 be used in pressurized tanks?

A: Yes, provided the process connection and electrode seals are rated for the specific pressure. Standard models handle up to 10 bar, but high-pressure versions are available for steam boiler applications.

Q: What is the maximum length for the EI19 electrodes?

A: Most manufacturers provide rods up to 3000 mm (3 meters). For deeper tanks, wire-rope electrodes are sometimes used as an alternative to rigid rods to prevent bending.

Q: Can I cut the EI19 rods to size on-site?

A: In many cases, yes. Stainless steel rods can be cut to the desired length during installation, provided the insulation is stripped back correctly at the tip to allow for electrical contact with the liquid.

Q: Is the EI19 suitable for food and beverage applications?

A: If constructed with SS316L and food-grade insulation (like PTFE) and equipped with a sanitary connection (e.g., Tri-Clamp), the EI19 is suitable for detecting levels in milk, beer, and fruit juices.

For engineers seeking to optimize their level control systems, understanding the nuances of conductive technology is essential. The EI19 offers a robust, low-maintenance solution for a wide range of industrial liquids. For further technical assistance and to view the full range of level measurement instruments, visit the [Main Page](#).