Eclipse Series Transmitters Et 12

A practical guide to eclipse series transmitters et 12, covering the reader intent, the relationship to eclipse series transmitters et 12, 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 landscape of industrial process control, the demand for precise, reliable, and maintenance-free level measurement has led to the widespread adoption of Guided Wave Radar (GWR) technology. The eclipse series transmitters et 12 represent a sophisticated evolution in this field, utilizing Time Domain Reflectometry (TDR) to provide continuous level measurement in challenging environments. As a professional manufacturer, Welk provides these instruments to address the complexities of water treatment, chemical processing, and oil and gas operations.

This guide serves as a practical engineering reference for understanding the operational principles, selection criteria, and installation requirements for the ET 12 series, ensuring that project managers and engineers can make informed decisions for their specific application needs.

Understanding the Measurement Principle: Time Domain Reflectometry

The fundamental technology behind the eclipse series transmitters et 12 is Time Domain Reflectometry (TDR). Unlike traditional non-contact radar, which broadcasts electromagnetic waves through the air, GWR systems guide the signal along a physical probe or waveguide. This approach significantly reduces signal loss and minimizes the impact of environmental factors such as foam, dust, or vapor.

The Signal Path

1. Pulse Generation: The transmitter electronics generate low-power, high-frequency electromagnetic pulses.

2. Propagation: These pulses travel down the probe at the speed of light.

3. Reflection: When the pulse encounters a medium with a different dielectric constant ($εr$) than the air or vapor space above it (typically the liquid surface), a portion of the pulse energy is reflected back toward the transmitter.

4. Timing: The device measures the precise "time of flight" between the pulse emission and the reception of the reflected signal. Since the speed of light is constant, the distance to the product surface is calculated as: $Distance = (Speed of Light × Time) / 2$.

Because the signal is concentrated along the probe, the ET 12 is less affected by internal tank obstructions, such as agitators or ladders, compared to non-contact radar, provided the probe is positioned correctly.

Key Technical Specifications and Capabilities

The ET 12 series is designed for versatility across various industrial sectors. When evaluating these transmitters, engineers should consider the following baseline specifications:

Measurement Range: Typically up to 30 meters (approx. 100 feet) for rod probes and up to 60 meters (approx. 200 feet) for cable-based probes.

Accuracy: Standard accuracy is often within ±2.5 mm (0.1 inches), making it suitable for custody transfer or high-precision inventory management.

Operating Pressure: Capable of handling vacuum conditions up to 400 bar (5800 psi), depending on the seal and flange configuration.

Temperature Range: Standard models operate from -196°C to +450°C (-320°F to +842°F), covering both cryogenic and high-heat applications.

Output Signals: 4-20 mA with HART protocol is standard, with options for Foundation Fieldbus or Profibus PA in many industrial automation setups.

For more detailed product specifications or to explore alternative measurement technologies, you can visit the Welk Main Page for comprehensive technical documentation.

Practical Selection Table for Probe Types

Selecting the correct probe is the most critical step in applying the eclipse series transmitters et 12. The probe type determines the transmitter's ability to handle dielectric constants, turbulence, and coating.

Probe Type	Best Application	Dielectric Constant (εr)	Advantages	Limitations
Coaxial	Low dielectric liquids, small tanks	εr ≥ 1.4	Highest signal-to-noise ratio; immune to tank internals.	Prone to clogging with viscous or dirty fluids.
Single Rod	Viscous fluids, coating liquids	εr ≥ 10 (Direct)	Easy to clean; resists buildup.	Sensitive to tank wall distance and internal obstructions.
Twin Rod	Clean liquids, long ranges	εr ≥ 1.9	Better signal than single rod for low εr.	Can trap debris between the rods.
Flexible Cable	Tall silos or deep sumps	Varies by design	High tensile strength for heavy solids or deep tanks.	Requires weight at the bottom; subject to swaying in turbulence.

Installation Considerations and Best Practices

To ensure the eclipse series transmitters et 12 perform to their rated accuracy, specific installation guidelines must be followed. Improper mounting is the leading cause of signal interference and measurement drift.

1. Nozzle Geometry

The diameter and height of the mounting nozzle can affect the signal at the top of the tank (the "dead zone"). For single rod probes, the nozzle diameter should be as large as possible relative to the nozzle height to minimize parasitic reflections. If using a coaxial probe, nozzle geometry is less critical as the signal is contained within the outer tube.

2. Obstruction Clearance

Single and twin rod probes require a clear "keep-out zone" around the probe. As a general rule, the probe should be installed at least 300 mm (12 inches) away from the tank wall or any internal structures like pipes, heating coils, or baffles. If this clearance is not possible, a coaxial probe or a stilling well should be utilized.

3. Turbulence and Agitation

In tanks with heavy agitation, the lateral forces on a long probe can be significant. In these cases, the probe should be anchored at the bottom of the tank or housed within a bypass chamber. Anchoring must allow for thermal expansion to prevent the probe from buckling.

4. Avoiding the Fill Stream

Never install the transmitter directly in the path of the incoming product flow. The force of the material can damage the probe, and the falling liquid will create false echoes that interfere with the surface reflection.

Limitations and Common Risks

While the eclipse series transmitters et 12 are highly robust, they are not universal solutions. Engineers must be aware of the following limitations:

Dielectric Minimums: If the dielectric constant of the medium is extremely low (less than 1.4), the reflected signal may be too weak for the transmitter to detect reliably. In such cases, a coaxial probe or a different technology, such as a displacement transmitter, might be required.

Heavy Coating and Bridging: While GWR handles thin coatings well, heavy, conductive buildup that "bridges" the gap between a twin-rod probe or fills the space in a coaxial probe will cause the device to report a high-level error.

Interface Measurement Constraints: GWR is excellent for measuring the interface between two liquids (e.g., oil over water). However, the upper liquid must have a lower dielectric constant than the lower liquid, and the upper layer must be thick enough (typically > 50 mm) for the transmitter to distinguish the two reflections.

Frequently Asked Questions (FAQ)

Q: Can the ET 12 be used in plastic tanks?

A: Yes, but for single rod probes, a metal flange or a grounding plate must be used at the mounting point to provide a proper reference for the electromagnetic pulse. Coaxial probes do not require this, as they carry their own ground reference.

Q: How does the ET 12 handle foam?

A: It depends on the foam's density and conductivity. Light, airy foam is usually transparent to the radar pulse, allowing the transmitter to see the liquid level beneath. Dense, wet foam may reflect the signal, causing the transmitter to measure the top of the foam layer.

Q: Is calibration required on-site?

A: The ET 12 is factory-calibrated. On-site configuration typically involves entering the tank height, the probe length, and the desired 4-20 mA mapping points. No actual liquid level movement is required for basic setup.

Q: What maintenance is required for these transmitters?

A: Because there are no moving parts, maintenance is minimal. In applications with heavy buildup, periodic inspection and cleaning of the probe may be necessary to prevent signal attenuation.

Conclusion for Project Stakeholders

The eclipse series transmitters et 12 offer a high-reliability solution for industrial level measurement, bridging the gap between simple float switches and complex non-contact radar systems. By guiding the signal along a probe, these devices provide stability in the presence of vapors, varying pressures, and changing temperatures.

Before finalizing a specification, project teams should confirm the chemical compatibility of the probe materials (typically 316 Stainless Steel, Hastelloy, or Monel) and verify the dielectric constant of the process media. For complex applications involving high-pressure steam or multi-phase interfaces, consulting with a technical specialist at Welk is recommended to ensure the selected probe geometry matches the vessel's internal dynamics. By adhering to the installation and selection guidelines outlined above, facilities can achieve long-term accuracy and reduced total cost of ownership in their level monitoring processes.