

# Overfill Alarm Function in the FIMTEK System

## Overview of the Overfill Alarm Function

Overfill Alarm is a safety feature designed to prevent fuel tank overfills and spills by providing an early warning when a tank is nearing its full capacity. In a FIMTEK fuel management system, this function continuously monitors the fuel level and triggers audible and visual alarms before the tank reaches an unsafe level. Think of it like the automatic shut-off on a fuel nozzle, but for your entire storage tank – it alerts operators when the tank is almost full so they can stop the flow in time. By catching high fuel levels early, the overfill alarm helps avoid messy, dangerous, and costly spills, protecting personnel, the environment, and equipment.

*An example of an overfill prevention alarm setup: as fuel level rises in the tank, a sensor detects when a high threshold is reached and signals the alarm unit (horn/light) to warn operators.*

At its core, an overfill alarm system has three key components: a sensor inside the tank to detect fuel level, a control console to process the signal, and an alarm device (with lights or horn) to alert staff. In the FIMTEK system, these roles are filled by the FIMROD magnetostrictive probe (the in-tank sensor) and the FIM7L tank console (the control unit and interface). Together, they act as a first line of defense against overfills, taking guesswork out of tank filling and ensuring operators get a clear warning before a spill can occur.

## FIMROD Probe & FIM7L Console: Early High-Level Alarm Operation

The FIMROD magnetostrictive probe is installed inside the storage tank and provides continuous, high-precision measurements of the fuel level (and even water level) in real time. As a magnetostrictive sensor, it uses a float that moves with the fuel; the probe's electronics detect the float's position with millimeter accuracy, converting it into a level reading. This probe is designed for harsh, flammable environments – it's intrinsically safe and ATEX/IECEx approved for use in fuel tanks (Zone 0).

In practice, that means the FIMROD sensor can safely operate immersed in fuel, continuously monitoring levels without igniting fumes, thanks to its explosion-proof design.

The FIM7L tank console is the indoor control unit that receives the probe's readings and manages the alarm logic. The console constantly polls the FIMROD probe's data so it knows exactly how much fuel is in the tank at any moment. The user (or installer) configures a High-Level Alarm set-point on the console – typically this is set at a



conservative threshold (often around 90% of tank capacity) to serve as an “early warning” before the tank actually reaches overflow.

How they work together: As fuel is delivered into the tank, the FIMROD probe’s float rises accordingly. When the fuel level approaches the preset alarm point (e.g. 90% full), the console immediately recognizes this from the probe data. Before the tank can overflow, the FIM7L console triggers an early high-level alarm, activating warning devices to alert the staff.

In essence, the probe is the *eyes* within the tank and the console is the *brain* that decides when to sound the alarm. This pairing delivers a proactive alert to prevent overflowing, rather than reacting after a spill. Importantly, because the FIMROD probe provides real-time continuous level information, the FIM7L console can issue the alarm the instant the threshold is reached, ensuring no delay in notification.

## Technical Workflow of the Overfill Alarm

The overfill alarm function follows a straightforward workflow from detection to alert:

1. **Alarm Level Configuration:** A high-level alarm threshold is set in the FIM7L console software for each tank. This could be defined as a percentage of tank volume (commonly 90% as per industry guidelines) or a specific height/volume. This level is typically chosen to provide a margin of safety (often corresponding to about one minute before overflow at normal fill rates in underground tanks).
2. **Continuous Monitoring:** During fuel operations, the FIMROD probe continuously measures the fuel height. It sends a digital signal to the console with the current level data in real time. The probe’s magnetostrictive technology enables precise and repeatable readings of the liquid level at all times.
3. **Threshold Detection:** As fuel is being loaded, the console compares the rising level against the preset alarm threshold. When the fuel reaches the threshold, the system detects this “high-level” condition instantly. For example, if the alarm is set at 90% capacity, once the probe’s reading hits that point, the console registers that the tank has hit the high-level mark.
4. **Alarm Activation:** The moment the threshold is crossed, the FIM7L console automatically triggers the alarm output. In practical terms, the console closes or energizes a relay that is linked to the alarm devices. This causes the audible alarm (horn/siren) to sound and the visual alarm (flashing beacon/light) to activate. The alarm is designed to be loud and clear – for instance, similar systems use horns around 90–100 dB and bright red strobe lights, making the warning unmistakable. Operators at the fill point are immediately alerted that the tank has reached the high level, prompting them to stop the fuel delivery.

*Illustration of the overfill alarm process: (1) The FIMROD tank probe detects the rising fuel and hits the preset threshold; (2) The FIM7L console (controller) receives the signal and decides “High level reached!”; (3) The console triggers the alarm siren and beacon to warn the operator.*

1. **Alarm Indication and Response:** Once activated, the alarm will continue to sound and flash, indicating an urgent high-level condition. Station staff should respond by halting the fuel transfer before the tank actually overfills. The system essentially buys time for a safe shutdown – it’s alerting at (for example) 90% full, *not* at 100%, thereby providing a critical buffer.
2. **Acknowledgement/Reset:** The FIMTEK console or alarm module will typically allow the alarm to be acknowledged or muted once personnel are responding. For instance, many alarm systems include a mute or reset button: pressing it will silence the horn while allowing the light to continue flashing[14]. (This ensures the warning remains visible as long as the high level condition persists, but the noise can be stopped after it’s been heard.) The alarm light will usually stay on until the fuel level drops below the threshold or until the system is reset in the console. The FIM7L console likely logs the alarm event and may require the operator to acknowledge it in the interface as well, ensuring that alarms are not missed without action.
3. **Post-Alarm Status:** After the delivery is stopped and fuel level stabilizes (or is brought down below the alarm level), the alarm can be fully cleared. The console may automatically return to normal monitoring once the level is safe, or an operator might have to confirm the condition is resolved. In either case, the system remains ready to trigger again on the next high-level event.

Throughout this workflow, the speed and accuracy of the magnetostrictive probe and the console are crucial. Unlike older mechanical overfill prevention (e.g., float valves that physically block flow), this electronic system provides an immediate and reliable alert without interfering with the filling process. The result is an early warning system that is precise (no false triggers from slight level fluctuations) and timely (activating exactly when it should).

## Integration into the Existing System

One of the advantages of the FIMTEK setup is that the overfill alarm function can be integrated into existing station automation with minimal hassle. The FIM7L console is designed as a modular management system, meaning it can work with expansion peripherals and alarm outputs to fit the needs of the site. To add an overfill alarm capability to an existing FIMTEK installation, an overfill alarm module (alarm box) is typically introduced and wired to the console:

- **Alarm Module Hardware:** The overfill alarm module usually consists of a weatherproof alarm station containing a loud horn and a flashing light (and optionally an acknowledge/reset button). This module is placed in a strategic location, often near the fill point of the tanks, so that delivery personnel cannot miss it. It is built to industrial standards (outdoor-rated, and often explosion-proof due to the fuel vapors). For example, many alarm boxes are ATEX-certified enclosures with a red beacon lamp on top and a siren that can output ~90 dB at 1 m.

- **Console Connections:** The FIM7L console will have configurable outputs (such as dry contact relays or digital outputs) designated for alarms. Integrating the overfill alarm involves connecting the alarm module to one of these outputs. When configured, the console will activate the relay at the programmed high-level threshold, thereby supplying power to the external alarm's circuits. The wiring typically runs from the console (in the office/control room) to the alarm box at the tank area. In FIMTEK's design, this could be a simple two-wire control for a relay or a more advanced communication depending on the module, but in principle it's very straightforward: the console tells the alarm when to activate.
- **Intrinsically Safe Interface:** Because the probe and possibly the alarm device operate in or near hazardous zones, integration may involve safety barriers or intrinsically safe interfaces. The FIMROD probe is intrinsically safe by design and is wired through an approved barrier or directly to an intrinsically safe input on the FIM7L console. Similarly, if the alarm module is placed in a Zone 1 area (near tank fills), the wiring from the console will go through explosion-proof glands or barriers as required. In many cases, the console's relay output will drive a separate alarm power circuit that is suitably isolated for safety (for instance, using an isolation relay or an intrinsic safety relay if needed). However, since the alarm box itself is often an explosion-proof assembly with its own certification, the integration is engineered so that all components meet the required safety codes.
- **Configuration and Testing:** After hardware installation, the FIM7L console is configured via its software menus to enable the overfill alarm function on the desired tank channels. This includes setting the alarm threshold (if not already set) and specifying which output relay or port is linked to the external alarm. The system is then tested: the tank levels may be simulated or the probe manually raised to trigger the alarm, verifying that the horn and light activate as expected. (Periodic testing of the alarm is recommended to ensure it remains functional.) Because the system uses the real tank readings, operators can also program different alarm levels for different tanks if needed (for instance, if tanks have different sizes or safe fill heights). The FIM7L console supports these custom alarm set-points for each tank, making it flexible for multi-tank installations.



In summary, adding the overfill alarm to a FIMTEK system is typically a matter of mounting the alarm device and connecting a few wires to the FIM7L console. The console's built-in logic and

configuration handle the rest. This integration approach means that existing FIMTEK fuel automation systems can be upgraded with overfill protection without a complete overhaul – a cost-effective path to enhanced safety. The use of standard interfaces (like relay contacts) ensures the FIMTEK console can even drive third-party alarm enclosures if needed, though FIMTEK’s own module will ensure full compatibility.

## Safety, ATEX Compliance, and Alarm Response Behavior

Because overfill alarm systems operate in fuel storage environments, safety and regulatory compliance are paramount. The FIMTEK overfill alarm function adheres to strict safety standards:

- **ATEX Compliance:** All components of the FIMTEK monitoring system are designed for explosive atmospheres. The FIMROD probe, being installed in a tank’s ullage (a Zone 0 hazardous area with continuous fuel vapor presence), is ATEX certified as intrinsically safe (EX ia) for use in Zone 0. In practical terms, it carries an explosion protection rating (e.g., Ex II 1G Ex ia IIA T4 Ga or similar) which certifies it will not ignite flammable vapors during normal operation or faults. The probe and its cabling meet IP68 and other ingress protections, ensuring safe submerged operation.

The alarm console (FIM7L) is typically housed in a non-hazardous or safe area (e.g., inside a building). If a console needs to be in a hazardous area, FIMTEK offers explosion-proof console options (like the Eksproof Console variant) to ensure safety. Additionally, the external alarm station, if mounted near the fill point, will be ATEX-rated or intrinsically safe as well, or installed in a zone that is deemed safe enough. Many commercial overfill alarm units in the industry are ATEX certified for Zone 1 use, meaning they can safely operate in the presence of fuel vapors. Overall, the FIMTEK overfill alarm solution is built to comply with international standards for equipment in explosive atmospheres, giving operators confidence that the system won’t become an ignition source.

- **Connection and Power Safety:** The integration uses appropriate safety barriers or isolators, and the alarm circuits are typically low-power or fail-safe. For instance, the FIM7L’s relay output will not directly carry raw high voltage into hazardous zones without proper isolation. FIMTEK likely provides guidelines or modules (such as an associated



apparatus or safety barrier mentioned in similar probe systems) to wire the probe and alarm correctly. This ensures the wiring and interface meet ATEX and IECEx requirements for intrinsic safety.

- Alarm Response and Behavior: When the overfill alarm is triggered, it produces a distinct audible and visual signal that is hard to miss. Typically, the alarm siren is very loud (in the range of 90–100 dB at 1 meter) and the beacon is a flashing red light, grabbing attention. The alarm is usually designed to be heard and seen from the tanker driver’s location, even if they are outdoors near a running truck. This immediate alert allows the delivery operator to react by stopping the fuel flow. In many jurisdictions, such an alarm is required to be *near the fill* and unobstructed, precisely to ensure the person delivering can hear/see it clearly. The FIMTEK alarm module would be installed accordingly.

Once an alarm is sounding, station operators can acknowledge it. Pressing a mute/reset button (either on the alarm box or via the console interface) will usually silence the horn to avoid prolonged noise, but the indicator light remains flashing as long as the high level condition persists[14]. This way, the situation is only fully “cleared” when the tank level is brought down or the alarm is otherwise reset. The console might also display an on-screen message or alarm code for the tank in question, and it may log the event in its memory for compliance records.

The system is robust against false alarms – it continuously measures level, so a momentary slosh of fuel would not typically trigger the alarm unless it sustains at the threshold. And if multiple tanks are being filled, the system can differentiate which tank hit the alarm (each tank can have its own alarm relay or at least an identifier on the console). In scenarios with multiple tanks, the alarm unit can even alert for more than one tank (for example, by resetting and re-triggering if a second tank reaches limit) since the console monitors all probes simultaneously.

- Emergency Protocol: The presence of an overfill alarm does not directly shut off the flow (unlike some mechanical overfill prevention valves). Instead, it relies on human action. Therefore, part of the safety procedure at fuel stations is training staff and drivers to respond immediately to the alarm: stop pumping, close valves, and verify the tank status. The FIMTEK system’s console could aid this by showing the exact volume and percentage at alarm, so the operator knows how close to full the tank is. Some advanced implementations might interface the alarm with pump control systems (for example, sending a signal to automatically halt a delivery pump when alarm triggers), but typically for truck deliveries, the truck operator will manually stop when warned. By adhering to these protocols, the overfill alarm function becomes a reliable last barrier against spills.

In summary, the FIMTEK overfill alarm is engineered with explosion safety in mind and a clear alarm behavior: it loudly warns of high tank levels while being failsafe and compliant. All components are suitable for flammable fuel environments, and the alarm’s design (both hardware and how it’s used) aligns with safety regulations and best practices for fuel storage facilities.

## Benefits to Station Operators

Implementing the overfill alarm function in the FIMTEK system brings significant benefits to fuel station operators and site owners:

- **Spill Prevention & Safety:** The primary benefit is preventing fuel spills before they happen. Overfilling a tank can lead to hazardous fuel geysers or spills around the fill point, posing fire risks and slip hazards. The overfill alarm provides a critical warning in advance, so operators can avoid these incidents. This keeps the station environment safe for workers and customers, reducing the chance of fire or explosion from overflowed fuel. By acting as a first line of defense against overfill, the alarm protects lives and property from the dangers of uncontrolled fuel releases.
- **Environmental Protection:** Even a small fuel overflow can contaminate soil and groundwater, leading to environmental damage and costly cleanups. By helping operators avert spills, the overfill alarm function aids in preventing pollution. This is not only good for the environment but also ensures the station remains in compliance with environmental regulations (avoiding hefty fines or remediation costs associated with fuel leaks).
- **Regulatory Compliance:** Many regions require an overfill prevention device for underground storage tanks (USTs) – this can be an automatic shutoff or a high-level alarm that triggers at ~90% capacity. The FIMTEK overfill alarm can help stations meet these regulatory requirements for overfill protection. Having a documented alarm system (with test logs from the FIM7L console) demonstrates compliance with safety standards and gives inspectors confidence that the site is well protected against overfills. In essence, it helps fulfill legal obligations (such as EPA rules in the US or similar regulations elsewhere) by providing the required early warning mechanism.
- **Operational Efficiency & Peace of Mind:** With the automated alarm in place, station operators and fuel delivery drivers can carry out fuel drops with confidence. They don't need to rely on manual gauging or guesswork to know when to stop filling – the system will tell them. This reduces stress during deliveries and minimizes human error in monitoring tank levels[1]. It also means drivers can potentially offload fuel more quickly up to a safe fill limit, optimizing delivery volumes without the fear of accidentally going too far. The clear alarm allows the person delivering fuel to focus on the procedure, knowing they will be alerted at the right time.
- **Inventory Management Integration:** Because the overfill alarm is part of the FIMTEK FIM7L console, it likely integrates with the broader tank inventory management features. Station operators benefit from having one console that not only tracks fuel stock levels but also handles safety alarms. This centralized system can produce reports or instant status of all tanks at a glance. In case of an alarm, operators can immediately see which tank is high and by how much, enabling quick decision-making (for example, switching deliveries to a different tank if one hits the limit). The magnetostrictive probe's

accuracy also ensures that the alarm set-point is reliable, avoiding false alarms and enabling maximum usable tank capacity without crossing safety margins.

- **Cost Avoidance:** Preventing a single overfill incident can save thousands of dollars. A spill would incur product loss, downtime for cleanup, environmental remediation expenses, and possibly legal liabilities. The overfill alarm's cost is minor compared to these potential losses. By averting accidents, the system pays for itself over time. Insurers may also look favorably on facilities with robust overfill protection, potentially lowering insurance premiums due to reduced risk.
- **Easy Retrofit and Scalability:** For existing stations using FIMTEK systems, adding the overfill alarm is straightforward (as described above). This means operators can upgrade safety without significant upgrades or interruptions to operations. The alarm can also cover multiple tanks (programming each tank's threshold separately), so one FIMTEK system installation can safeguard an entire site's storage capacity with one integrated solution. This scalability is beneficial for large facilities with many tanks – operators get a cohesive alarm system rather than a patchwork of standalone alarms.

In conclusion, the FIMTEK Overfill Alarm Function provides clear, early warning of high fuel levels, enhancing safety and ensuring smooth, compliant operations at fuel storage facilities. It represents a synergy of precision sensing (via the FIMROD probe) and smart control (via the FIM7L console) to protect against one of the most serious risks at fueling sites. By deploying this function, station operators gain peace of mind knowing that an ever-vigilant guard is in place: as fuel is being received, the system is constantly watching the levels and will proactively alert them before an overflow turns into an emergency. The result is a safer work environment, protection of assets and the environment, and a demonstration of the operator's commitment to best practices in fuel management.

## OVERFILL ALARM SYSTEM – TECHNICAL SPECIFICATIONS

### AUDIBLE ALARM

- **Sound Level:** 78 – 103 dB @ 3 meters
- **Activation Duration:** Adjustable, 0 – 60 seconds
- **Purpose:** Provides immediate audible warning prior to tank overfill condition

### VISUAL ALARM

- **Lamp Power:** 25 W, 120 VAC lens assembly
- **Flashing Frequency:** 75 flashes per minute
- **Lens Dimensions:** Ø102 mm × 89 mm (D)
- **Indication:** High-intensity visual signal for operator alert

### MAIN ALARM ENCLOSURE

- **Enclosure Dimensions:** 262 mm (L) × 203 mm (W) × 102 mm (D)
- **Construction:** Heavy-duty industrial housing, suitable for outdoor installation
- **Operating Temperature:** –40 °C to +65 °C
- **Power Supply:** 120 VAC, 50 / 60 Hz

### OVERFILL ALARM ACKNOWLEDGEMENT / RESET UNIT

- **Function:** Allows operator to acknowledge and reset audible/visual alarm
- **Dimensions:** 173 mm (L) × 109 mm (W) × 76 mm (D)
- **Operating Temperature:** –40 °C to +65 °C
- **Power Supply:** 120 VAC, 50 / 60 Hz
- **Acknowledgement Lamp:** Amber lens, 120 VAC rated



## ENVIRONMENTAL CONDITIONS

- **Operating Range:** –40 °C to +65 °C / –40 °F to +150 °F
- **Humidity:** Suitable for high-humidity and outdoor environments

## GENERAL FEATURES

- Rugged, weather-resistant design for fuel storage applications
- Compatible with FIMTEK FIM7L Tank Console and FIMROD Level Probes ( or Any Probe Brand )
- Easy installation and maintenance
- Meets industry standards for safety and reliability