



## **Subject: MODEL 1872 for Overfill Applications**

### **INTRODUCTION**

The INCON Model 1872 is a high accuracy liquid level monitor, which can be used in a wide variety of continuous level measurement applications. Less obvious is the fact that it can also be used in state-of-the-art overfill prevention (high-level alarm and shutdown) applications, providing both flexibility and safety of the highest level. The 1872 may be used in applications requiring a combined level gauge and overfill prevention system or in those requiring stand-alone overfill prevention equipment. In the first case, a level probe will extend from the top of the tank to its bottom. The 1872's internal alarm set points are programmed to activate at appropriate levels. Alarms and/or shutdown equipment are connected to its relay outputs. It will simultaneously display level information and act as an overfill prevention system. In the second case, a short probe is used. It extends into the tank only a few feet, to whatever depth represents the lowest overfill level that will be required. In this mode, as in the full continuous level mode, the system offers the flexibility of remotely programmable level alarm points, saving the user the cost of manually adjusting point-level sensors on a tank.

Of course, with a level sensor that does not extend to the bottom of a tank, the 1872 cannot display tank level until the liquid has risen above the bottom of the sensor. However, one can take advantage of the unit's continuous gauging mode to report the level or remaining tank capacity as the liquid nears the alarm point. This very useful feature offers an early warning that the liquid is nearing the overfill level during liquid transfer operations.

### **OVERFILL PREVENTION**

The fact that the 1872 makes a flexible and versatile high-level alarm or shutdown system is undeniable. But what about safety? How does an INCON Model 1872 compare with other systems in this all-important area? A brief discussion of overfill prevention systems, their purpose and safety requirements is necessary before answering these questions.

Overfill prevention systems (including both high-level alarm and high-level shutdown systems) are a special class of equipment. They normally play no role in day-to-day tank operation but must be ever-ready to spring into act They normally play no role in day-to-day tank operation but must be ever- ready to spring into action when an overfill condition is detected. This unusual purpose puts special demands



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on this equipment, for if it fails to do its job, a spill will almost certainly occur. The catastrophic results of such an accident (fire, explosion, pollution, etc.) can be costly financially, as well as in loss of life and environmental impact. To eliminate the possibility that a system fails to detect an overflow; some manufacturers design their equipment using special techniques and circuits. These systems are generally called self-checking, self-testing or self-supervising. In all cases, the goal is the same - - to make certain that if the equipment has failed and is unable to detect an overflow, it reports that problem immediately.

Most self-checking systems rely on some dynamic or pulsating action to verify that the sensors and wiring are functioning. The presence of this pulsation is interpreted by the monitoring electronics as the normal safe condition. If the monitor does not see this dynamic signal from the sensors, it assumes that the system has failed or that an overflow has occurred and announces this through an alarm or display.

The fundamental problem with these simple self-checking schemes is that is that they cannot distinguish between a system failure and an overflow. As a result, they tend to have a high false alarm rate. While this tendency to false alarms might at first appear not to be a problem, it does have important safety consequences. In fact, in many systems, false alarms are so common that all alarms tend to be ignored by the operating personnel or the equipment is turned off entirely. This result is the worst of all possible situations. By installing "safety equipment" with this false alarm problem, a situation is created where all alarm incidents are ignored and safety is actually reduced.

What is needed to provide effective overflow protection is a system that is self-checking (or equivalently self-supervisory, or self-testing) but can distinguish between a system fault and an actual overflow alarm. This type of equipment will assure that the operating personnel are made immediately aware of any problems in the system's operation, without encouraging them to ignore the high-level alarms or, worse yet, turn off the alarm or shutdown equipment.

The INCON Model 1872 provides exactly this type of operation. The magnetostrictive liquid level sensor sends pulses to the 1872 monitor many times per second. Should these pulses ever disappear, the system immediately concludes that there is some fault in the system. That problem might be a failed sensor, a broken wire, a damaged or missing sensor float, etc. When the 1872 detects such an error, it immediately shows an error message on its display indicating that the unit is not operating. This error message is displayed only for system faults and cannot be confused with a legitimate overflow alarm. Thus, the 1872 provides the high level of safety associated with self-checking systems along with the very important ability to distinguish between system faults and high-level alarms.

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### SUMMARY

The INCON Model 1872 can be used as a very effective overflow prevention system. It offers the advantage of programmable alarm points and continuous level display, if desired, as well as self-checking operation. In addition, it eliminates the major weakness in most self-checking high-level alarms by differentiating between system failures and level alarms. As a result, operating personnel know that any alarm is a real emergency and not a false alarm caused by a system failure.

The result is clear: The INCON Model 1872 offers a combination of performance; flexibility and safety that is unique among overflow prevention systems