

AN4009

Alarm IC Sample Applications

Prepared by: Rudi Lenzen
Application Engineer, Toulouse France

INTRODUCTION

The MC14600 is an integrated circuit (IC) designed for low-cost applications requiring an alarm to be triggered and heard. This device affords the designer a low-cost, easy-to-integrate solution, where board space and design time are at a premium. The Alarm IC can be used in multiple applications, such as personal, home and auto safety/security devices; door, gate and pool alarms; and even toys, where lasers and motion are employed, for example. However, this paper's purpose is to introduce you to just a few applications for which the MC14600 is a perfect fit.

GAS SENSOR APPLICATION

The MC14600, used with a flammable gas sensor and a few added components, provides a reliable solution for gas detection.

When gas leakage is detected, the sensing resistor decreases typically by a factor 3 or 4 as the gas concentration reaches 10 percent of the lower explosive limit. During the calibration sequence (test under gas), a variable resistor is used to set the trigger level of the Alarm IC comparator which, in response, drives a piezo horn.

By adding a thermistor—with negative temperature coefficient (NTC) in this case—in the detection circuit, the variation of the sensor resistance with temperature is easily compensated, avoiding false alarms when the room temperature increases.

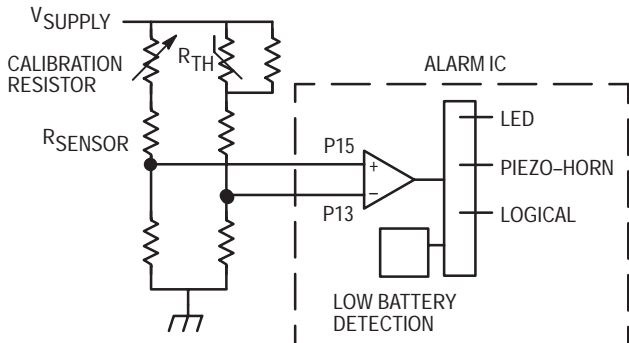


Figure 1. Gas Detection Example

The logical output is useful to signal a remote control station that a gas leakage has been detected.

When using a low power sensor, the circuit is fully compliant with a portable solution enhanced by the integrated low battery comparator indicating the state of the power supply.

TEMPERATURE LEVEL DETECTOR

When connected to a simple network of thermistor and resistors, the Alarm IC provides a portable solution for temperature control and supervision. The example hereafter uses an NTC thermistor.

An audible alarm will sound when the threshold value at the comparator input is reached. A logic output is usable for starting either a fan or a heater depending upon the required temperature.

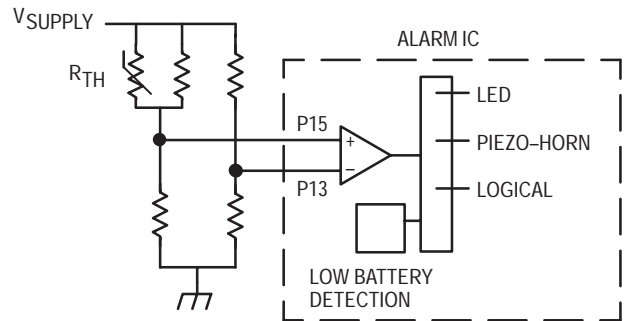


Figure 2. Temperature Level Example

WATER LEVEL DETECTOR

A single probe connected directly on the detection pin of the Alarm IC provides a portable solution for water level detection. When liquid enters in contact with the probe, the resistor between the detection pin and the supply drops from an open circuit to a measurable value. With an appropriate choice of bridge resistors, the presence of liquid will trigger the comparator. The logic level can be connected to any monitoring system allowing pump starting, floodgate closing and others. This simple system is useful for numerous applications, such as swimming pool water level alarms, defrosting water level detectors, and in-house flood alarms.

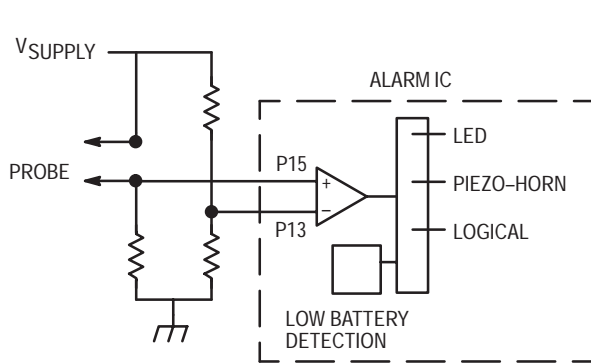


Figure 3. Water-Level Detection Example

MOTION INDICATOR

The Alarm IC can be used to detect motion and can be integrated into products, such as an ordinary clothes iron, where this is critical. Used with a low G accelerometer and a few logic components, the device can signal the user that there is a risk of clothes burning during use and that the iron must be shut off from the AC power after use. At the output of the accelerometer, a simple peak detection circuit is required to keep the signal active long enough.

When no movement is detected, the output comparator is low and the counter starts. A first "beep" is heard after a few seconds to advise that there is a risk of clothes burning. If no movement is detected, the counting continues and drives a flip-flop connected to pin 15 of the Alarm IC. The alarm is triggered and will continue on until a new movement is detected, resetting the counter.

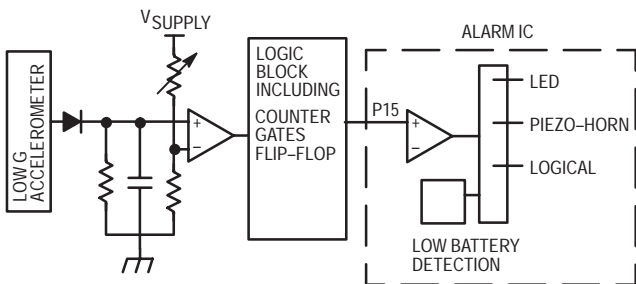


Figure 4. Motion Indicator Example

FILTER MONITOR

An ideal solution for air cleanliness control is provided when the Alarm IC is directly connected to an MPX5000 series pressure sensor. This sensor family is compensated in temperature and has its output signal directly exploitable (internally amplified). Therefore, the sensor can be connected to the detection pin of the circuit without any additional component. When a certain level of dust affects the efficiency of the filter, a differential pressure is measured and the Alarm IC comparator is triggered.

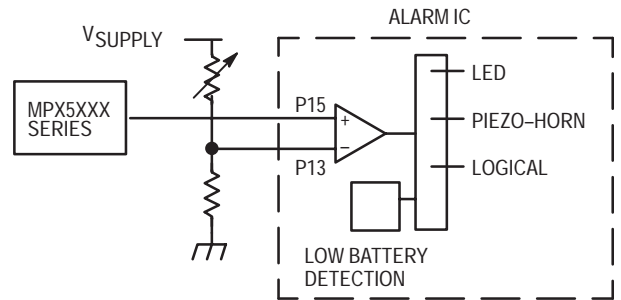


Figure 5. Pressure Change (Filter) Example

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