Industry Developments:

Leak Detectors for Liquid Loop Systems

Liquid leaks can occur in many places. For autos, they can be motor oil or engine coolant dripping onto a driveway, sometimes leading to expensive repairs. For drinking water, problems with complex, often crumbling piping systems causes a waste of this essential resource. A report from the American Society of Civil Engineers stated that every day, seven billion gallons of drinking water disappears, mainly due to leaky pipes and mains. [1]

When water leaks from water coolers, cold plates, dispenser and filtrations systems the consequences are just as unwelcome. According to a major insurance company, water leaks are among the leading causes of property damage in commercial properties. The most common sources of these leaks are water heater/cooling closets, laundry rooms, dishwashers, refrigerators with ice makers, sinks and toilets. [2]

Many insurers recommend the use of water leak detection systems, also called water damage loss mitigation devices. These devices detect and alert when a water leak occurs. Some systems are capable of stopping or diverting the leaking water. A range of these detection devices are available to help prevent losses from slow leaks as well as more forceful types of water damage. The simplest units cost as little as $50 and systems with broader features reach $1,400 per unit.

Leak detectors can be passive or active. A simple passive system will provide a leak alert, e.g. alarm, to the area impacted while an active system can send a warning to a central monitoring station and also stop water flow by activating a shutoff valve. [2]

One manufacturer offering a water alarm is Gizmode Innovations. Their 9-volt powered Water Screamer quickly detects water and emits an extra-loud siren (130 dB) that can be heard throughout a workplace or home. The company also offers Flood Stop, an active system that detects leaks and shuts off a water supply automatically.

Figure 1. The Passive Water Screamer (Left) Emits a Loud Alarm When it Detects Water. The Active Flood Stop System (Right) Detects Leaks and Shuts Off the Water Supply [2]

Another active leak detection system is the Water Cop, by DynaQuip. [3] Designed for domestic use, the Water Cop automatic shutoff valve is installed on a home's main water line near the existing manual shut-off valve. WaterCop flood sensors install near appliances that use water and in rooms where running water is present. When water comes in contact with any of the sensors, a wireless signal is broadcast to the WaterCop main valve causing the valve to close. Water flow is quickly cut off to all areas of the home and any flooding is stopped. DynaQuip also offers the LeakStop, a single-point leak detection system. This wired version detects leaks at a single location (such as a water heater or washing machine) and automatically shuts off the water supply to just that device.

Figure 2. The DynaQuip Water Cop System Automatically Shuts Off the Main Water Supply to a Home at the First Sign of a Leak [3]

Figure 3. An Automatic Shutoff Valve for Detecting and Stopping Water Leaks in High Water Pressure Systems [4]

For industrial use, Advanced Thermal Solutions, Inc. offers a series of Automatic Shut-Off Valves, electronic devices for detecting water leaks in coolers, cold plate loops, dispensers and filtration systems. When these systems detect a leak they automatically shut off a valve in the piping to prevent water flow, and provide a beeping alarm. For water-based systems that include filtration, the valves provide an audible end-of-filter life alert. Valves on the base model are plastic, and for higher pressures, up to 8 Bar (116 psi), brass valve units are also available. [4]

For larger installations such as data centers, a continuous-run sensing system makes use of cable-based intelligent sensors. These cables enable the detection of multiple leaks over wide areas, and can quickly pinpoint the exact location of each leak. With the intelligent cable sensor, businesses can easily detect single or multiple water leaks in a specific area or areas in conjunction with a zone control panel. Installations with large cooling systems are typically divided into multiple zones and feature multi-zone control panel. For these, the sensing cable is placed on the floor or the sub-floor around the potential leak sources, with each cable monitoring one zone. This allows each zone's sensitivity to be adjusted. If water or other liquids contact the cable anywhere along its length, the control panel announces the water and in which zone the leak is located.

Figure 4. Sensing Cables Can Detect Multiple Leaks Over Wide Areas and Pinpoint the Location of Each Leak [5]

For even larger areas, the exact location of water leaks can be pinpointed using one continuous length of the sensing cable in conjunction with a "distance read" control panel. In one example, a single cable sensor of several thousand feet is installed throughout a floor or sub-floor around possible water sources. When a leak occurs, the control head announces this information and provides a distance measurement within a few feet. This data is cross-referenced with the cable route map that indicates the corresponding location of the leak. The "distance read" system is ideal for locations where it is not possible to view the cable, or any water that may come in contact with it, such as large raised-floor areas. [5]

Figure 5. A Remote Water Leak Detector from La Crosse Technology Can Be Monitored by Mobile Devices, and Sends Email and Text Alerts [6]

Leak detectors can also be accessed by smartphones, tablets and desktop PCs for remote monitoring of water leaks, as well as a water-using device's temperature and humidity. One system is available from La Crosse Technology. Their water leak detector transmits data to a gateway connected to a local router, which uploads the data to a La Crosse website for 24/7 monitoring by smartphone or other devices.

Alerts from the La Crosse leak detectors are automatically sent as email or text messages. For domestic use, these remote water detector systems provide an early warning when the location is unattended. The systems are particularly useful in unoccupied centers where property damage can be caused by faulty pipes or hoses, water processing systems, or by water pipes that have frozen and burst. [6]

In summary, leak detection is an intricate part of any liquid cooled system since any leakage of the coolant may cause significant damage. Thus, leak detection is more acute in mission critical centers that serve millions of users, where its absence may bring major disruption to the area and facilities it provides service to.

References:

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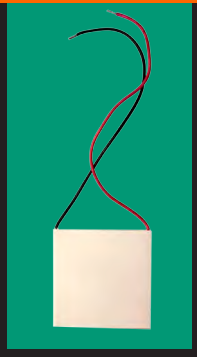
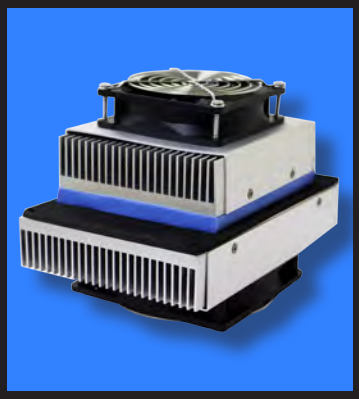


CHILLERS

THERMOELECTRIC ASSEMBLIES

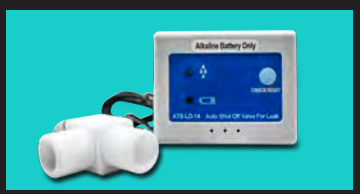


HAND HELD ANEMOMETER

HEAT PIPES

LEAK DETECTORS

FLOW METERS



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