



The Importance and Benefits of Planned Facility Sensing Equipment Maintenance and Calibration

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ONTARIO RECREATION FACILITIES ASSOCIATION INC.

1 Concorde Gate, Suite 102, Toronto, Ontario M3C 3N6, Canada

Tel: 416-426-7062 Fax: 416.426.7385

1.800.661.6732 (Toll Free In Ontario)

info@orfa.com www.orfa.com

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Introduction

Sensor – is a device that detects or measures a physical property and records, indicates, or otherwise responds to it.



“Install, set and forget it” – with “forget it” being the most common approach to many of the electronic sensors or transmitting devices found in today’s recreation facilities. Sensors are devices that are frequently used to detect and respond to electrical or optical signals. A sensor converts the physical parameter (for example: temperature, pressure, humidity, speed, etc.) into a signal which can be measured electrically. Condition monitoring using sensors identifies trends that may indicate a change in the way equipment is performing. Such changes often serve as early warnings of impending issues. Recognizing them can be the key to triggering action that prevents failure-and its consequences. When a sensor doesn't work, equipment doesn't know when to cycle on or off. They are not maintenance free devices and do fail.

There will always be a required balance between technology and operator intelligence. As many facility managers are constantly investigating the most recent and effective energy reduction tools, what needs improving is sensor care and maintenance to ensure the return on investment remains in tact. This goal makes testing, cleaning, and calibration essential to making sure any sensor maintains its accuracy.

There are several key issues attached to this problem. First, most facilities lack an actual list of installed sensors. Second, few know the life-cycle of these devices – no, they do not last forever. Third, most are never cleaned and serviced after installation. Consider that these devices are exposed to periods of extreme temperatures and frequent

thermal cycling. Combined this with dirt and dust results with many of these devices being inaccurate.

Consider the obligations under the Fire Code to annually test emergency equipment that includes facility heat sensors that activates the buildings alarms. Usually, the technician uses a simple heat source such as a hair dryer attached to a pole that has the heat applied to the sensor to confirm activation capability. Now consider, if this was not regulated to an outside source how often facility staff might conduct such a test. Now apply this formula to all other sensors currently in the facility.

Sensors that require a power supply are called active sensors with devices that do not require power supply being called passive sensors. Today's newest equipment often comes with on-board sensors that can be coupled with wireless technology. This allows plant operators immediate notification of equipment operational issues. Another benefit of sensor-based condition monitoring systems is a software application that houses and provides access to ongoing operational data.



Advancing technology allows equipment to see what's happening in real time. Sensors can pick-up on changing weather data, internal temperatures or information about the utilization of energy and make automatic adjustments. This enables the optimization of various factors that can affect operations or patron comfort levels based on variables, such as ambient air temperature that can impact energy-saving discounts offered by utility suppliers when energy utilization during peak times can be minimized and validated. Where once the operator had to determine adjustment requirements and act accordingly they are now being more focused on maintaining the technology. By no means will this reduce the need for operational staff as such change will reduce the need for staff to

perform manual reads of equipment conditions, which can net a significant improvement in labour efficiency. The second gains, and likely even more significant, come with the prevention of equipment downtime.

Common sensors found in a recreation facility include:

- Motion detectors
- CO₂ sensor
- NO₂ sensor
- Ammonia sensor
- Chlorine gas sensor
- Hot water control sensor
- Lack of heat sensor
- Laser leveling equipment
- Thermostats
- Refrigerants
- Heat
- Air conditioning

Infrared temperature readings are influenced greatly by the type material and surface finish of the objects they are pointed at, because infrared temperature readings depend on surface emissivity. These must be cleaned no less than annually with some manufacturers recommending every 6 months.

Handheld infrared devices are most often checked on the ice. The operator can pour a small amount of water on the sheet and check the outer edge of the surface water against the frozen surface – it should read 0°C (32°F). Mounted refrigeration plant sensors are often found high above the surface.

Many aquatic facilities choose to use automatic controllers to maintain compliance with Regulation 565 requirements for free available chlorine concentration and pH of the water. This equipment functions through a sensing device – usually a probe that measures electrical conductivity variances of the water passing over them. These (very expensive) probes need to be maintained and the instruments need to be re-calibrated as per the manufacturers recommendations. Equipment being used on an outdoor pool require special off-season storage and handling procedures.

Gas detectors should be included in the plant maintenance schedule. The performance of most

detectors deteriorates with time, the rate depending on the type of sensor and the operating conditions.



The introduction of laser technology includes transmitting devices. This equipment manufacturer requires regular dusting and cleaning to maintain accuracy.

How often any sensor must be cleaned or adjusted varies. The first indicator is always the devices owner’s manual. While dusty, corrosive or damp environments can cause accelerated decline in response. Other considerations may include electrical fluctuation. Spikes in electricity may cause premature failure. Insects and bugs seem attracted to sensors and will often nest on the device. These factors will affect the frequency of inspection, maintenance and calibration.

Facility management must determine what can be performed internally and what should be outsourced. Properly cleaning any sensor or transmitter must be carefully considered. Electronics and water do not mix. Any cleaning should be made only with a damp nonabrasive cloth with no or limited chemical application. While testing and calibration should only be performed by a trained technician.

Pending the type of device, the technician may recommend that it be sent to a calibration laboratory. However, replacement is most likely more cost effective. Facility management must consider the benefits of planned life-cycle replacement of these devices. Predictive maintenance would include replacing one or two sensors each year. This has several benefits such as creating a manageable cost center that helps guarantee equipment functionality.



Facility management must also consider pressure gauges in this same plan. Pumps and other similar equipment that have temperature or pressure gauges will also need replacing. How often these devices should be checked or calibrated will be based on the criticality of what is being monitored. Vibration, pulsation, pressure spikes and temperatures will all impact life cycle. While incorrect installation methods can result in gauge damage. Gauges should always be installed using a wrench as hand tightening using the gauge housing could result in damage.

Monitoring and logging sensor data has many proven benefits:

- Early detection and prevention of failures
- Determining life of asset
- Scheduling predictive maintenance
- Maintaining an inventory of spare parts
- Determine right warranty period for the assets at the design time
- Prevent risk of collateral damage and secondary failure
- Prevent downtime
- Maximizing equipment life

Facility management is the ability to ensure regular maintenance is being performed to ensure 100% efficiency. Attention to such fine details is the sign of management proficiency.