

Are You Having Problems with your Photo-Sensors?

Consider several features when choosing a sensor for your wash
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Just as car washes vary from self serve to rollover to tunnel wash, there are many types of sensors being used to start, stop, measure length, and control the wash and entry/exit doors. However, all sensors are not created equal. There are early warning signs to look for that might indicate a maintenance check-up is in order. Are the automatic doors operating properly? Are the nozzles turning on and off as needed? Is soap being dispensed after vehicles exit the wash instead of on time? Does snow and ice cause false signals from the photo-eyes?

If your wash equipment and door systems are not functioning correctly, the photo-eyes that signal the wash line's computer system may not be operating properly. We will examine the most common problems that photo-eyes face in the demanding wash environment and the features that you should consider when selecting sensors for your wash. Afterwards, we will review various types of applications in each type of wash and give some "first-aid" tips for your photo-eye sensors.

How many of you have ever experienced fog in your bays so thick that you couldn't see someone standing 10 feet away? This is a very common problem in locations where cooler temperatures during the winter months combined with hot water put extreme demands on your sensors. Most photo-eyes would fail under these circumstances. To compound this problem, add soap, grease and dirty water and you have the makings for a true disaster.

You know the picture. After a week of snow and ice, the sun finally comes out and the temperature rises to create a nice slushy, mud bath for your car. As cars line up at the wash, the last thing the operator needs is for the equipment to stop working. One single day of non-operation means lost profit that you can never recover.

Keeping your car or truck wash equipment in top-notch condition includes checking and replacing defective photo-eyes. Sensors provide the critical signal to the wash computer. Therefore, it is absolutely necessary they operate properly. As the old saying goes, "junk in, junk out." A photo-eye could mean the marginal difference between profit and loss for your wash.

Common Problems

The number one reason for photo-eye failure is contamination. A car wash is ideally the best testing grounds for a photo-eye because of contamination. Practically, no other industry can compare to the wet, hostile environment of the car wash's dirt, steam, ice, snow, soap, film, grease and everyone's "favorite", fog. If a photo-eye can pass this test, you have a winner.

There are some sensor brands of this caliber on the market. They are able to withstand this type of abuse because they do not use a lens to magnify the light to the receiver eye. Lens-less eyes are usually designed as modulated infrared sensors (see figure 2).

The transmitter LED (light emitting diode) is turned on and off, acting as a pulse of light, invisible to the naked eye. The receiver is calibrated to the same frequency of modulation to accept the transmittal signal. Just as a lighthouse penetrates the fog to warn an approaching ship of danger, the lens-less photo-eye cuts through fog, steam, dirt and grime to ensure your car wash trouble-free service. Relate the photo-eye made with a lens to a pair of glasses. If you walk into the wash wearing glasses, they immediately become fogged up. You must take the glasses off and clean them. This is a perfect example of the wrong photo-eye to use in a car wash. By removing the photo-eye made with a lens you eliminate the step of continual lens cleaning.

Misalignment is another photo-eye problem common to car wash facilities. In some cases, it is possible to judge visually if the eyes are out of alignment at an angle or askew to one another.

When installing photo-eyes at a distance of eight to twelve feet, it should be possible to pull a string between the two to check positioning. If the viewing angle of the photo-eye is eight degrees or greater, alignment should not be difficult.

The next common reason why so many photo-eyes fail is vibration. Have you ever seen a car or truck wash facility devoid of vibration? With arches turning on and off, and other assorted wash components in constant motion, vibration is certain to occur.

If a photo-eye system is difficult to align when installed, given the amount of on-site vibration, it is highly probable that proper alignment will be difficult to maintain. With a wide opening- angle, or "beam-spread", installation is not only simple, but vibration won't knock the eyes out of alignment.

Mounting plays an important role in photo-eye alignment. In the wash environment, eyes should always be mounted in a through-beam manner. Properly mounted eyes promote reliability for the wash over the long haul.

A special word of warning: Do not use reflectors! In car and truck wash applications, the use of reflectors is a bad idea. Condensation that forms on reflector faces may cause significant problems and they are prone to damage and mischief.

Last, but certainly not least, water leakage can cause photo-eyes to perform intermittently at best, or fail altogether at worst. As water leaks into the housing of the photo-eye, the internal components become damaged and condensation begins to form on the inside of the lens, fogging up glass and plastic lenses alike. Check the rating on this eye to determine whether it was designed to withstand wash-down or submersion. A rating of IP67 means that a sensor will perform reliably in water. If the photo-eyes in your car or truck wash are not performing up to standards, replace them. Eliminating the problem sensor before it interferes with the performance of the equipment will save you money on those high volume days.

The Right Sensor

Selecting the right sensor for your application can be tricky, and turning the pages of photoelectric sensor catalogs may only add to the confusion.

The components for most infrared systems used in the car wash industry include a transmitter, receiver, amplifier and socket. Don't be tempted to purchase a photoelectric sensor system based on price alone. The cost of installing quality sensor eyes that are made specifically for the car or truck wash is more than justifiable.

As an operator, you're looking for equipment that will perform reliably, day in and day out, with the least amount of maintenance. Remember that your best profit days are when you are managing and the wash is working. Quality eyes will help put you back in the driver's seat of your wash so you can do the important things like servicing and delivering a quality wash.

Light immunity rating, sensing range, strain relief and body style are other features to consider when selecting your sensors; and often the application will help narrow down your choices. For example, if you plan to mount photo-eyes at the entrance to the car or truck wash, a compact body style will simplify installation and service. These sensors should be fully encapsulated, resisting water leakage. The entrance area also subjects the photo-eyes to prolonged exposure to bright sunlight. To avoid intermittent interference, opt for a sensor with a rating of 50,000 LUX or above.

Although operators only need to cover a distance of approximately 10-50 feet, the sensing range of the photo-eye is extremely crucial in carwash applications. Photo-eyes with ranges of 120 feet or more are strongly recommended to ensure that you will have enough power to penetrate the harsh environment caused by dirt, water, soap, fog, etc.

Common applications

Now, let's take a look at some of the most common types of car or truck wash applications.

Self Serve Washes

In self-serve washes, the most common usage is on service-bay automatic doors. Photo-eyes are installed on entrance and exit doors to prevent damage to a car or to the door if the operator closes the door prematurely. The sensors should be mounted on each side of the door in a through-beam configuration with the transmitter placed on one side and the receiver on the opposite side. The amplifier is placed in a watertight enclosure or in the main control panel. As the car comes into or out of the wash, it breaks the infrared beam and signals the door to reverse. Other applications in self-serve washes include automatic entry systems, exit signs, and "unlimited time" self-serve bays.

"Unlimited time" self-serve bays offer extra value to your customers by allowing them plenty of time to clean their vehicles. This may be achieved by installing two photoelectric systems in the bay. One system is used to detect that a vehicle is present in the bay. The second system is used to reset the timer when that customer leaves to prevent the next customer from enjoying a free wash.

Rollover washes

Rollover washes require the car or truck to be driven into the wash and then the machine moves around the vehicle. Photo-eyes are used to position the wash equipment, measure the length of the vehicle and turn the equipment on and off as needed. The entrance and exit doors generally use photo-eyes to signal the PLC or industrial computer that the vehicle has entered or exited the wash.

Tunnel wash

Tunnel wash applications are very similar to the rollover wash except that a conveyor is used to move the vehicle through the wash. Photo-eyes are used to start and stop equipment, turn on soap or hot wax dispensers and start and stop rinse arches.

For those who are using old limit switches with a wand that drags along the side of the vehicle, it's really time to update your equipment. Wands are prone to failure in freezing temperatures and are possibly damaging to the vehicle. If not adjusted correctly, wands won't start the wash sequence correctly. Photo-eyes are a no-touch alternative to wands.

Photo-eyes are also recommended in the tunnel wash for entrance and exit doors. Most high-speed automatic doors are equipped with a reversing edge or some type of sensor. The edges become worn and cracked when exposed to a combination of continuous cold weather and sunlight. If edges are kept in good repair they can provide a backup system but photo-eyes are the ideal solution for the doors because they offer a no-touch system.

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Another common application in the wash environment is the loop detector. Loops are generally found at the entrance and exits of the wash. They are usually mounted in the pavement by cutting into the concrete, inserting a loop of wire attached to the controller and then some type of filler or potting is layered on top to cover the wire.

If freezing rain, ice or snow seep down into the loop area through a crack in the potting, the loop can malfunction and cause invalid signals to the PLC or controller.

Also, with the large variation and size of cars and trucks, loops often malfunction due to the height of a vehicle. Faulty loop detectors can be easily replaced with photo-eyes mounted at an angle with the transmitter approximately 12-15 inches above the ground and the receiver 4-5 feet above the ground ensuring that any size or shape vehicle will be detected.

We have looked at some of the various applications found in the car or truck wash. You have been given the basics to help you determine the type of sensor you will need for your wash. Routine check-ups and maintenance will enable you to keep your wash running this winter. If your equipment budget doesn't allow for any changes at this time, check out the troubleshooting guide to see a list of things you can do to keep your current equipment running.

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TROUBLESHOOTING GUIDE

First-Aid for your sensors

If your equipment budget doesn't presently allow you to buy new sensors to take advantage of the features listed in this article, try the following. You may be able to inject some new life into the old sensor and help keep your current equipment up and running.

Installation: Check the mounting of the sensors. Are you using a reflective/eye combination in the wash that requires constant maintenance? You may be able to mount the sensors in a through-beam setup and totally eliminate the need to use reflective/eye combinations. This will reduce the maintenance time required to regularly clean the reflector and photo-eye lens, or to realign the photo-eye itself.

Wiring: Look to see if the wires of the photo-eye are pulled tight. Some manufacturers of equipment pull the wiring tight and secure it in place for cosmetic purposes. This can break down the seal on some photo-eyes and cause leakage into the sensor. There should be some slack in the wire coming out of the sensor. If it happens that the seal is broken, apply a potting material to the back of the sensor to prevent any more moisture from leaking into the sensor.

Maintenance: Have the sensors cleaned during regular maintenance to remove soap, film, grease and dirt from the front of the sensors. Also, check for proper alignment at this time. Vibration can cause some sensors to be knocked out of alignment very easily.

Sunlight: If you notice that the sensors are malfunctioning when exposed to bright sunlight check with the manufacturer of the sensor to see if a polarized filter or shield is available.