

Background Suppression

While through beam and reflex sensors detect objects that block the light path, the various types of photoelectric proximity sensors detect objects by the light they reflect back to the sensor.

Energetic proximity sensors offer a long sensing range, but that range is dependent on the color of the object being detected. In the case where the object to be detected is close to that of some "background" object, such as a conveyor belt being detected from above, an energetic proximity sensor may have difficulty (object and background reflecting at the same or similar level). This is especially true if the object to be detected is darker than the background (background having more reflectivity than the object).

A fixed-focus proximity sensor can provide some "background suppression" in that it will only detect an object within a given range of its focal distance. This detection area would also be affected by the color of the object, so there may still be some difficulty with a dark object that is very close to a light-colored background.

True background suppression is accomplished by means of light triangulation (Fig. 1) in which a focal distance is defined by mechanical or electronic adjustment of the sensor. This focal distance defines a plane beyond which the sensor is not capable of detecting objects, hence the name "background suppression." Multiple receivers are used to define this plane. When a background suppression sensor is adjusted, the focal plane is moved but the sensitivity of the sensor is not changed as it is with energetic or fixed-focus proximity sensors.

This has the advantage of making the background suppression sensor much less susceptible to environmental changes or dirt build-up on the optics.

All background suppression sensors have a special set of curves that show their capabilities. These curves show the background suppression as a percentage of the sensing distance for different color objects on a white (90% reflectance) background.

In the curve below (Fig. 2), taken from the WT 27-2ABS IR/DC, the worst case is a black (6% reflectance) object on a white (90% reflectance) background. At a distance of 300 mm (11.8 in) the curve shows a background suppression of about 3%. This means that at 300 mm the white background must be at least 3% of 300 mm, or 9 mm (0.35 in), behind a black object (Fig. 3).

True background suppression is provided in the following product series:

W.150
W.4
W.1000
W.12-2
W.190
W.14
W.18
W.250
W.23
W.27-2
W.260
W.24
W.36
W.45

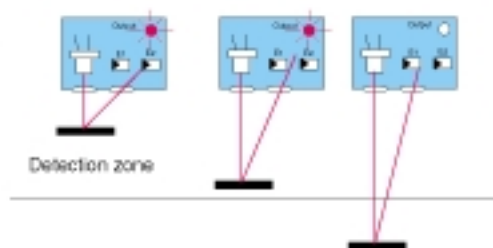


Fig. 1 Background suppression principle

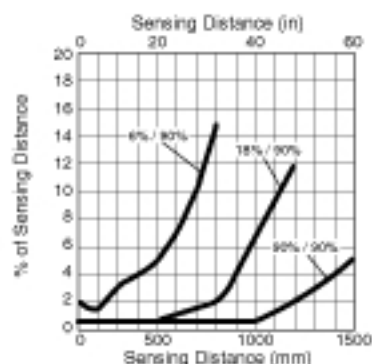


Fig. 2 Example WT 27-2 with black (6%) and gray (18%) object on white background

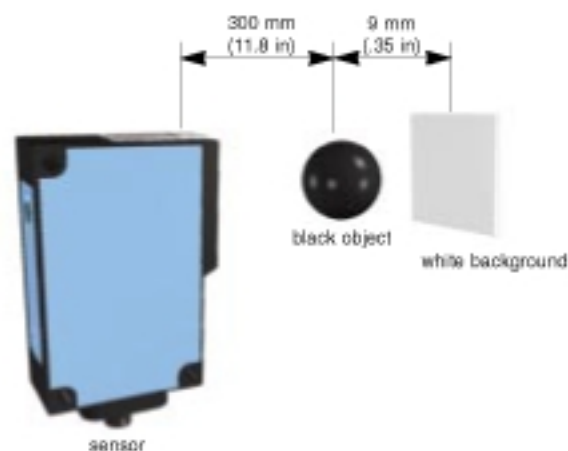


Fig. 3 At 300 mm a white background must be 9 mm behind a black object