Sensing Modes

Photoelectric devices can be packaged and arranged in various configurations to match the application. The different methods are often called sensing modes. Modes can be grouped around two basic principles: thrubeam and reflection.

Thrubeam

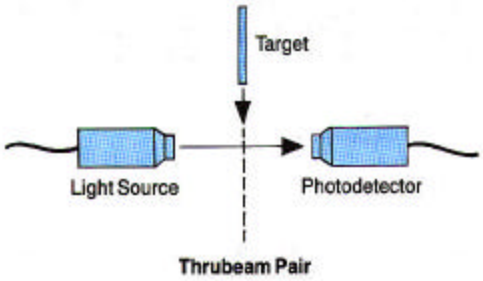

FIG. 12

The thrubeam mode uses components in separate housings. The light source and photodetector are aligned facing each other across a space where the target objects will be passing. When no target is present, the photodetector will be illuminated. The target blocks the beam, cutting off most of the light and causing the output of the control to change state. The region of detection is approximated by an imaginary cylinder between the lenses of the two components with the diameter of the lenses. The target will be detected anywhere along the length of the cylinder as long as most of the light is blocked. Because light from the source makes a one-way trip directly to the photodetector without being reflected, thrubeams offer the greatest range and largest light/dark contrast.

Features

- Longest range
- Highest light/dark ratio
- Target color or surface texture have no effect

Limitations

- Two components must be mounted and wired
- Alignment may be difficult

Retroreflective

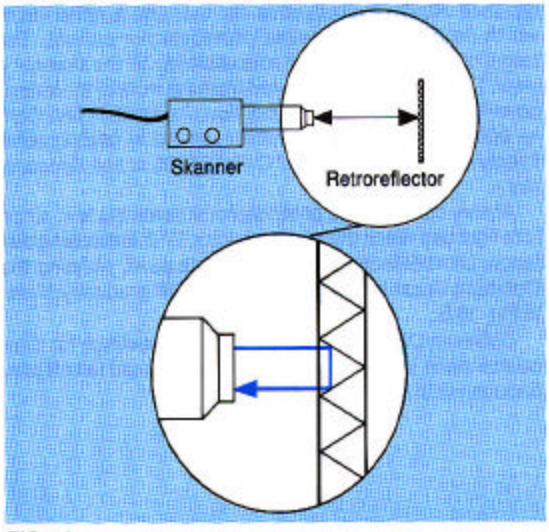

FIG. 13

A variation on the thrubeam principle uses a highly-efficient reflector to return light to the photodetector. Light source and photodetector are placed together, usually in one housing. Light crosses the area where the target object will pass, strikes the retroreflector, and returns to illuminate the photodetector. As with a thrubeam, the target is detected when it blocks the light path.

When light strikes a retroreflective surface within about 15° of the perpendicular to the surface, the light will be reflected back along the same path. One common type of retroreflector seen on bicycles and highway markers uses 3-plane corner reflectors. Another popular type uses tiny glass beads covering adhesive tape or dispersed thru a paint or chalk — this type is common on road and street signs.

Features

- Long range
- High light/dark ratio
- Easy to set-up and install

Limitations

- Can sometimes be confused by reflections from shiny objects