

Technical report

VarOS: Variable Object Sensors

Sensors with light-band – a trend in the detection of irregular objects



The detection of variable objects, i.e., of objects with changing shapes and dimensions, is the World Series of detection tasks. The new Leuze electronic retro-reflective photoelectric sensors with light-band detect everything safely and reliably. A Fresnel lens with high imaging quality produces a very homogeneous and wide light-band which has numerous advantages over selective detection in many applications, especially in packaging systems and intralogistics.

If objects have inclined or curved shapes or surfaces with cutouts and holes, irregular edges or variable heights, optical detection with selective light beams becomes a challenge. In practice, such cases are varied and occur in nearly all industries. While different object heights and container formats can be handled relatively easily as long they are known, it is a much more difficult task with heterogeneous objects.

Typical examples from practical experience include damaged pallets – where boards may be missing – or stacked products with overhanging or protruding elements. To all of the non-cubic objects that are transported on the conveyor systems used in intralogistics or in packaging systems, whether machine components or shrink-wrapped pallets with variable external shape, presence monitoring and positioning applications with standard sensors are difficult and complex.

This also applies for objects with interrupted surfaces, especially when they are of varying size and with irregularly distributed openings. Light scanners and photoelectric sensors, which are otherwise the sensors of choice, must then be arranged in a complex manner and often used in combination in order to detect the front edges of the objects that are to be identified. The innovative light-band of the RK 46C VarOS sensors brings this to an end.

The main advantage of these sensors is that, compared to alternative, standard sensor concepts with combined transmitter and receiver modules, they considerably reduce material and installation costs. Instead of combinations of multiple individual photoelectric sensors, small light barriers or complex, multiple switching configurations, now a single light-band sensor suffices. With this, Leuze electronic demonstrates in concrete terms how Smarter Application Know-How can be advantageously implemented for the user in technology and in practice.

In principle, a retro-reflective photoelectric sensor

The special feature of the VarOS is a specially developed Fresnel lens that, instead of discrete laser beams, generates a very homogeneous light-band (red light) with a considerable width of 45 to 60 mm. This makes possible the reliable detection of objects variably over the entire width of the light-band with just one sensor. The sensor reacts to all objects that appear within the light-band depending on the taught sensitivity (resolution). It doesn't matter where the light-band is broken by the object.

At first glance, the light-band sensors function in the same way as the familiar retro-reflective photoelectric sensors of the 46 series from the "sensor people" from the town of Owen/Teck. This is due primarily to the same compact housing shape of the entire series – but also because no special reflectors are required; here, the 40 x 60 mm or 100 x 100 mm standard reflectors can be used. Last but not least, the use of identical parts in the housing and electronics components brings considerable advantages with respect to production and, as a result, cost.

Compatibility within the entire series also of course means that the tried and tested fastening elements fit, allowing the VarOS to be practically seamlessly integrated in existing system designs – all of this shows what Leuze electronic means with "Smarter Product Usability."

Teachme function for two sensitivities

The VarOS makes two easily teachable, preset sensitivity levels available to the user (one standard setting and one for increased sensitivity). Sensors can thereby be quickly and optimally adapted to object sizes and surface properties. The first sensitivity level, "standard setting," is suitable for objects 12 mm and larger. It offers a maximum operating range with largest possible performance reserve in the event of soiling or vibrations.

Typical areas of application include, e.g., pallet applications. In the second sensitivity level, objects 8 mm and larger are reliably detected. This setting is also ideal, e.g., for objects with cutouts or holes or depolarizing media, such as foils, and also delivers maximum performance reserves even under rough conditions. In addition, the sensor offers light/dark switching through a teach function for adapting the signal sequence to the control.

Adapt and re-adjust sensitivities

In addition to the two preselectable sensitivity levels, a so-called "easytune" fine tuning function offers further options for individually adapting the sensitivity of the sensors to applications with respect to object sizes and transmission properties. With easytune fine tuning, the VarOS can be set so that it can be used for the detection of transparent objects.

Another key feature of the new VarOS that contributes to the highest possible process reliability and system availability is ALC sensitivity readjustment (Auto Level Control). With this tracking function, the sensors automatically correct their switching threshold during operation. Thanks to ALC, the maximum performance reserve is available constantly even in the event of soiling or changing environmental conditions, thereby allowing the sensors to work continuously with absolute reliability and error-free.

brightvision is Smarter Product Usability at its best

Typical of many of Leuze electronic products is the "brightvision" technology. It considerably simplifies commissioning and handling of the sensors and is further proof that Leuze electronic stays true to its credo of "Smarter Product Usability." In the foreground is simple alignment with the aid of the very bright, highly visible red light. With the VarOS, this also includes the special characteristics of the light-band. A small gap in the middle (mid-gap) enables pinpoint alignment, ensuring maximum edge tolerance, i.e., utilization of the light-band upward and downward. In addition, the mid-gap technology prevents saturation precisely in this particularly bright area by reducing energy in the middle of the light-band. This increases the light-band quality and, thus, the reliability during operation. Moreover, bright indicator diodes with all-round and high visibility ensure particularly convenient setup and commissioning.

Especially advantageous as well is the A²LS active extraneous and active ambient light suppression. The sensors detect stray light and differentiate between their own sensor signal and the interference source. If an interfering signal is detected near the frequency or phase range of the sensor signal, the sensor changes the phase position and frequency of its own signal with an extremely fast reaction time. The susceptibility to interference from pulsed light sources, for example, from energy saving lamps, is thereby largely eliminated. Active ambient light suppression also enables the use of multiple, cascaded VarOS light-band sensors to implement, e.g., even longer, uninterrupted light-bands.

Summary: one for all

Whether nonuniform, non-cubic, irregular or variably changing object shapes – the VarOS detect everything and are, therefore, the right choice when flexible detection is required. In addition to presence monitoring, even positioning applications can be performed with a high level of accuracy. The light-band sensors are also ideally suited for muting applications. With irregular objects and shrink-wrapped containers or containers with openings, they provide significantly more reliability.

Photos and captions



Figure 1. The RK 46C VarOS variable object sensor also reliably detects objects with an irregular shape or with cutouts and holes.



Figure 2. easyhandling: the sensitivity is set via the black teach button on the sensor housing – the sensor state remains highly visible.



Figure 3 a/b. Reliable detection of pallets of varying sizes (left) and of objects with curved contours.



Figure 4. The light-band also makes the RK 46C VarOS ideal as a muting sensor.

Press inquiries

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