

Application report:

Fulfilling high expectation

Measuring object heights in any surroundings

If you have ever been frustrated by an overdue package delivery, you'll know why hardly anybody today is prepared to wait more than three days for ordered goods. This level of expectation confronts automated shipping operations with entirely new challenges. Most shippers are therefore constantly optimizing their throughput times in order to process as many products as possible in ever shorter times. Customers pile on more pressure by demanding increasingly high quality. These challenges can be met by measuring with contact-free FADK 14 red-light sensors from Baumer.

The German Distance Selling Trade Association reports that national mail-order sales reached approx. 29 billion € (roughly \$ 20 billion) last year. This represents an almost unimaginable number of pocket envelopes and packages. Every single item was pre-sorted and measured on conveyor belts for incoming or outgoing goods. An overlooked or misdirected package can either cause a bottleneck which requires manual servicing or it may reach the wrong recipient. Both eventualities increase throughput times and costs. Correct recognition of product contours is a quality and time criterion in other sectors too, for example the wood-processing or packaging industry.



Figure 1: Height measurement of pocket envelopes and packages on conveyor belts (original photo: Baumer).

The following procedures have been used until now to detect the height and contours of objects:

- Detection of the height profile by laser light-section systems. This is a mature technique which achieves very good results. However, it has many drawbacks. Its installation generates high cost and effort expenditures. Software must be written and only trained specialists can operate and maintain the system. Moreover, the technique relies on a high laser class and requires appropriate safety measures (eye protection).
- Another option is to determine the profile with light barriers on both sides of the conveyor belt. This has the advantages of easy, rapid commissioning and object detection by red or infrared light. One disadvantage is that information can only be obtained from the highest point of the object. Bulges or twists of the object cannot be recognized.
- A relatively new, third alternative involving 3D camera systems also offers solutions. However, its critical factors include high commissioning costs and problems in detecting varicolored objects.

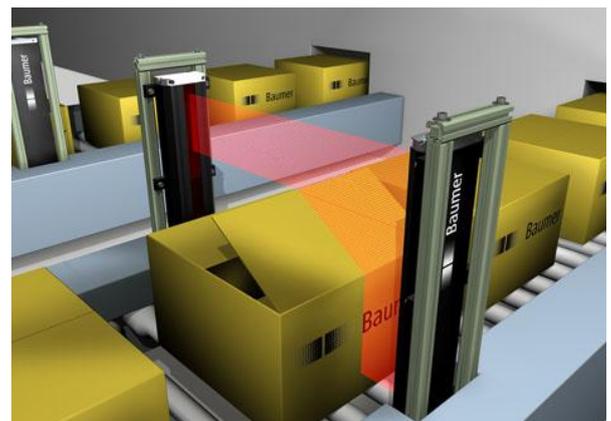


Figure 2: Detecting height profiles with light barriers

These drawbacks can be remedied by a plug-and-play sensor which has been optimally preset for the application requirements. It can be commissioned quickly and saves costs and time. An array of these contact-free measuring sensors mounted above the conveyor belt reliably detects

object heights and recognizes excessively high stacks or overly large objects at an early stage.



Figure 3: The wide Baumer range of contact-free measuring sensors

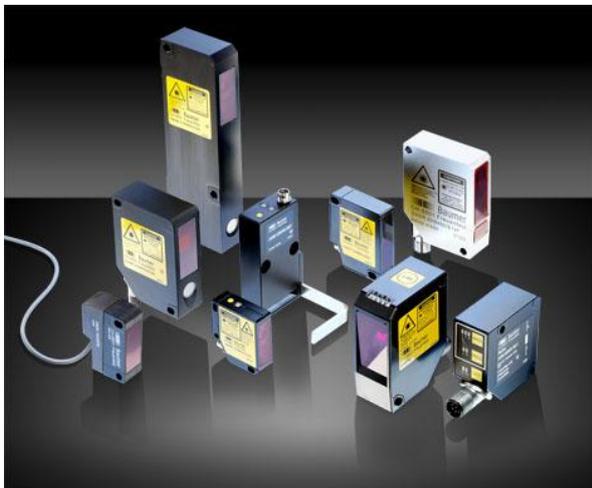


Bild 4: The Baumer range of photoelectric measuring sensors

Along with a short response time for high-speed operation, the sensors require minimal sensitivity to influences such as colors, surfaces, changing ambient light and soiling to deliver the desired performance. They must also be able to recognize a wide variety of objects ranging from packages in different sizes to envelopes. Yet they must dispense with the elaborate protection required for laser sensors and be immune to manipulation by non-service personnel or inexperienced fitters.

The new Baumer FADK 14 red-light distance sensor overcomes all these problems. Its high measuring speed of >200 Hz makes it optimal for dynamic applications. In combination with its incorporated triangulation technique, the cutting-edge technology of its receiver chip ensures reliable measurement processes that are substantially more independent of object

materials and colors than those of generally applied products. Its great measuring range of 400 mm and high resolution of up to 0.1 mm ensure immediate recognition of both the thinnest objects and large packages on the same conveyor belt. This avoids the cost of manual pre-sorting, separate sorting lines for products of different heights and other manual interventions in the automated process.

Dirty surroundings? So what!

The new FADK 14 is also equipped to beat the problem of measuring heights in considerably dirtier surroundings (e.g. wood panel contours in the wood-processing industry). Besides many other new features that boost its process reliability, it employs IO-Link to query the state of the receiver signal in terms of several signal stages. The information can be used as a service message to plan the cleaning cycle. An integrated alarm outlet is another standard feature. This helps to inform the operator that soiling has reduced the sensor to its reserve. These features therefore combine to keep measuring processes functioning reliably even in dusty surroundings.



Figure 5: Early service messages via IO-Link ensure reliable measurements even in dirty surroundings

Carefree summer days

A bright, cloudless summer day tends to lift human spirits, but too much sunshine spells trouble for many photoelectric sensors. It disturbs their receiving optics and makes them malfunction. The machine must therefore be suitably positioned or parts of the system must be shielded. The FADK 14 has the highest ambient light immunity available in this class. Since it is unaffected by light intensities up to 25 kLux, it makes no difference whether the system is

situated beside a window or in a dark corner. Exposure to sunlight on a fine midsummer day therefore cannot make the sensor lose its cool.

The extremely small red-light point featured by the FADK 14 enables simpler and cheaper solutions to be found for applications solved by laser distance sensors until now. Users gain extra benefits from the following advantages of this technique:

- since no safety regulations must be observed, elaborate concepts that costs time and money can be dispensed with,
- the life cycle of the transmission light source is significantly prolonged. This lengthens the life of the sensor and makes it more reliable,
- the diffuse sensor is much cheaper to buy than a laser sensor

Adaptable and versatile

The FADK 14 is the first red-light distance sensor with IO-Link to appear on the market. It has a preset measuring range of 50 to 400 mm, a voltage or current outlet (0...10 V; 4...20 mA) and the alarm outlet. The new IO-Link communication standard creates attractive scope for adapting the sensor optimally for different jobs by setting appropriate parameters. The active measuring range can for example be parameterized (with millimetric accuracy via the control). The alarm outlet can be individually allocated to a multi-stage contamination alarm, a "beyond measuring range" signal or a switching outlet. Switchable averaging is an especially useful aid to improve the signal quality and obtain a more stable signal when dealing with rough surfaces. Operating with IO-Link therefore adds genuine value, enhances process reliability and boosts productivity.

Plug and play for the whole sensor family

The overall concept of fast, easy, cost-efficient commissioning supports an extensive range of accessories. One highlight is the new frame adapter. Sensors can now be mounted and de-installed without any screws or tools in less than 10 seconds. This saves time and money in comparison with other installation methods. The FADK 14 is part of a sensor family that includes the M8, M12, cable and cable-plug connection variants along with all the red-light or laser versions. Users can therefore pick and choose efficient solutions for any sensor or connection requirement.



Figure 6: Accessory range includes new frame adapter

The new FADK 14 from Baumer delivers economic performance and support for optimizing throughput times. Packages obviously will never arrive as quickly as e-mails in future, but increasingly reliable, ever faster machines will soothe impatient customers with even earlier package deliveries in coming years.