

Application report:

Driving into New Dimensions with Miniature Sensors

Who doesn't know this situation? A machine is fully designed, the available space has been optimally exploited, but at the end it is found that additional sensors must be installed for precise control of the process. With its new ultra-flat shape (4 x 6 x 45 mm), the new optical sensor series 04 from Baumer opens new perspectives.

In constrained conditions, optical fibers often solve space problems with special sensing heads and matching optical fiber amplifiers. However, two disadvantages must usually be tolerated. With optical fibers, objects cannot or only inadequately be detected against a background and the mounting of optical fibers and amplifiers often incurs more work, adding up to a relatively expensive solution. Baumer now offers a world-wide unique diffuse red light sensor which can solve both problems with its compact shape and very efficient background suppression.



Fig. 1: The smallest optical sensor FHDK 04 with background suppression

New means of mounting save space

The minimal sensor dimensions (4 x 6 x 45 mm) permit new solutions. For example, the sensor can be installed in a normal fractional or metric extrusion frame with a quick-release adapter.



Fig. 2: Mounting of the sensor in a extrusion frame

After the sensor has been clipped into the quick-release adapter, it is placed in the extrusion frame. The quick-release adapter is fastened in any commonly available profile with just one groove plate. Well protected, the sensor detects container rollers, tool holders and pallets completely independently of their color, surface or material with great positional accuracy. This elegant and simple solution is therefore suitable for many applications in machine and plant construction.

Baumer also offers more intelligent mounting accessories. For example, a fastening pin is available to which the sensor can be attached with a screw. The dimensions of the fastening pin are such that the sensor is protected over its entire length, although the fitted volume hardly increases.



Fig. 3: Sensor with fastening pin

Small but no less powerful

The optical properties of the FHDK 04 are particularly notable. Despite its extremely small dimensions, it has been possible to implement a highly precise sensing distance. The sensor detects objects up to a distance of 50 mm regardless of their color or surface. With the efficient and precise background suppression, all interfering objects only a few millimeters beyond this are reliably suppressed. The sensor is also largely insensitive to dirt, which makes it highly suitable for industrial environments.

The point source LED permits spot sizes of less than 2 mm in diameter at the focus. In comparison with sensors with standard LEDs, this means that smaller objects can be reliably detected. The FHDK 04 thereby provides an ideal lower cost alternative to laser sensors. Its optical precision is higher than that of a conventional sensor, and the price is distinctly better than for a laser sensor.

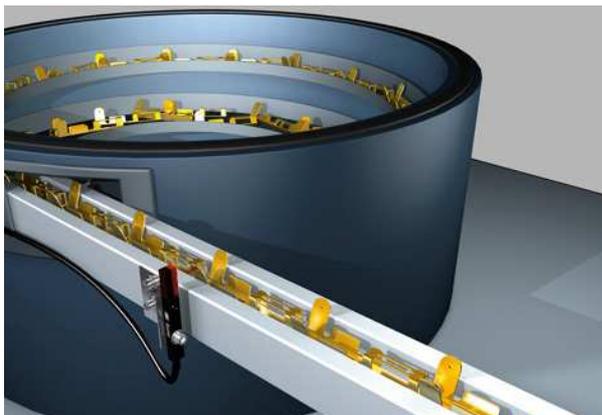


Fig. 4: The FHDK 04 offers a good alternative to conventional sensors

Suppression of inter-sensor interference

If several sensors are employed adjacent to each other, it is important that these do not interfere optically with each other. Reflections from adjacent sensors must not affect the state of the other sensor. Despite the small outside dimensions, it has been possible to implement this feature. Several sensors can be integrated in a tight space without impairing their reliable functions.

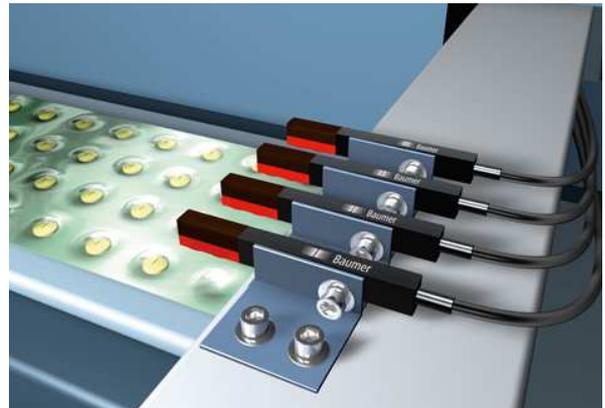


Fig. 5: Several sensors can be fitted directly adjacent to each other to detect tablets, without inter-sensor optical effects occurring.

Such solutions are demanded particularly in the pharmaceuticals and laboratory automation industries. The FHDK 04 is also suitable to detect transparent objects such as test tubes, pipettes and micro-titration slides.

Ready for the future with IO-Link

The FHDK 04 sensor not only excels with its optical values. As a further highlight, the new communications standard IO-Link has been implemented in the 04 series. IO-Link is the progressive communications standard for peer-to-peer connections, e.g. from a control system to a sensor. It is also possible for the user to exchange serial data between the control system and the sensor via the switching output. For example, the parameters of the sensor can be conveniently set through this uniformed interface.

Two different variants with permanently adjusted sensing distances are available for the diffuse laser sensor with background suppression: 30 mm and 50 mm. The benefit is obvious: no adjustment work is necessary during commissioning and unintentional misadjustment during operation is impossible.

With its small dimensions, the FHDK 04 fulfils the requirements of many users. With the precise background suppression and suppression of inter-sensor interference, the sensor ensures reliable operation. By supporting the communications standard IO-Link, this sensor is excellently equipped for the future.