

## Application report:

# Liquids can cause trouble

***Higher integration in all areas of technology requires that sensors become more and more versatile. With fiber optic sensors, this results in a continuously expanding range of different sensing heads. Coaxial fiber optics to position objects, fiber arrays to monitor specific areas and focused fiber optics for identifying highly transparent media in a reflective sensing mode. Baumer electric is now expanding the versatile application range of fiber optic sensors with new solutions to monitor liquid levels and leakage.***



*A wide range of fiber optics*

Higher integration in the electronics, semiconductor and handling industry requires flexible sensors, which provide an optimal fit for the machine design and ease of use. During the design stage, the sensor should adapt to the optimum machine design and not vice versa. Flat or round sensor heads are available, as well as side-view sensing heads, and even sensors where the fibers are aligned to precisely monitor a specific area. Due to their technical construction, sensors with integrated electronics are not as

flexible and in many instances results in restrictions or modifications to the machine design.

For the first time, Baumer electric now offers fiber optic sensor solutions to detect liquid levels and leakage of fluids. These unique products permit simple detection of the liquid level in standpipes or hoses, as well as detection of leaks in reservoirs or vats.

### **Detection of non-conductive liquids**

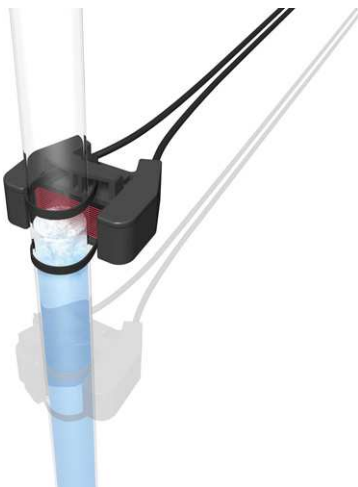
Many wet production areas require monitoring or detection of liquids. The tremendous advantage of optical liquid level sensors is that non-conductive liquids, such as distilled water or certain oils can be detected. Available for the first time are optical liquid level sensors, which have been developed especially for fill level detection in (semi) transparent stand pipes or hoses with diameters of up to 13 mm. The sensors can simply be attached directly to the pipe or hose! Due to the high refractive index of liquids, the sensor is able to detect the fluid level accurately with a reproducibility of typically 1 mm.



*Fiber optics version and sensor design with integrated electronics*

### Suppression of foam or air bubble interference

The fiber optic sensor FSL 500C6Y00 with an integrated array is able to ignore foam or air bubbles up to 3 mm in diameter, detecting only the current fill level. This is possible due to an array alignment of the individual fibers. This layout forms a small light grid of approximately 5 mm in length within which a single drop or fine foam has less influence compared to a round light spot. Undesired effects can be corrected with the "teachable" Series 69 high performance fiber optic sensors. In addition to the fiber optic version, a more economical sensor model FFDK 16x50Y0 with integrated electronics and round light spot is also available. The sensor can very easily be attached to the pipe/hose and does not require any adjustment, simplifying start-up. The only selection that has to be made is light- or dark operation.



*It is possible to ignore foam or air bubbles with the precision light grid*

### Leakage-Monitoring – if it does not overflow, but leaks!

In general, fill level sensors or float regulator switches are used in reservoirs and vats for overflow monitoring. What happens however if a tank with a chemically aggressive liquid springs a leak or if a connecting pipe is no longer tight? The new products for leakage monitoring from Baumer electric can be applied here. Screwed or glued to a base plate, these sensors react quickly to a small amount of liquid, approximately 1 ml, thus allow early warning. Similar to the liquid level

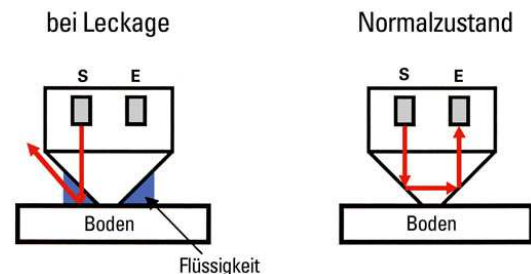
sensors, the operational principle is based on the utilization of the refractive index of liquids. When the sensor is mounted, a focused light beam is reflected from the base plate. If fluid reaches the light beam, it is refracted, which in turn can be clearly detected by the sensor. Because of the Fail-Safe mode with an activated output during standard operation, error sources, such as a cable break or disconnection from the ground, can be definitely detected.



*The leakage sensors are mounted on the lowest location, directly under or next to the reservoir*

### Applications even in dangerous environments

The fiber optic sensor FOC 500C6Y00 is completely coated with Teflon® PFA, which guarantees a high chemical resistance. Another advantage is that fiber optic sensors are inherently safe since only light is transmitted. There are no additional electronic components and the fiber optic amplifier resides in a safe place at a distance of up to 5 m away.



*Principle of operation*

A sensor model with integrated electronics is available here as well. The small round casing of the FODK 23x90Y0 also consists of a chemically resistant Teflon® PFA coating, which meets ingress protection IP67. The sensor is attached

directly to the base plate with two M4 screws. With the user-friendly clip technique, the sensor can quickly and easily be removed from the support bracket for cleaning purposes. The FODK 23x90Y0 is easy to use with simple startup thanks to the fact that it requires no settings.



*Simple removal with clip-on system*

### **Extensive assortment of fiber optic sensors**

Many years of experience prove that only a well coordinated and balanced offering of fiber optic sensor and sensor equipment guarantees a successful solution. This is the reason Baumer electric continuously adapts the assortment of fiber optic sensor equipment to market requirements. Available are standard potentiometer versions of the Series 80 in fast or high sensitivity versions, teach-in sensors of the Series 12 and 60 with simple displays, all the way up to multifunctional fiber optic sensors of the Series 69 and 67, which combines several operating modes for the most flexibility in various applications. For multiple sensing applications in a small space, the Master/Slave System of the Series 31 is available, which permits up to 16 sensors to be connected to the control unit with only one flat-round cable, which in turn reduces the wiring, labor and material expenditures tremendously.