

Technical Report

Reliable level measurement – in the bottle and in the vibratory feeder.

UR18 ultrasonic sensors by Baumer with flexible parameterization and filter functions

The new UR18 ultrasonic sensors by Baumer are ideal for level measurement. With their robust sensor element and enhanced functions thanks to IO-Link, they can be flexibly integrated into existing machine processes and adapted to different materials and interfering objects. Baumer has set new standards in the field of ultrasonic sensor technology.



The robust ultrasonic sensors UR18 and U500 are ideal for level measurement. The sensors are equipped with an extremely resistant sealed sensor element, two adjustable outputs and a very short blind range of 20 mm. The ultrasonic sensors offer extended functions due to IO-Link.

Ultrasonic sensors are frequently used in the packaging industry, in plant construction and mechanical engineering – for example, wherever levels of liquid media or bulk materials in tanks or boxes have to be measured. However, not every sensor meets the high standards required. Some sensors are difficult to adjust and cannot be adapted to different media or processes. In addition to the reliable detection of the object, the mechanical and chemical robustness of the sensor is an essential requirement. Wherever aggressive chemicals are used, a sensor has to withstand this stress for several years. The new UR18 (M18 round housing) ultrasonic sensors by Baumer have been specifically designed for this environment. While the sensing element of conventional ultrasonic sensors is easily

damaged by aggressive mechanical and chemical influences, the new UR18 ultrasonic series by Baumer scores with its extremely resistant sensing element. The sensing element is hermetically sealed and can withstand most organic and inorganic chemicals, such as aggressive cleaning agents. The UR18 series can also withstand extremely high mechanical loads. The sensor complies with protection class IP 69K, whose test conditions require that hot liquids do not penetrate into the sensor housing, even at a pressure of 40 bar, or damage the sensor element. With the combination of an extremely robust sensing element, flexible parameterization and the variety of functions in one standard sensor, the new series is unique in its class.



The sonic beam angle width of the new Baumer ultrasonic sensors can be adjusted on site depending on the container opening and the filling medium. A narrow sonic beam angle is necessary to measure level through a narrow opening.

Precise level measurement thanks to adjustable sonic beam angle

With the UR18 ultrasonic, the sensing range is up to one meter, with a blind region of 20 mm, one of the highest in the market for the 18 mm class. This gives the user great freedom in positioning. In addition, the flexibility in sonic beam angle adjustment allows to be adjusted for the application. For example, a narrow sonic beam angle is necessary if a level needs to be measured through a narrow opening, such as a bottle-neck. If, on the other hand, bulk material has to be measured, like screws in a vibratory feeder, a narrow sonic beam angle can lead to errors, because the screws scatter the sound in many different directions due to their shape and therefore do not reflect enough sound. In this case, a wide sonic beam angle is better, since the more strongly deflected reflections can also be detected with a wide beam angle. The sonic beam angle of the new Baumer ultrasonic sensors can be flexibly adjusted

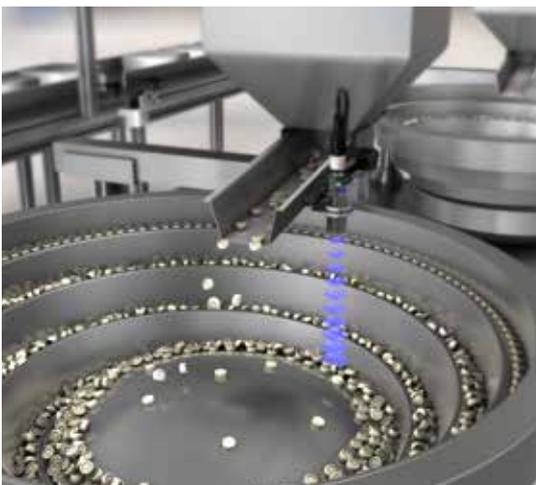
to narrow, medium and wide. The combination of an adjustable sonic beam angle with a robust sensor element in an 18 mm housing, which is so popular for level measurements, is currently only available from Baumer.

More reliable: filters conceal interference

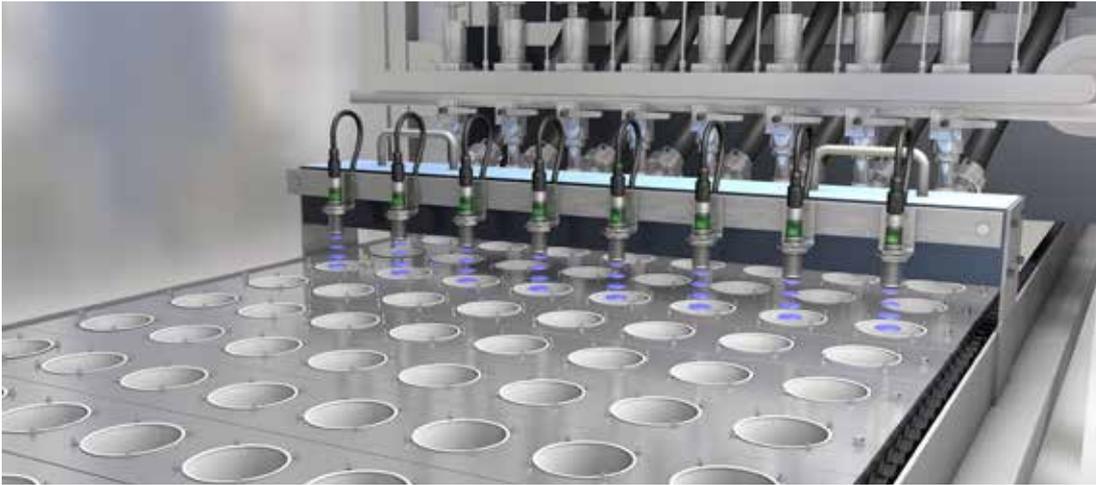
Any ultrasonic sensor can easily measure a smooth liquid surface that only rises or falls very slowly. It becomes more difficult when waves ripple on the surface, like when the tank is wobbling or when the level varies slightly due to pressure fluctuations in pumps and pipes. Simple sensors can misinterpret these fluctuations. But not the new UR18 sensors. They contain filters that the user can activate and configure as required. The mean value filter calculates the average of the measured values over an adjustable number of measuring cycles, which compensates for fluctuations in the liquid level and provides a stable measuring signal. The interrupt filter suspends the measurement process for a defined period of time, so that a rotating stirrer in a tank is not detected within this measurement gap. In systems where several ultrasonic sensors are mounted close to each other, they may influence each other. The new ultrasonic sensors have both a synchronization function and a multiplex function that can prevent a sensor from picking up signals that are actually intended for its neighbor.

Quick and easy configuration with IO-Link

The filters and the sonic beam angles are configured quite simply using IO-Link. This interface standard is becoming more and more established in sensor technology. The resulting sensor functions, such as the filter functions, allow the customer to configure the sensor to



The new UR18 ultrasonic sensors offer individual sonic beam angle adjustment: narrow, medium and wide. If the level of bulk material has to be measured, for example screws in a vibratory feeder, a wide sonic beam angle is required. With a wide sonic beam angle, even more strongly deflected reflections are reliably detected.



With the synchronization function of the new Baumer UR18 ultrasonic sensors, it is possible to operate several sensors in close proximity to each other without the risk of interference. This means that the sonic beam angles of the directly adjacent sensors do not influence each other. The synchronization function can be triggered either by an external pulse or by a command through IO-Link.

suit his application. The new dual channel IO-Link interface allows convenient parameterization from the controller as well as the transmission of cyclic and acyclic data to the controller. If a sensor has to be changed, parameter server functions allow simple and fast sensor replacement as well as the reproduction of parameter data, which enormously reduces the downtimes of the system. Thanks to the Baumer exclusive *qTeach* function, the engineer can also adjust the settings directly on the sensor. All of the sensors of the UR18 family have IO-Link. The new ultrasonic sensors are available as proximity switches (1 or 2-point), retro-reflective sensors, through beam sensors or as distance measuring variants.

The sensor with the same functions as the UR18 is also available in a rectangular plastic housing as part of the U500 sensor family. However, both represent only a small selection from Baumer's range of ultrasonic sensors. Users will find miniature sensors, sensors for long ranges or sensors with sonic nozzles for particularly narrow sonic beam angles, as well as many other standard and special versions.

Further information:
www.baumer.com/robust-ultrasonic-sensors

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