Use maximum precision with Balluff ultrasonic sensors.

With over 50 years of sensor experience, Balluff is a leading global sensor specialist with its own line of connectivity products for every area of factory automation. Balluff is based in Germany and has a tight international network of 54 representatives and subsidiaries.

Balluff stands for comprehensive systems from a single source, continuous innovation, state-of-the-art technology, highest quality, and greatest reliability. That’s not all: Balluff also stands for exceptional customer orientation, customized solutions, fast worldwide service, and outstanding application assistance.

High-quality, innovative products – certified in accordance with DIN ISO 9001:2008 (EN 29001) – are a secure foundation for optimized value creation for our customers.

Whether electronic and mechanical sensors, rotary and linear transducers, identification systems or optimized connection technology for high-performance automation, Balluff masters not only the entire technological variety with all of the different operating principles, but also provides technology that fulfills regional quality standards and is suitable for use worldwide. Wherever you are in the world, Balluff technology is never far away. You won’t have to look far for your nearest Balluff expert.

Balluff products increase performance, quality and productivity around the world every day. They satisfy prerequisites for meeting demands for greater performance and cost reductions on the global market. Even in the most demanding areas. No matter how stringent your requirements may be, Balluff delivers state-of-the-art solutions.
Ultrasonic Sensors
Precise – simple and reliable

Regardless of color and material
BUS ultrasonic sensors are perfect for distance measurement or position detection of granules, fluids and powders. They measure fill levels, heights and sag without making contact as well as count and monitor the presence of objects.
They are extremely versatile, operate independently of color and surface finish, and are not affected by transparent objects that generate strong reflections.
Ultrasonic sensors are precision all-rounders designed for critical situations. Dust, dirt and steam do not pose a problem.

Broad detection range – high precision
Their detection range extends from 20 mm to 8 m, meaning that even longer object distances can be handled without problem. Their high resolution and small blind zones ensure extreme precision.
Integral synchronization means that the sensors do not interfere with one another.

Switching and analog variants
Our BUS ultrasonic sensors differ from one another in their output signal. Each series is available as a switching or analog version, whereby all analog versions are available with voltage or current output (0...10 V or 4...20 mA). The BUS M30 includes variants with two switching outputs, one switching and one analog output or two switching outputs and one analog output so that one sensor can adopt the function of a second sensor.

IO-Link
BUS 18M sensors with push/pull output are equipped with an IO-Link interface that enables a change from SIO mode to IO-Link mode.
Ultrasonic Sensors
Media

The all-rounders, even for difficult environments

Because the distance to the object is determined via a sound transit time, ultrasonic sensors have excellent background suppression. With their transit time measurement, ultrasonic sensors can record the measured value with highly-precise resolution. Some sensors to even 0.025 mm. The sensors are able to measure in dusty air or through paint spray mist. Nearly all materials that reflect the sound are detected. Even thin foils, crystal clear materials and different colors are no problem for ultrasonic sensors. Thin deposits on the sensor membrane do not affect sensor function.

Colors
Red, green, yellow or blue — all make no difference to Balluff ultrasonic sensors: they reliably detect all colors.

Transparent layers
Glass plates, Plexiglas and razor thin foils — BUS ultrasonic sensors reliably detect transparent layers.

Surfaces of bulk materials
Fine sand, shavings or coarse-grained materials — in the areas of fill-level measurement, our ultrasonic sensors are unbeatable.

Contrasts
Black objects against a black background or white on white — even with weak contrasts, our BUS sensors measure without ifs and buts.

Liquids
Clear water, cloudy liquids, oils or black coffee — ultrasonic sensors can be used with nearly any liquid. The liquid surface should have no foam.

Material surfaces
Whether velvet, wool or leather — nearly all clothing materials can be simply detected with our BUS ultrasonic sensors.
BUS ultrasonic sensors are particularly well suited for the following industries:

- Handling and automation
- Specialty machine construction
- Automotive industry
- Bottling and packaging
- Pharmaceutical industry
- Plastic and rubber industry
- Timber and furniture industry
- Paper and printing industry
- Conveying
- Commercial vehicles
- Scales
- Agricultural machinery
- Food processing machinery
- Office and information technology
- Construction and building material machinery
- Textile machinery

Other applications on the next page.

www.balluff.com
Ultrasonic Sensors

Application areas, sensor selection

Positioning
When scanning glass plates or other smooth and flat surfaces, make certain that the ultrasonic sound strikes the surface at a right angle.

Wire-breakage monitoring
When winding and unwinding a wire rope, ultrasonic sensors with analog output detect its position on the layer.

Stack-height detection
Whether wooden boards, glass plates, paper or color plastic plates, BUS ultrasonic sensors measure stack heights with high precision.

Fill-level monitoring
In silos, bunkers, containers – for all bulk materials (e.g., sand, gravel, coal, grain), our ultrasonic sensors are ideal.

Object detection
BUS ultrasonic sensors sort containers and parts with different heights. BUS count objects. And with absolute reliability.

Sensor selection
Important selection criteria for an ultrasonic sensor are its scanning range and the associated, three-dimensional detection range.

Definitions

- **Blind zone**
  The blind zone defines the smallest reliable scanning range of the sensor. There must be no objects or interfering reflections within the blind zone, as measurement errors may otherwise occur.

- **Operating scanning range**
  The operating scanning range is the typical working range of a sensor. For objects with good reflective properties, it can also be used up to its limiting scanning range.

- **Detection range**
  The detection range is measured using various standard reflectors.

Detection ranges
The red areas are measured with a thin round rod (Ø 10 mm or 27 mm, depending on sensor type) and show the typical working range of a sensor.
To obtain the blue areas, a plate is moved into the sound fields from the side. In doing so, the optimum angle of the plate to the sensor is set. This is thus the maximum detection range of the sensor. It is not possible to evaluate ultrasound reflections outside of the blue sound cones.

Detection range
- **Detection range**
- **Blind zone**
- **Object**
- **Scanning range**
- **Limiting scanning range**
The ultrasonic sensor as a diffuse reflective sensor is the classic operating mode. Compared to other sensor principles, it has superior background suppression. During operation, the switching output is set as soon as the object is located within the set switching distance. The switch point has a hysteresis. The operating mode is suitable for, e.g., counting objects on a conveyor belt or for performing presence verification.

The ultrasonic sensor in window mode is an extended function of the ultrasonic diffuse reflective sensor. In this case, the switching output can only be set if the object is located within a window that is defined by two window limits. This can be used to monitor, e.g., the correct bottle size in a bottle crate. Bottles that are too tall or too short are sorted out. Window mode and the diffuse reflection ultrasonic sensor can be set on all ultrasonic sensors that are equipped with teach-in.

The function of the diffuse reflection ultrasonic sensor is similar to that of a photoelectric sensor. Any reflector, such as a metal sheet, is sufficient. In window mode, the ultrasonic sensor is set so that the permanently mounted reflector lies within the window. The ultrasonic sensor returns a signal as soon as an object fully covers the reflector. It plays no role here whether the object completely absorbs or reflects away the sound. This operating mode is therefore used for materials than can be only poorly reflected, such as foam, or for scanning objects with irregular surfaces.

Ultrasonic sensors with analog output output the measured distance value as a voltage that is proportional to distance (0...10 V) or as current that is proportional distance (4...20 mA). For the ultrasonic sensors with analog output, the sensor-near and sensor-distant window limits of the analog characteristic as well as a rising or falling characteristic can be set. Depending on the sensor model and window width, the resolution is between 0.025 mm and 0.36 mm.

Ultrasonic sensors with IO-Link enable gapless communication through all levels of the system architecture: from the sensor to the top fieldbus level. Transmission of the measured distance value to the controller is bit serial.
Ultrasonic Sensors
M30 tubular-style housing

- Display with direct, measured value output for immediately visible results
- Numeric setting of the sensor via the display for completely presetting the sensor
- Automatic synchronization and multiplex operation for simultaneous operation of up to ten sensors
- 5 scanning ranges with a measuring range from 30 mm to 8 m
- 1 or 2 switching outputs in PNP- or NPN-design
- Analog output 4...20 mA and 0...10 V
  - Automatic changeover between current and voltage output
- Analog output plus switching output for measurement that is proportional to distance with an additional limit value
- Teach-in via 2 buttons for simple, menu-driven commissioning

Scanning range

<table>
<thead>
<tr>
<th>Blinding zone</th>
<th>Limiting scanning range</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 mm</td>
<td>65 mm</td>
</tr>
<tr>
<td>200 mm</td>
<td>350 mm</td>
</tr>
<tr>
<td>350 mm</td>
<td>600 mm</td>
</tr>
</tbody>
</table>

BUS M30M switching output

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Ordering code</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO/NC contact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO/NC contact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2x PNP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO/NC contact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2x NPN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO/NC contact</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BUS M30M analog output

<table>
<thead>
<tr>
<th>Resolution (depends on analog window used)</th>
<th>Ordering code</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0...10 V / 4...20 mA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BUS M30M switching and analog output

<table>
<thead>
<tr>
<th>Resolution (depends on analog window used)</th>
<th>Ordering code</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0...10 V / 4...20 mA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sensors are also available in stainless steel variants.

Callout

TouchControl

With TouchControl, all settings are made on the sensors. The three-digit LED indicator continuously displays the current distance value and automatically switches between mm and cm display. Two buttons are used to call up the configuration and navigate through the self-explanatory menu structure.

Inspecting transport boxes for completeness

Performance shows up on conveyor belts. Multiple ultrasonic sensors simultaneously monitor transport containers for completeness. Reflective, transparent or different-colored surfaces are reliably detected. In multiplex operation, mutual interference of the sensors is prevented.
## Ultrasonic Sensors
### M30 tubular-style housing

### General data
- **Supply voltage**: 9...30 V DC, polarity reversal protected
- **Output current**: 200 mA
- **Accuracy**: ± 1% (temperature drift internally compensated)
- **Degree of protection as per EN 60529**: IP 67
- **Operating temperature**: –25...+70°C
- **Material**:
  - **Housing**: Nickel-plated brass, plastic parts: PBT, TPU
  - **Sensing surface**: Polyurethane foam, epoxy resin containing glass
- **Connection**: M12 connector, 5-pin

### Scanning range
- **30...250 mm**: 65...350 mm
- **200...1300 mm**: 350...3400 mm
- **600...6000 mm**:

### Blind zone
- **30 mm**: 65 mm
- **200 mm**: 350 mm
- **600 mm**:

### Limiting scanning range
- **350 mm**: 600 mm
- **2000 mm**: 5000 mm
- **8000 mm**:

### BUS M30M switching output
- **Resolution**:
  - 0.025 mm
  - 0.025 mm
  - 0.18 mm
  - 0.18 mm
  - 0.18 mm
- **PNP, NO/NC contact**
- **Ordering code**:
  - BUS0022
  - BUS0039
  - BUS0030
  - BUS0045
  - BUS005F
  - BUS003P
  - BUS0054
  - BUS0055

### BUS M30M analog output
- **Resolution (depends on analog window used)**:
  - 0.025...0.10 mm
  - 0.025...0.17 mm
  - 0.18...0.57 mm
  - 0.18...1.5 mm
  - 0.18...2.4 mm
- **0...10 V / 4...20 mA**
- **Ordering code**:
  - BUS002N
  - BUS003N
  - BUS003F
  - BUS004F
  - BUS005L
  - BUS004L

### BUS M30M switching and analog output
- **Resolution (depends on analog window used)**:
  - 0.025...0.10 mm
  - 0.025...0.17 mm
  - 0.18...0.57 mm
  - 0.18...1.5 mm
  - 0.18...2.4 mm
- **0...10 V / 4...20 mA**
- **PNP, NO/NC contact**
- **Ordering code**:
  - BUS002L
  - BUS003L
  - BUS003F
  - BUS004F

### Suitable connector
- **Size/style**:
  - M12, 5-pin/straight
  - M12, 5-pin/angled
- **Length/cable material**: 5 m/PUR
- **Ordering code**:
  - BCC098C
  - BCC08FC

### Recommended accessories
- **Description**:
  - Mounting cuff
  - Mounting clamp
  - Mounting bracket
  - Sound deflection bracket
- **Ordering code**:
  - BAM000H
  - BAM007N
  - BAM000H
  - BAM010ER

You can find additional electrical accessories in our catalog Industrial Networking and Connectivity.

You can find additional mechanical accessories in our catalog Accessories Line.
Ultrasonic Sensors
M18 tubular-style housing

Scanning range
- Blind zone
- Limiting scanning range

BUS M18M switching output, straight
- Resolution
  - Push/Pull, NO/NC contact, IO-Link
  - Ordering code
  - Part number

BUS W18M switching output, angled
- Resolution
  - Push/Pull, NO/NC contact, IO-Link
  - Ordering code
  - Part number

BUS M18M analog output, straight
- Resolution (depends on analog window used)
  - 0...10 V
  - Rising/falling
  - Ordering code
  - Part number
  - 4...20 mA
  - Rising/falling
  - Ordering code
  - Part number

BUS W18M analog output, angled
- Resolution (depends on analog window used)
  - 0...10 V
  - Rising/falling
  - Ordering code
  - Part number
  - 4...20 mA
  - Rising/falling
  - Ordering code
  - Part number

Variant with 90° angled head
- for individual installation situations

IO-Link interface
- for supporting the new industrial standard

Automatic synchronization and multiplex operation
- for simultaneous operation of up to ten sensors

4 scanning ranges with a measuring range from 20 mm to 1.3 m

1 push/pull switching output PNP- or NPN-switching

Analog output 4...20 mA or 0...10 V
- for analog distance measurements

Teach-in via control line (pin 5)

IO-Link — the new standard
With the IO-Link interface, the prerequisites are filled for gapless communication through all levels of the system architecture all the way to the sensor. Commissioning and maintenance of a machine are simplified and productivity increased.

Control foil sag and monitor roll diameter
Using an ultrasonic sensor with analog output, the material on a roll or a coil is detected and the roll drive or a brake is readjusted. Another sensor with analog output readjusts the material infeed at the dancer roller as a function of the cable loop.
Ultrasonic Sensors
M18 tubular-style housing

General data
Supply voltage 10...30 V DC, polarity reversal protected
Output current 200 mA
Accuracy ± 1 % (temperature drift internally compensated)
Degree of protection as per EN 60529 IP 67
Operating temperature –25...+70°C
Material Housing Nickel-plated brass tube, plastic parts: PBT
Sensing surface Polyurethane foam, epoxy resin containing glass
Connection M12 connector, 5-pin

Scanning range
20...150 mm 30...250 mm 65...350 mm 120...1000 mm

Blind zone
20 mm 30 mm 65 mm 120 mm

Limiting scanning range
250 mm 350 mm 600 mm 1300 mm

Suitable connector
Size/style Length/cable material Ordering code
M12, 5-pin/straight 5 m/PUR BCC098C
M12, 5-pin/angled 5 m/PUR BCC08FC

Recommended accessories
Description Ordering code
Mounting cuff BAM00F2
Mounting clamp BAM00T3
Mounting bracket BAM00EY
Focusing attachment BAM01HJ
Sound deflection bracket BAM01EP

You can find additional electrical accessories in our catalog Industrial Networking and Connectivity.

You can find additional mechanical accessories in our catalog Accessories Line.
Scanning range

<table>
<thead>
<tr>
<th>Blind zone</th>
<th>Limiting scanning range</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mm</td>
<td>100 mm</td>
</tr>
<tr>
<td>20 mm</td>
<td>250 mm</td>
</tr>
<tr>
<td>55 mm</td>
<td>350 mm</td>
</tr>
<tr>
<td>30 mm</td>
<td>350 mm</td>
</tr>
<tr>
<td>120 mm</td>
<td>1000 mm</td>
</tr>
</tbody>
</table>

BUS R06K switching output

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Ordering code</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNP, NO/NC contact</td>
<td>BUS0021</td>
<td>BUS R06K1-PPX-02/007-S75G</td>
</tr>
<tr>
<td>NPN, NO/NC contact</td>
<td>BUS004C</td>
<td>BUS R06K1-PPX-02/015-S75G</td>
</tr>
<tr>
<td>PNP, NO/NC contact, 125 Hz</td>
<td>BUS004L</td>
<td>BUS R06K1-PPX-05/024-S75G</td>
</tr>
<tr>
<td>NPN, NO/NC contact, 125 Hz</td>
<td>BUS0057</td>
<td>BUS R06K1-PPX-03/025-S75G</td>
</tr>
<tr>
<td>NPN, NO/NC contact, 125 Hz</td>
<td>BUS0059</td>
<td>BUS R06K1-PPX-12/070-S75G</td>
</tr>
</tbody>
</table>

BUS R06K analog output

<table>
<thead>
<tr>
<th>Resolution (depends on window used)</th>
<th>Ordering code</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0...10 V</td>
<td>BUS004K</td>
<td>BUS R06K1-XA-02/015-S75G</td>
</tr>
<tr>
<td>4...20 mA</td>
<td>BUS004J</td>
<td>BUS R06K1-XB-02/015-S75G</td>
</tr>
</tbody>
</table>

Focusing attachment

For fill-level measurement through tiny openings with diameters to 5 mm, the sensor with focusing attachment is positioned directly over the measurement location. The tightly bundled sound field is incident exactly on the location that is to be measured. The blind zone of the sensor lies within the focusing attachment, making measurement possible starting directly from the sound outlet.

Comment: Can be used with BUS R06K1..-02/007-.. and BUS R06K1..-02/015-.. for measurements in boreholes and filling levels as well as for scanning circuit boards or highly transparent foils.

Fill-level measurement in narrow containers

On a rotary indexing table, narrow containers are filled with liquid or solid media. The ultrasonic sensor then checks the exact filling level.
### General data

<table>
<thead>
<tr>
<th>Size</th>
<th>20x32x12 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>20…30 V DC, polarity reversal protected</td>
</tr>
<tr>
<td>Output current</td>
<td>200 mA</td>
</tr>
<tr>
<td>Degree of protection as per EN 60529</td>
<td>IP 67</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>–25…+70°C</td>
</tr>
<tr>
<td>Material</td>
<td>Housing ABS</td>
</tr>
<tr>
<td>Sensing surface</td>
<td>Polyurethane foam</td>
</tr>
<tr>
<td>Connection</td>
<td>M8 connector, 4-pin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>20…70 mm</th>
<th>20…150 mm</th>
<th>55…240 mm</th>
<th>30…250 mm</th>
<th>120…700 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mm</td>
<td>20 mm</td>
<td>55 mm</td>
<td>30 mm</td>
<td>120 mm</td>
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<tr>
<td>100 mm</td>
<td>250 mm</td>
<td>350 mm</td>
<td>350 mm</td>
<td>1000 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BUS0021</th>
<th>BUS004C</th>
<th>BUS004L</th>
<th>BUS0057</th>
<th>BUS0059</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS R06K1-PPX-02/007-S75G</td>
<td>BUS R06K1-PPX-02/015-S75G</td>
<td>BUS R06K1-PPX-05/024-S75G</td>
<td>BUS R06K1-PPX-03/025-S75G</td>
<td>BUS R06K1-PPX-12/070-S75G</td>
</tr>
<tr>
<td>BUS004E</td>
<td>BUS004A</td>
<td>BUS0048</td>
<td>BUS0058</td>
<td>BUS005A</td>
</tr>
<tr>
<td>BUS R06K1-NPX-02/007-S75G</td>
<td>BUS R06K1-NPX-02/015-S75G</td>
<td>BUS R06K1-NPX-05/024-S75G</td>
<td>BUS R06K1-NPX-03/025-S75G</td>
<td>BUS R06K1-NPX-12/070-S75G</td>
</tr>
<tr>
<td>BUS004H</td>
<td>BUS R06K1-NPX-02/015-S75G-F01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUS R06K1-NPX-02/015-S75G-F01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BUS004K</th>
<th>BUS0056</th>
<th>BUS005E</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS R06K1-PPX-02/015-S75G</td>
<td>BUS R06K1-PPX-05/024-S75G</td>
<td>BUS R06K1-PPX-12/070-S75G</td>
</tr>
<tr>
<td>BUS004J</td>
<td>BUS004F</td>
<td>BUS005C</td>
</tr>
<tr>
<td>BUS R06K1-XA-02/015-S75G</td>
<td>BUS R06K1-XA-05/024-S75G</td>
<td>BUS R06K1-XA-12/070-S75G</td>
</tr>
</tbody>
</table>

### Recommended accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Ordering code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting tab</td>
<td>BUS0012</td>
</tr>
<tr>
<td>Focusing attachment</td>
<td>BAM014U</td>
</tr>
<tr>
<td>Mounting bracket</td>
<td>BAM006H</td>
</tr>
</tbody>
</table>

You can find additional electrical accessories in our catalog Industrial Networking and Connectivity. You can find additional mechanical accessories in our catalog Accessories Line.
Ultrasonic Sensors
M12 tubular-style housing

- Stainless steel housing
- Measuring range from 25 mm to 200 mm
- 1 switching output in PNP or NPN design
- Teach-in via line (PIN 2)

General data
Supply voltage 18...30 V DC, polarity reversal protected
Output current 100 mA
Resolution 0.2 mm
Degree of protection as per EN 60529 IP 65
Operating temperature –20...+70°C
Material Housing V2A, plastic parts: PA
Sensing surface Epoxy resin - hollow-glass sphere /PUR
Connection M12 connector, 4-pin

Scanning range 25...200 mm
Blind zone 25 mm

BUS M12E switching output
PNP, NO/NC contact Ordering code BUS0005
Part number BUS M12E0-PPXCR-020-S04G

NPN, NO/NC contact Ordering code BUS0006
Part number BUS M12E0-NPXCR-020-S04G

Suitable connector
<table>
<thead>
<tr>
<th>Size/style</th>
<th>Length/cable material</th>
<th>Ordering code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12, 4-pin/straight</td>
<td>2 m/PUR</td>
<td>BCC032F</td>
</tr>
<tr>
<td>M12, 4-pin/straight</td>
<td>5 m/PUR</td>
<td>BCC032H</td>
</tr>
<tr>
<td>M12, 4-pin/angled</td>
<td>2 m/PUR</td>
<td>BCC032Y</td>
</tr>
<tr>
<td>M12, 4-pin/angled</td>
<td>5 m/PUR</td>
<td>BCC032Z</td>
</tr>
</tbody>
</table>

Recommended accessories
<table>
<thead>
<tr>
<th>Description</th>
<th>Ordering code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting cuff</td>
<td>BAM00C4</td>
</tr>
<tr>
<td>Mounting clamp</td>
<td>BAM01KM</td>
</tr>
<tr>
<td>Mounting bracket</td>
<td>BAM00C0</td>
</tr>
<tr>
<td>Focusing attachment</td>
<td>BAM01ET</td>
</tr>
</tbody>
</table>

You can find additional electrical accessories in our catalog Industrial Networking and Connectivity.

Monitoring of packages
High hygienic requirements in the food industry place special demands on sensor technology. The ultrasonic sensor reliably monitors the proper sealing of packages and thereby ensures uniform quality.

You can find additional mechanical accessories in our catalog Accessories Line.
General data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>18...30 V DC, polarity reversal protected</td>
</tr>
<tr>
<td>Output current</td>
<td>500 mA</td>
</tr>
<tr>
<td>Resolution</td>
<td>1 mm</td>
</tr>
<tr>
<td>Degree of protection as per EN 60529</td>
<td>IP 65</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>–15...+70°C</td>
</tr>
<tr>
<td>Material</td>
<td>Housing: PBT</td>
</tr>
<tr>
<td></td>
<td>Sensing surface: Epoxy resin - hollow-glass sphere /PUR</td>
</tr>
<tr>
<td>Connection</td>
<td>M12 connector, 5-pin</td>
</tr>
</tbody>
</table>

Scanning range

- 600...6000 mm
- Blind zone: 600 mm

BUS Q80K switching output

- 2x PNP, NO/NC contact
  - Ordering code: BUS000A
  - Part number: BUS Q80K-PNXP-600-S92K
- 2x NPN, NO/NC contact
  - Ordering code: BUS000C
  - Part number: BUS Q80K-NPNX-600-S92K

BUS Q80K analog output

- 0...10 V
  - Ordering code: BUS000E
  - Part number: BUS Q80K-XAEP-600-S92K
- 4...20 mA
  - Ordering code: BUS000F
  - Part number: BUS Q80K-XBER-600-S92K

Suitable connector

<table>
<thead>
<tr>
<th>Size/style</th>
<th>Length/cable material</th>
<th>Ordering code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12, 5-pin/straight</td>
<td>5 m/PUR</td>
<td>BCC098C</td>
</tr>
<tr>
<td>M12, 5-pin/angled</td>
<td>5 m/PUR</td>
<td>BCC08FC</td>
</tr>
</tbody>
</table>

Fill-level monitoring in silos

The fill level of bulk materials in a container is detected by a continuous measurement with ultrasonic sensors. The fill level can optionally be output by an analog signal or with two switching signals – as min./max. value.