



Capacitive Sensors

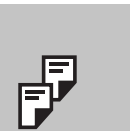
Capacitive sensors for object detection

Balluff capacitive sensors BCS are used for object and level detection. They measure all materials – even non-conductive ones such as liquids, granules and powders – in direct contact or through a container wall and they do this even with stringent technical requirements. In this way, difficult environments such as high temperature and pressure, stainless steel and Teflon housing or a wide supply voltage are not a problem for the capacitive sensors BCS. BCS sensors are available in different designs, including particularly small versions. As adhesive sensors, they also fit extremely easily in the housing design.

The high-end SmartLevel variant is the ideal level sensor for conductive media. This is because it compensates for humidity, foam and deposits of any kind, even through thick glass and plastic walls. And it guarantees application security in advanced applications.



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Basic information and definitions can be found on **page 934**.



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Performance spectrum

It would be hard to imagine not having capacitive sensors in industrial automation, because they bring reliability to object and level detection. Balluff capacitive sensors show what they can do in situations where other capacitive sensors reach their limit.

With extreme precision, BCS sensors check:

- Stack height
- Level
- Presence
- Volume

In doing so, they are not affected by dust, reflection or object properties and color. They also measure objects with absolute reliability through glass and plastic walls, without being impeded by external factors. In this way, the capacitive Balluff sensors provide for certainty.



Balluff capacitive sensors BCS provide more potential than others.

The ideal level sensor, SmartLevel not only sees through thicker glass and plastic walls, it also compensates for moisture, foam and deposits. SmartLevel is able to provide solutions in applications that would have been impossible before.



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Performance spectrum



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Special Accessories for Capacitive Sensors



SmartLevel sensors take off in the Airbus A380

Airbus is equipping the restrooms in its 4-engine large-body A380 with a mixer tap. The heart of this exclusive system in the elegant Airbus design are compact SmartLevel capacitive sensors from Balluff. These enable passengers to conveniently select the desired water temperature with the assistance of an LED indicator. The special attraction: Sensing errors are impossible, since SmartLevel sensors ignore clinging dirt, liquid films and soap foam all on their own. Touching the faucet triggers a switching operation, even if a wet paper towel covers it.



SMARTLEVEL

Capacitive Sensors

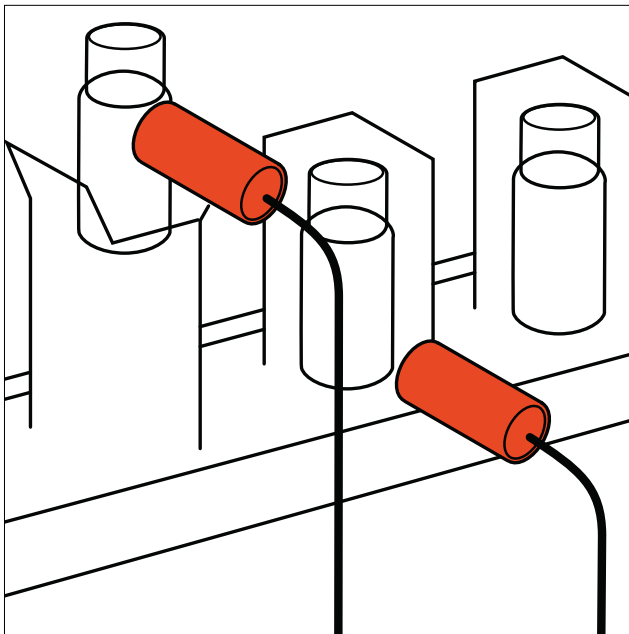
Sensors in use

Capacitive sensors BCS measure metallic or non-metallic objects and levels of granular materials, powdery, viscous or liquid media. In doing so, they can be used as contacting sensors, in other words, in direct contact with the object to be measured, or as contactless sensors. This is because they work extremely reliably, even through container walls.

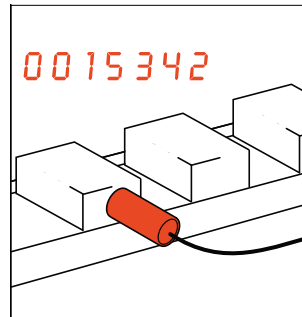
Whether contacting or contactless, the capacitive sensors from Balluff are excellently suited for difficult applications, so that they can also fulfill your special requirements.

Contact us

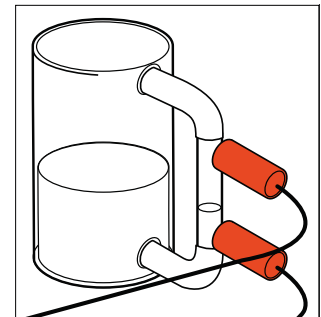
Packaging lines: Checking packaging and volume



Transfer lines: Determining number of pieces

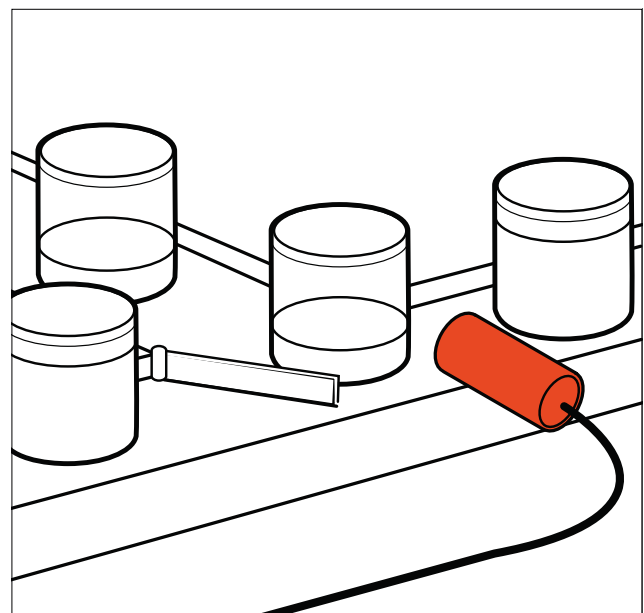


Water tanks: Regulating in-flow and controlling pumps



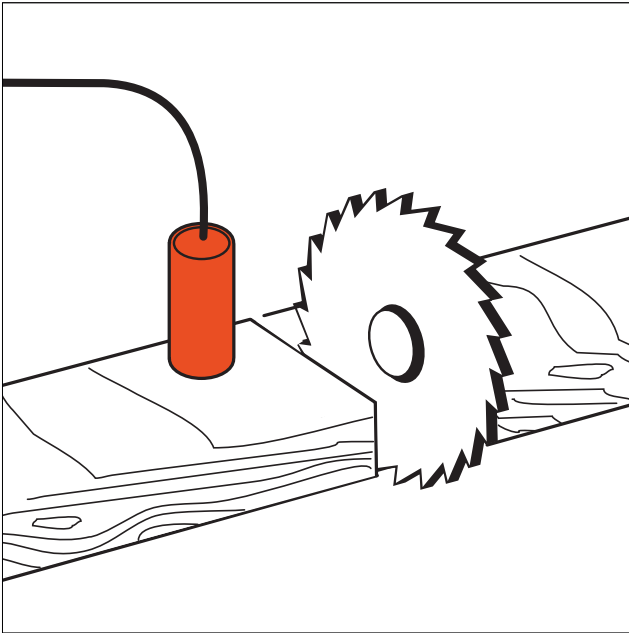
Industries

- Handling and automation
- Specialty machine construction
- Automotive industry
- Semiconductor industry
- Electronics industry (circuit boards, CD and DVD manufacturing, etc.)
- Food industry
- Bottling and packaging
- Chemical industry
- Industrial cleaning technology
- Pharmaceuticals and medical technology
- Plastic and rubber industry
- Timber and furniture industry
- Paper and printing industry
- Energy generation

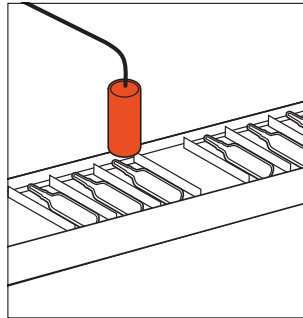


Bottling equipment: Checking fill level and controlling the ejector station

Wood processing: Measuring wood and thickness



Packaging: Checking completeness



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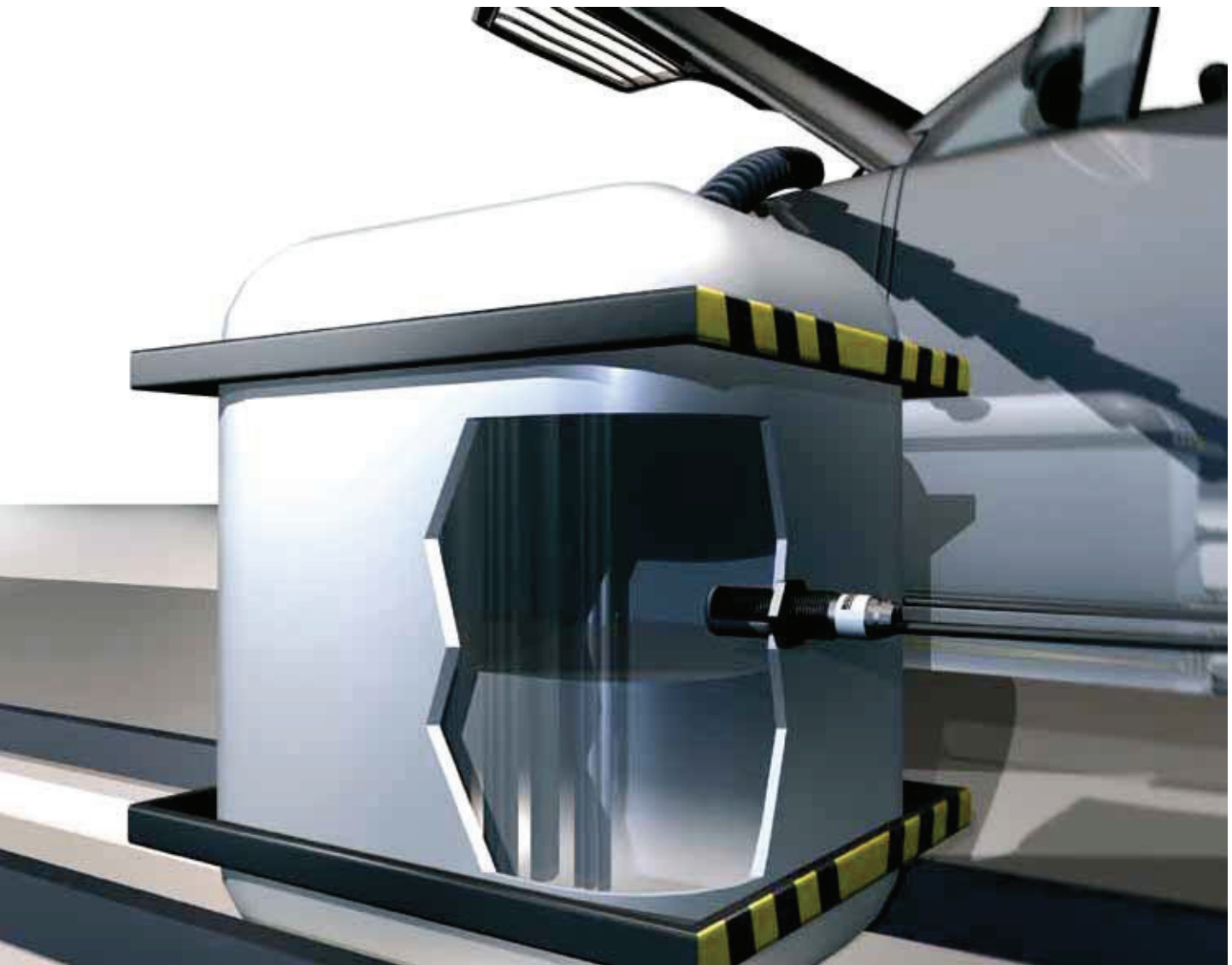
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Capacitive Sensors for Level Detection

Capacitive Sensors with Special Properties

Capacitive Sensors for Analog Distance Measurement

Accessories for Capacitive Sensors



Product Selection Guide

Detecting objects	Detection of objects (paper, cardboard, glass, plastic, wood, wafers, metal)	Capacitive sensors for object detection (flush standard sensors)	
		With large dielectric constant Glass, ceramics, wafers, metals All sensors for object detection can be used. The sensor depends on the required switching distance and the space conditions of the installation situation. The switching distance decreases by a factor of 0.6 to 1. On page 749	
		With medium dielectric constant Massive plastic parts, dense stacks of paper and cardboard, wires, filled plastic containers, etc. Sensors for object detection as of Ø 6.5 mm and M8 can be used. Sensors with a higher switching distance are preferable; application tests are useful. The switching distance decreases by a factor of 0.3 to 0.5. On page 755	
		With low dielectric constant Small plastic parts, paper, cardboard, electronic components, etc. Large sensors for object detection are required and installation very close to the object is useful. Sensors with an external amplifier are ideal due to their compact designs. Application tests are absolutely necessary. The switching distance decreases by a factor of 0.1 to 0.3. On page 759	
Detecting fill levels	Detecting non-conducting media (plastic granulates, feed pellets, wood pellets and oils)	Capacitive sensors for level detection (non-flush standard sensors)	
		Through the container wall Plastic granulates, wood pellets and feed pellets Sensors for Object Detection on page Cylinder Designs M18...M30 759 Disc types Ø 50 mm 764 Block Design 40x40 mm Uniflat 767	In contact with the media Oils, greases Sensors for Level Detection on page Cylinder Designs M12...M30 771 MicroLevel Probe Design 778 High-temperature Probe Design 794
		Oils, greases, powders Sensors for Object Detection on page Cylinder Designs M18...M30 759 Disc types Ø 50 mm 764 MicroBox Block Design 765 Block Design 40x40 mm Uniflat 767	Plastic granulates, wood pellets and feed pellets Sensors for Level Detection on page Cylinder Designs M18...M30 773 MicroLevel Probe Design 778 High-temperature Probe Design 794
	Objects in outer packaging Sensors for Object Detection on page Cylinder Designs M18...M30 759 Disc types Ø 50 mm 764 MicroBox Block Design 765 Block Design 40x40 mm Uniflat 767		
Detecting conductive media	Detecting conductive media (such as aqueous liquids, acids, bases and conductive powders)	Capacitive SMART^{LEVEL} sensors for level detection	
		Through the container wall Conductivity up to 15 mS/cm SMART^{LEVEL} 15 on page Cylinder Designs M18...M30 784 MicroBox Block Design 790 Block Design 40x40 mm Uniflat 791 Disk Design Ø 50 mm 788	In contact with the media Conductivity up to 15 mS/cm SMART^{LEVEL} 15 on page Cylinder Designs M18...M30 (PBT/PTFE) 785 Cylinder Design Ø 7x52 mm (PTFE) 783 MicroLevel Probe Design 786
		Conductivity up to 50 mS/cm SMART^{LEVEL} 50 on page Disk Design Ø 50 mm Disk 789	Conductivity up to 500 mS/cm SMART^{LEVEL} 500+ on page M30 tubular-style housing 799
	Conductivity up to 500 mS/cm SMART^{LEVEL} 500+ on page M30 tubular-style housing 799		

Quickly and reliably find the right capacitive sensor for your standard application. In case of doubt, we recommend on-site application tests. For specific technical data on the sensors, please refer to the respective data sheet.

The most important selection criteria

- Technology and installation: Sensors for object detection (flush), sensors for level detection (non-flush) or **SMARTLEVEL** sensors
- Housing materials: Plastic, metal/plastic or PTFE
- Connection: Cable, plug or pigtail connection, switching functions

Installation and mounting options

Mounting sensors for object detection



Central mounting in a drilled hole

- M5, M8, M12, M18, M30
- Simple, flexible fastening with two nuts
- Flexible positioning in the sensor axis



Through-holes in the sensor

- Standard mounting for cubical sensors
- Simple mounting through threaded hole
- Clear positioning when replacing



Threaded holes in the sensor

- Central hole with M3 thread
- Very easy installation
- Clear positioning when replacing



Clamping a cylindrical sensor

- Suitable for all cylindrical designs
- Simple, reliable fastening
- Very flexible positioning



Installation as a leak sensor

- Simple to install
- Clear positioning when fastening
- Use of sensors with a fixed switching distance

Installation of fill-level indicators



Flange mounting

- Pressure-tight screw connection
- Can be used in metal containers
- Installation in standard bushings is possible



Hole mounting

- Simple screw connection
- Can be used for every container material
- Not pressure-tight
- Suitable for powders and granules



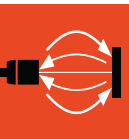
Installation of cable ties

- Simple, subsequent fastening
- No contact with product necessary
- For non-metallic containers



Wall mounting

- Simple fastening
- For non-metallic containers
- No drilling of container
- No contamination of the medium



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Housing materials for each application

A suitable housing material ensures long-term and reliable use of the sensor in your application.

Plastic housing made of PBT, PP, PVC, PUR, PSU:

They are often made of one piece, and therefore leakproof where they make contact with media (sensing surface). The plastic used has to be chemically resistant to the medium to be detected. Cost-effective.

Stainless steel housing with PTFE cap:

This version combines excellent housing stability with the very good sensor properties of PTFE. It is antistatic and nonstick. Under continuous operation, therefore, only minimal contamination can be expected. The metal housing is good at dissipating static charges.

Full PTFE housing:

These provide the best possible chemical resistance. The housing material is food-grade and FDA-compliant. The connection cable for all capacitive PTFE sensors is also made with PTFE. The LED and the setting potentiometer are also covered with PTFE. The mechanical stability is lower than for other plastics.

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Product overview



Ø 4 mm flush M5x0.5 flush Ø 6.5 mm flush Ø 6.5 mm non-flush M8x1 flush M8x1 non-flush

	Ø 4 mm flush	M5x0.5 flush	Ø 6.5 mm flush	Ø 6.5 mm non-flush	M8x1 flush	M8x1 non-flush	
Power supply							
DC	■	■	■	■	■	■	
AC/DC							
Housing materials							
Stainless steel	■	■	■	■	■	■	
Plastic							
PTFE (Teflon®)							
Connection							
Connector			■	■	■	■	
Cable with connector	■	■	■	■	■	■	
Cable			■	■	■	■	
Special properties							
Global series							
High temperature rated							
Function diagnostics							
SmartLevel							
Compensate for moisture, foam and deposits							
Penetrate glass or plastic walls over 10 mm thick							
Detection of aqueous to highly conductive media							
Virtually no adjustment or cleaning required							
Areas of application							
Object detection	Page 749	Page 749	Page 749 and page 755	Page 750 and pages 755...756	Page 750 and page 756	Page 750 and page 757	
Direct sensing of bulk product and powdery media							
Sensing bulk product and powdery media through a container wall up to approx. 4mm							
Direct sensing of non-conductive liquid and paste-like media							
Sensing non-conductive liquids and paste-like media through a container wall up to approx. 4mm							
Direct sensing of conductive liquids (SmartLevel technology)							

Capacitive Sensors

Product overview



	Ø 10 mm flush	Ø 10 mm non-flush	M12x1 flush	M12x1 flush	M18x1 flush	M18x1 non-flush	Ø 22 mm flush	Ø 30 mm flush
	■	■	■	■	■	■	■	■
	■	■	■	■	■	■	■	■
	■	■	■	■	■	■	■	■
	■	■	■	■	■	■	■	■
	■	■	■	■	■	■	■	■
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						Page 784...785 Page 784...785		
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Product overview



M30×1.5 flush M30×1.5 non-flush Ø 34 mm flush Disk designs Ø 18...30 mm Disc shapes Ø 50 mm Micro-Box 16×34×8 mm

	M30×1.5 flush	M30×1.5 non-flush	Ø 34 mm flush	Disk designs Ø 18...30 mm	Disc shapes Ø 50 mm	Micro-Box 16×34×8 mm
Power supply						
DC	■	■	■	■	■	■
AC/DC		■				
Housing materials						
Stainless steel	■	■		■		
Plastic	■	■	■		■	■
PTFE (Teflon®)		■			■	
Connection						
Plug connector	■	■	■		■	
Cable with connector				■		■
Cable	■	■	■	■	■	■
Terminal housing						
Special properties						
Global series	Page 760...761	Page 775...776	Page 761			
High temperature rated		Page 794				
Pressure rated						
Stick-on, flexible						
IP 68 degree of protection						
SmartLevel						
Compensate for moisture, foam and deposits		Page 785			page 789	Page 790
Penetrate glass or plastic walls over 10 mm thick		Page 785			page 789	Page 790 (up to 8 mm)
Detection of aqueous to highly conductive media		Page 785			page 789	Page 790
Virtually no adjustment or cleaning required		Page 785			page 789	Page 790
Areas of application						
Object detection	Page 760...761		Page 761	Pages 752...753 and page 763	Page 764	Page 765
Direct sensing of bulk product and powdery media	Page 760...761 (flush installation)	Page 775...776	Page 761 (flush installation)	Pages 752...753 and page 763 (flush installation)	Page 764 (flush installation)	
Sensing bulk product and powdery media through a container wall up to approx. 4mm	Page 760...761		Page 761	Pages 752...753 and page 763	Page 764	Page 765
Direct sensing of non-conductive liquid and paste-like media		Page 775...776				
Sensing non-conductive liquids and paste-like media through a container wall up to approx. 4mm	Page 760...761		Page 761	Pages 752...753 and page 763	Page 764	Page 765
Direct sensing of conductive liquids (SmartLevel technology)		Page 785				
Detecting conductive liquids through a container wall even over 10mm thick (SmartLevel technology)		Page 785			page 789	Page 790 (up to 8 mm)

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Uniflat
40x40x10 mm



90x16x4 mm



Ø 7x52 mm



MicroLevel
M12x1, G¼", NPT¼"

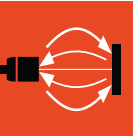


M18x1, R¾", NPTF¾"



M18x1, R¾", NPTF¾"

	■	■	■	■	■	■
	■	■		■		■
			■		■	■
	■	■		■		■
	■		■		■	
					■	



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