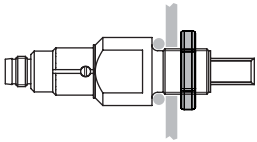


**Safety Instructions and Functions and Features**

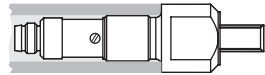
- Please read the product description prior to set-up of the unit. Ensure that the product is suitable for your application without any restrictions.
- The unit conforms to the relevant regulations and EC directives.
- Improper or non-intended use may lead to malfunctions of the unit or to unwanted effects in your application.

- That is why installation, electrical connection, set-up, operation and maintenance of the unit must only be carried out by qualified personnel authorized by the machine operator.
- The capacitive sensor detects without contact metals, almost all plastics, glass, ceramics, wood, paper, oils, greases, water and all hydrous materials and indicates their presence by providing a switched signal.

**Mounting Restrictions**



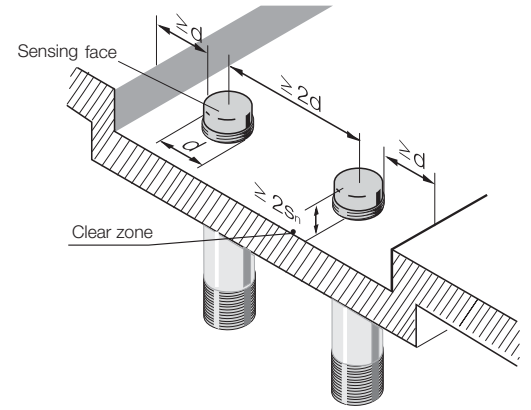
**Standard mounting** uses through-holes with included nut. This can be ignored when threaded holes are used or serve as additional security. Sealing is accomplished using an O-ring or gasket.



**Reverse mounting** in a tube of any desired length for fashioning "point-switching" rod sensors. Here, sealing can also be accomplished using an O-ring or a gasket.

**Unshielded proximity switches**

The sensing face must extend  $\geq 2s_n$  from the metallic installation medium. The distance between two proximity switches must be  $\geq 2d$ .



To ensure that the sensors are not mechanically destroyed during installation, make sure that you comply with the following torque figures.

Housing size	Material	Tightening torque
M5x0,5	V2A	3 Nm
M8x1	V2A	15 Nm
M12x1	V2A	40 Nm
M18x1	V2A	60 Nm
M30x1,5	V2A	90 Nm

**Electrical Definitions**

**DC 3-/4-wire**

**PNP (+) sourcing**

Cable/terminals

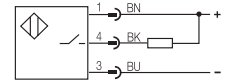
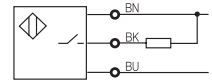
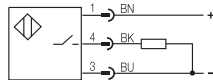
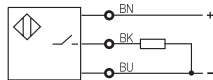
Connector

**NPN (-) sinking**

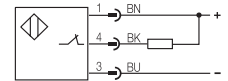
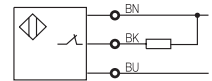
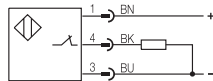
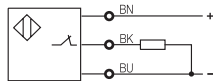
Cable/terminals

Connector

Normally open

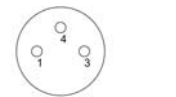
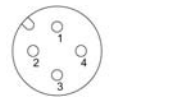
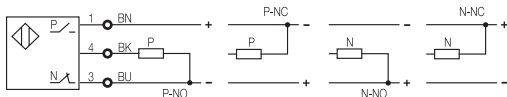


Normally closed



**PNP/NPN selectable**

NO/NC user selectable (XDC - output)



**Switching function**

N.O. (normally open):

The sensor closes a circuit to the load when a target is detected or the sensor is operated. Contacts are open when the sensor is not operated and when there is no external force on the actuator.



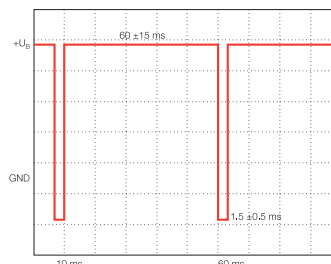
N.C. (normally closed):

The sensor opens a circuit to the load when a target is detected or the sensor is operated. Contacts are closed when the sensor is not operated and when there is no external force on the actuator.

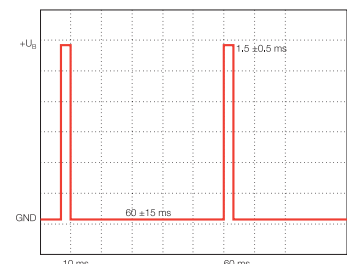


**The continuous self test signal (CST) is superimposed on the output signal.**

Test pulse positive



Test pulse negative



\* Only MicroLEVEL

**Wire colors, marking per DIN IEC 60757**

<b>BN</b>	brown
<b>BK</b>	black
<b>BU</b>	blue
<b>WH</b>	white





**Applications for SMARTLEVEL-sensors with conductivity values**

The following chart gives an approximated overview of electrical conductivity values for specific liquids. SMARTLEVEL Sensors rely on the conductivity for detection and compensation. Matching the right SMARTLEVEL sensor becomes especially crucial for challenging applications. The media and conductivity values given here are only guide values and are for general orientation only. Changing material composition and concentrations can affect the conductivity values substantially.

Industrial waste water (select the sensor according to conductivity of the medium)			
Disinfectants (media containing chlorine)			
Table salt solution			
Alcohol	Rinsing agents		
Marmalade	Milk/buttermilk/yoghurt		
Deionized water	Fruit juice		
Mineral oils	Coolant/lubricants	Ketchup/mayonnaise/mustard	
Plant oils	Formic acid (30 %)	Phosphoric acid (10 %)	
Ammonia (30 %)	Vinegar	Sulfuric acid (10 %)	
Drinking water	Cola	Calcium chloride (30 %)	
Sugar solution, diluted	Honey/glue	Blood	Hydrochloric acid (40 %)
Toothpaste	Beer	Saltwater	Nitric acid (12 %)

BCS Standard  
up to approx. 0.7 mS

**SMARTLEVEL 15**  
approx. 0.7...15 mS

**SMARTLEVEL 50**  
approx. 15...50 mS

**SMARTLEVEL 500+**  
approx. 15...50 mS  
and greater

**Standard applications with liquid, conductive media**

SMARTLEVEL sensors are factory adjusted for standard applications and can reliably detect liquid, conductive media through glass or plastic walls. The factory setting automatically hides glass and plastic walls (approx. 0.5...6 mm) and compensates for internal or external foam, moisture, and contamination.

**Special applications**

SMARTLEVEL sensors can also be used with liquid, conductive media in otherwise tricky or even impossible applications such as seeing through glass and plastic walls even greater than 6 mm thick.

**SMARTLEVEL sensors set new standards**

Simply describing SMARTLEVEL as a level sensor for reliable sensing of liquid, conductive media does not do it justice.

SMARTLEVEL sensors can solve applications that were previously tricky or even impossible.

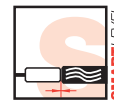
**SMARTLEVEL**

- Compensate for moisture, foam and build-up
- Penetrate glass or plastic walls up to 12 mm thick
- Detect aqueous to highly conductive media
- Feature chemically resistant housings made of PTFE

**SMARTLEVEL sensors reduce cost**

- Adjustment-free installation
- Freedom from cleaning in most applications
- Reduced use of materials
- Less construction outlay (e.g. no bypass tubes)

SMARTLEVEL sensors optimize production processes and increase



**Direct or Indirect Level Detection of Water-based or Conductive Liquids**

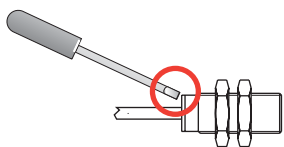
SmartLevel sensors use a new patented capacitive sensing technology to detect water-based or other conductive liquids direct or indirect through non-metallic container walls. SMARTLevel sensors do not require any preliminary sensitivity adjustment for container walls up to 6mm but are able to penetrate up to 12mm with additional adjustment described in the following for empty and full containers.

**Empty setup (normally open)**

1. Mount the sensor in the actual level sensing position flush to the non-metallic container wall.
2. The sensor will stay off independent of the container wall. Turn the sensitivity adjustment slowly CW until the sensor turns on.
3. The sensitivity now has to be reduced by slowly turning the potentiometer 3-turns CCW.
4. The sensor should switch on at 40% to 50% sensing area coverage - readjust the sensitivity CCW if the coverage is above 50% and CW if it is below 40%

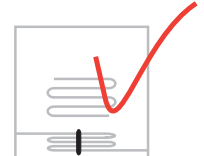
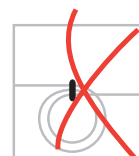
**Full setup (normally open)**

1. Mount the sensor in the actual level sensing position flush to the non-metallic container wall.
2. The sensor switches on if the thickness of the container wall is below 6mm, and stay off if it is thicker.
3. Adjust the sensor now CCW until it barely switches off or CW until it barely switches on.
4. Increase the sensitivity CW by another 1/2 turn to set the sensor to its optimal sensitivity setting.
5. The sensor should switch on at 40% to 50% sensing area



**Important:** Different material properties and conditions have to be taken into consideration during the calibration process. All Balluff BCS capacitive sensors are therefore equipped

with highly accurate trim potentiometers to adjust the device's sensitivity. Turning the potentiometer clockwise (CW) increases the sensitivity, whereas counter-clockwise (CCW) turning reduces it.



**Note on cable routing**

The connection cable should not be coiled behind the sensor. Instead, shorten the cable if needed or route it loosely. (see diagrams above)