

# Level Detection

DC 3-wire · **SMARTLEVEL** technology



## **SMARTLEVEL** sensors set new standards

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

**SMARTLEVEL** sensors can do far more - precisely when all other types have long since taken in their sails: in applications that were previously either tricky or simply impossible to solve.

**SMARTLEVEL** sensors go the extra mile.

## **SMARTLEVEL**

- Compensate for moisture, foam and build-up
- Penetrate glass or plastic walls even over 10 mm thick
- Detect aqueous to highly conductive media
- Feature chemically resistant housings made of PTFE

## **SMARTLEVEL** sensors reduce cost

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

**SMARTLEVEL** sensors optimize production processes and increase application reliability.

## 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. If needed, the calibration can be changed at the factory.



## Note on cable routing

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

## **SMARTLEVEL** takes off – in the Airbus A380

Airbus is equipping the rest rooms in their 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 show-stopper: sensing errors are impossible, since **SMARTLEVEL** sensors ignore clinging dirt, liquid films and soap foam. Only hand-touching the faucet results in a switching operating, even if a wet paper towel covers it.



# Level Detection

DC 3-wire · **SMARTLEVEL** technology  
M18



Housing size		M18x1	M18x1	M18x1
Mounting		non-flush	non-flush	non-flush
Rated switching distance $s_n$		<b>Self-adjusting</b>	<b>Self-adjusting</b>	<b>Self-adjusting</b>
PNP Normally open	<b>Ordering code</b>	<b>BCS008T</b>	<b>BCS007N</b>	<b>BCS008A</b>
	Part number	BCS M18VVN-PSCFAG-S49G	BCS M18W11-PSCFAG-DV02	BCS M18TTI2-PSCFAG-AT02
PNP Normally closed	<b>Ordering code</b>	<b>BCS008U</b>	<b>BCS007P</b>	<b>BCS008C</b>
	Part number	BCS M18VVN-POCFAG-S49G	BCS M18W11-POCFAG-DV02	BCS M18TTI2-POCFAG-AT02
NPN Normally open	<b>Ordering code</b>	<b>BCS008W</b>	<b>BCS007R</b>	<b>BCS008E</b>
	Part number	BCS M18VVN-NSCFAG-S49G	BCS M18W11-NSCFAG-DV02	BCS M18TTI2-NSCFAG-AT02
NPN Normally closed	<b>Ordering code</b>	<b>BCS008Y</b>	<b>BCS007T</b>	<b>BCS008F</b>
	Part number	BCS M18VVN-NOCFAG-S49G	BCS M18W11-NOCFAG-DV02	BCS M18TTI2-NOCFAG-AT02
Supply voltage $U_s$		10...35 V DC	10...35 V DC	10...35 V DC
Voltage drop $U_d$ at $I_o$		≤ 1.8 V	≤ 1.8 V	≤ 1.8 V
Rated insulation voltage $U_i$		75 V DC	75 V DC	75 V DC
Output current max.		300 mA	300 mA	300 mA
No-load supply current $I_o$ max.		≤ 20 mA	≤ 20 mA	≤ 20 mA
Reverse polarity/short circuit protected		yes/yes	yes/yes	yes/yes
Ambient temperature range $T_a$		-10...+60 °C	-10...+60 °C	-10...+60 °C
Switching frequency $f$		2 Hz	2 Hz	2 Hz
Output function indicator		LED yellow	LED yellow	LED red
Degree of protection per IEC 60529		IP 64	IP 64	IP 64
Material	Housing	PVC	PVC	PTFE
	Sensing face	PVC	PVC	PTFE
	Cover	PVC	PBT	PTFE
Wiring		M8 connector, 3-pin	2 m cable PVC, 3×0.25 mm <sup>2</sup>	2 m cable PTFE, 3×0.2 mm <sup>2</sup>

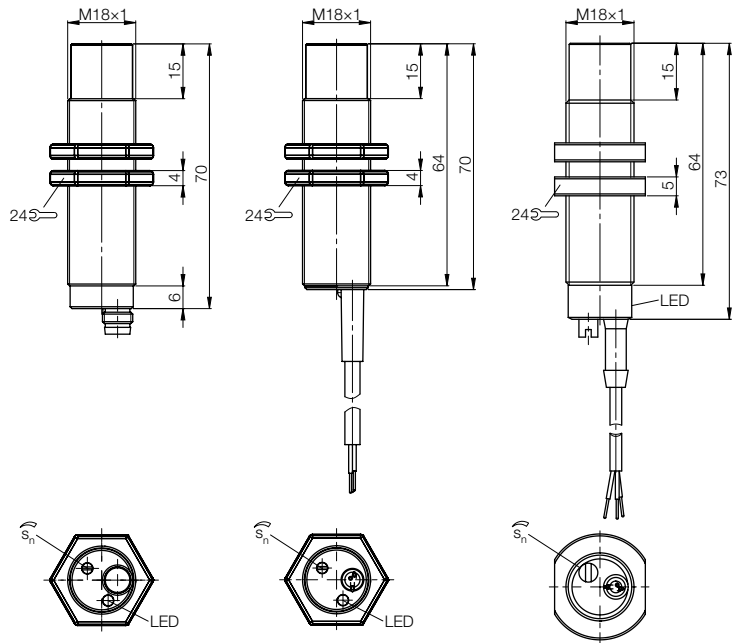
**DC 3-wire**  
Tubular housings  
**SMARTLEVEL-technology**  
High temperature rated styles  
Leak sensor

**AC/DC 2-wire**  
Tubular housings



## For direct installation in containers

The non-flush mount sensors for level detection M12...M30 in plastic or PTFE housing provide IP 68 protection (at approx. 5 bar) at the sensing face. Sensors in stainless steel housing meet IP 67 at the sensing face.



Electrical devices, connectors and holders see Accessories section starting **page 69**



# Level Detection

DC 3-wire · **SMARTLEVEL** technology  
M30

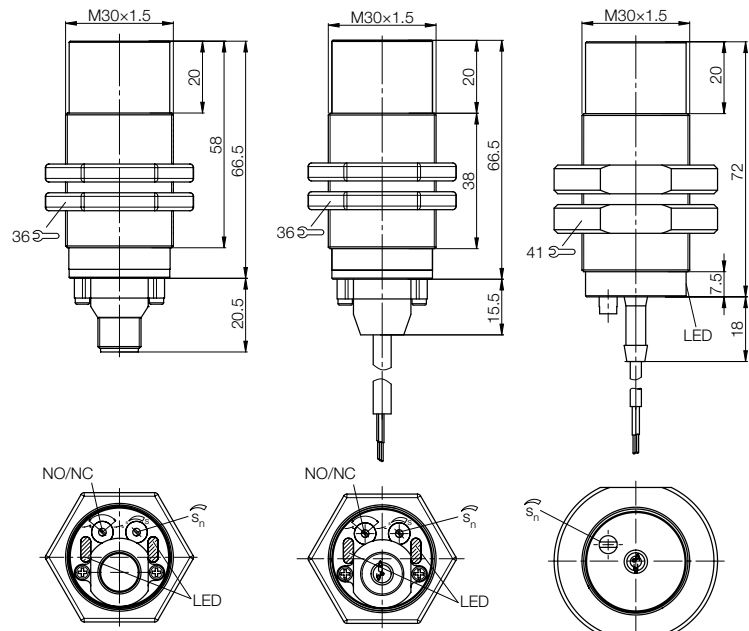


Housing size		<b>M30×1.5</b>	<b>M30×1.5</b>	<b>M30×1.5</b>
Mounting		non-flush	non-flush	non-flush
Rated switching distance $s_n$		<b>Self-adjusting</b>	<b>Self-adjusting</b>	<b>Self-adjusting</b>
PNP Normally open	<b>Ordering code</b>			<b>BCS0086</b>
	Part number			BCS M30TTH2-PSCFAG-AT02
PNP Normally closed	<b>Ordering code</b>			<b>BCS0087</b>
	Part number			BCS M30TTH2-POCFAG-AT02
PNP NO/NC selectable	<b>Ordering code</b>	<b>BCS007Y</b>	<b>BCS007U</b>	
	Part number	BCS M30BBM2-PPCFAG-S04G	BCS M30BBM3-PPCFAG-EP02	
NPN Normally open	<b>Ordering code</b>			<b>BCS0088</b>
	Part number			BCS M30TTH2-NSCFAG-AT02
NPN Normally closed	<b>Ordering code</b>			<b>BCS0089</b>
	Part number			BCS M30TTH2-NOCFAG-AT02
NPN NO/NC selectable	<b>Ordering code</b>	<b>BCS007Z</b>	<b>BCS007W</b>	
	Part number	BCS M30BBM2-NPCFAG-S04G	BCS M30BBM3-NPCFAG-EP02	
PNP/NPN and NO/NC selectable	<b>Ordering code</b>			
Part number				
Supply voltage $U_s$		10...35 V DC	10...35 V DC	10...35 V DC
Voltage drop $U_a$ at $I_o$		≤ 1.8 V	≤ 1.8 V	≤ 1.8 V
Rated insulation voltage $U_i$		75 V DC	75 V DC	75 V DC
Output current max.		300 mA	300 mA	300 mA
No-load supply current $I_o$ max.		≤ 20 mA	≤ 20 mA	≤ 20 mA
Reverse polarity/short circuit protected		yes/yes	yes/yes	yes/yes
Ambient temperature range $T_a$		-10...+60 °C	-10...+60 °C	-10...+60 °C
Switching frequency $f$		2 Hz	2 Hz	2 Hz
Power indicator		LED green	LED green	LED red
Output function indicator		LED yellow	LED yellow	LED red
Degree of protection per IEC 60529		IP 64	IP 64	IP 64
Material	Housing	PBT	PBT	PTFE
	Sensing face	PBT	PBT	PTFE
	Cover	PBT/PE	PBT/PE	PTFE
Wiring		M12 connector, 4-pin, A-coded	2 m cable PUR, 3×0.34 mm <sup>2</sup>	2 m cable PTFE, 3×0.2 mm <sup>2</sup>



## For direct installation in containers

The non-flush mount sensors for level detection M12...M30 and Ø 7×52 mm in plastic or PTFE housing provide IP 68 protection (at approx. 5 bar) at the sensing face. Sensors in stainless steel housing meet IP 67 at the sensing face.



# Level Detection

DC 3-wire · **SMARTLEVEL** technology  
 Ø 7 mm, Micro-Level M12, G 1/4", NPT 1/4"



SMARTLEVEL 15



SMARTLEVEL 15



SMARTLEVEL 15



SMARTLEVEL 15



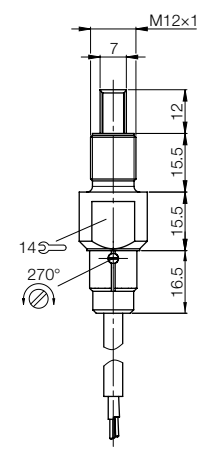
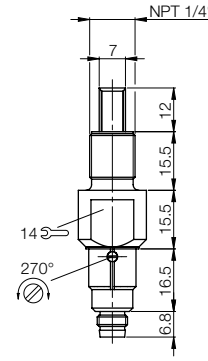
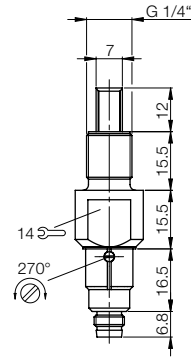
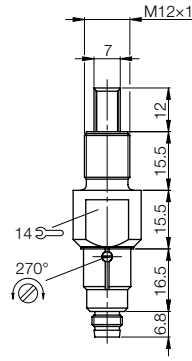
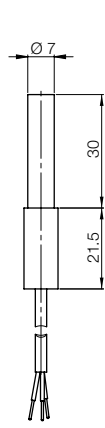
SMARTLEVEL 15

Ø 7x52 mm non-flush Self-adjusting	M12x1 Micro-Level non-flush Self-adjusting	G 1/4" Micro-Level non-flush Self-adjusting	NPT 1/4" Micro-Level non-flush Self-adjusting	M12x1 Micro-Level non-flush Self-adjusting
<b>BCS009C</b>				
BCS S20TT01-PSLFAG-ET02				
<b>BCS009E</b>				
BCS S20TT01-POLFAG-ET02				
<b>BCS009F</b>				
BCS S20TT01-NSLFAG-ET02				
<b>BCS009H</b>				
BCS S20TT01-NOLFAG-ET02				
	<b>BCS0095</b>	<b>BCS0096</b>	<b>BCS0097</b>	<b>BCS008Z</b>
	BCS S41SS01-GPCFAG-S49G	BCS S41SS02-GPCFAG-S49G	BCS S41SS03-GPCFAG-S49G	BCS S40SS01-GPCFAG-EP02
10...30 V DC	10...35 V DC	10...35 V DC	10...35 V DC	10...35 V DC
≤ 1.5 V	≤ 3 V	≤ 3 V	≤ 3 V	≤ 3 V
75 V DC	75 V DC	75 V DC	75 V DC	75 V DC
50 mA	50 mA	50 mA	50 mA	50 mA
≤ 20 mA	≤ 20 mA	≤ 20 mA	≤ 20 mA	≤ 20 mA
no/no	no/yes	no/yes	no/yes	no/yes
+5...+100 °C	-10...+105 °C	-10...+105 °C	-10...+105 °C	-10...+105 °C
10 Hz	5 Hz	5 Hz	5 Hz	5 Hz
	LED green	LED green	LED green	LED green
	LED yellow	LED yellow	LED yellow	LED yellow
IP 66	IP 67 (Sensing face: IP 68 at max. 10 bar)	IP 67 (Sensing face: IP 68 at max. 10 bar)	IP 67 (Sensing face: IP 68 at max. 10 bar)	IP 67 (Sensing face: IP 68 at max. 10 bar)
PTFE	PSU	PSU	PSU	PSU
PTFE	PSU	PSU	PSU	PSU
PTFE	PSU	PSU	PSU	PSU
2 m cable PTFE, 3x0.2 mm <sup>2</sup>	M8 connector, 3-pin	M8 connector, 3-pin	M8 connector, 3-pin	2 m cable PUR, 3x0.34 mm <sup>2</sup>



**DC 3-wire**  
 Tubular housings  
**SMARTLEVEL-technology**  
 High temperature rated styles  
 Leak sensor

**AC/DC 2-wire**  
 Tubular housings



Shield (M18 or 1/2") for Micro-Level sensors see Accessories section Page 100



Electrical devices, connectors and holders see Accessories section **page 69**



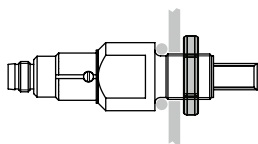
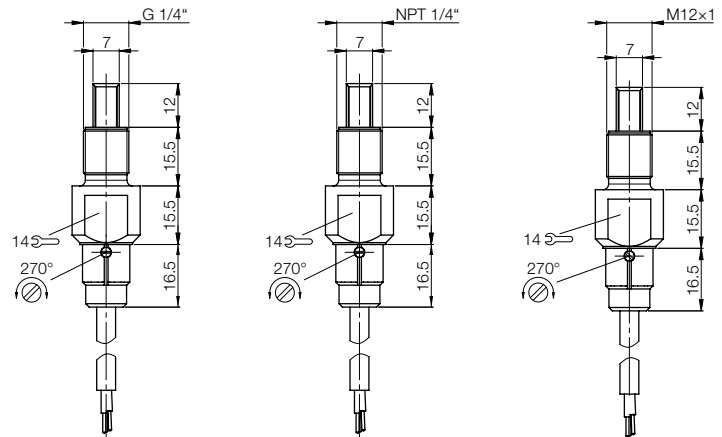
# Level Detection

DC 3-wire · **SMARTLEVEL** technology  
Micro-Level G 1/4", NPT 1/4", M12

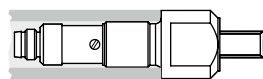


Housing size		<b>G 1/4"</b> Micro-Level	<b>NPT 1/4"</b> Micro-Level	<b>M12x1</b> Micro-Level
Mounting		non-flush	non-flush	non-flush
Rated switching distance $s_n$		<b>Self-adjusting</b>	<b>Self-adjusting</b>	<b>Self-adjusting</b>
PNP/NPN and NO/NC selectable	<b>Ordering code</b>	<b>BCS0090</b>	<b>BCS0091</b>	<b>BCS0092*</b>
	Part number	BCS S40SS02-GPCFAG-EP02	BCS S40SS03-GPCFAG-EP02	BCS S40SS01-GPCFAG-EP02-D01
Supply voltage $U_s$		10...35 V DC	10...35 V DC	10...35 V DC
Voltage drop $U_d$ at $I_o$		≤ 3 V	≤ 3 V	≤ 3 V
Rated insulation voltage $U_i$		75 V DC	75 V DC	75 V DC
Output current max.		50 mA	50 mA	50/50 mA push-pull
No-load supply current $I_o$ max.		≤ 20 mA	≤ 20 mA	≤ 20 mA
Reverse polarity/short circuit protected		no/yes	no/yes	no/yes
Ambient temperature range $T_a$		-10...+105 °C	-10...+105 °C	-10...+105 °C
Switching frequency $f$		5 Hz	5 Hz	100 Hz
Power indicator		LED green	LED green	LED green
Output function indicator		LED yellow	LED yellow	LED yellow
Degree of protection per IEC 60529		IP 67 (Sensing face: IP 68 at max. 10 bar)	IP 67 (Sensing face: IP 68 at max. 10 bar)	IP 67 (Sensing face: IP 68 at max. 10 bar)
Material	Housing	PSU	PSU	PSU
	Sensing face	PSU	PSU	PSU
	Cover	PSU	PSU	PSU
Wiring		2 m cable PUR, 3x0.34 mm <sup>2</sup>	2 m cable PUR, 3x0.34 mm <sup>2</sup>	2 m cable PUR, 3x0.34 mm <sup>2</sup>

Shield (M18 or 1/2") for Micro-Level sensors see Accessories section Page 100



**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 also sealing can be accomplished using an O-ring or a gasket.

# Level Detection

DC 3-wire · **SMARTLEVEL** technology  
Micro-Level G 1/4", NPT 1/4", M12



SMARTLEVEL 15



SMARTLEVEL 15



SMARTLEVEL 15



SMARTLEVEL 15



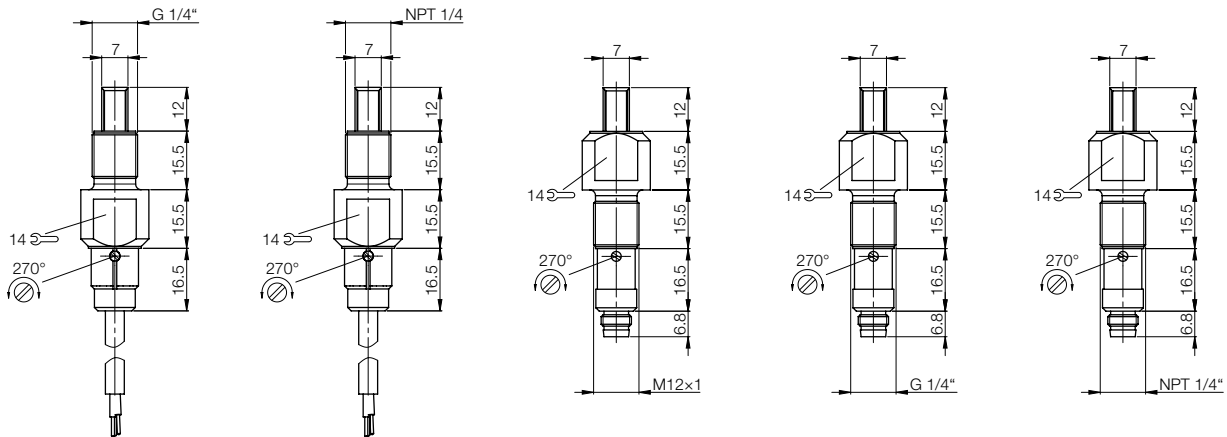
SMARTLEVEL 15

G 1/4" Micro-Level non-flush Self-adjusting BCS0093*	NPT 1/4" Micro-Level non-flush Self-adjusting BCS0094*	M12x1 Micro-Level non-flush Self-adjusting BCS0098	G 1/4" Micro-Level non-flush Self-adjusting BCS0099	NPT 1/4" Micro-Level non-flush Self-adjusting BCS009A
BCS S40SS02-GPCFAG-EP02-D01	BCS S40SS03-GPCFAG-EP02-D01	BCS S42SS01-GPCFAG-S49G	BCS S42SS02-GPCFAG-S49G	BCS S42SS03-GPCFAG-S49G
10...35 V DC	10...35 V DC	10...35 V DC	10...35 V DC	10...35 V DC
≤ 3 V	≤ 3 V	≤ 3 V	≤ 3 V	≤ 3 V
75 V DC	75 V DC	75 V DC	75 V DC	75 V DC
50/50 mA push-pull ≤ 20 mA	50/50 mA push-pull ≤ 20 mA	50 mA ≤ 20 mA	50 mA ≤ 20 mA	50 mA ≤ 20 mA
no/yes	no/yes	no/yes	no/yes	no/yes
-10...+105 °C	-10...+105 °C	-10...+105 °C	-10...+105 °C	-10...+105 °C
100 Hz	100 Hz	5 Hz	5 Hz	5 Hz
LED green	LED green	LED green	LED green	LED green
LED yellow	LED yellow	LED yellow	LED yellow	LED yellow
IP 67 (Sensing face: IP 68 at max. 10 bar)	IP 67 (Sensing face: IP 68 at max. 10 bar)	IP 64 (Sensing face: IP 68 at max. 10 bar)	IP 64 (Sensing face: IP 68 at max. 10 bar)	IP 64 (Sensing face: IP 68 at max. 10 bar)
PSU	PSU	PSU	PSU	PSU
PSU	PSU	PSU	PSU	PSU
PSU	PSU	PSU	PSU	PSU
2 m cable PUR, 3×0.34 mm <sup>2</sup>	2 m cable PUR, 3×0.34 mm <sup>2</sup>	M8 connector, 3-pin	M8 connector, 3-pin	M8 connector, 3-pin



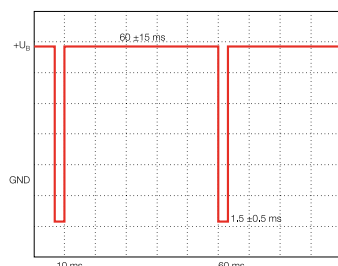
**DC 3-wire**  
Tubular housings  
**SMARTLEVEL-technology**  
High temperature rated styles  
Leak sensor

**AC/DC 2-wire**  
Tubular housings

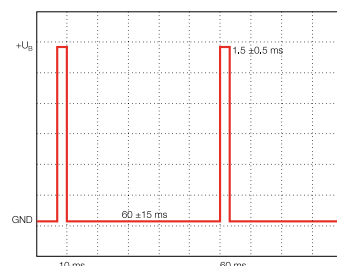


\* **i** The continuous self-test signal (CST) is superimposed on the output signal.

Test pulse positive



Test pulse negative



Electrical devices, connectors and holders see Accessories section starting page 69



# Level Detection

DC 3-wire · **SMARTLEVEL** technology

Ø 50 mm



**SMARTLEVEL 15**

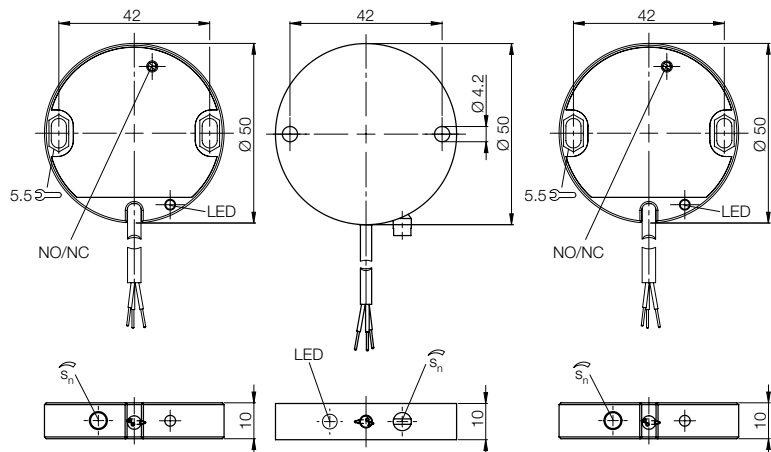


**SMARTLEVEL 15**



**SMARTLEVEL 50**

Housing size		Ø 50×10 mm	Ø 50×10 mm	Ø 50×10 mm
Mounting		flush	flush	flush
Rated switching distance $s_n$		<b>Self-adjusting</b>	<b>Self-adjusting</b>	<b>Self-adjusting</b>
PNP Normally open	<b>Ordering code</b>		<b>BCS0080</b>	<b>BCS00CK</b>
	Part number		BCS D50TT05-PSCFAC-ET02	BCS D50O006-PSFSC-EV02
PNP Normally closed	<b>Ordering code</b>		<b>BCS0081</b>	<b>BCS00CM</b>
	Part number		BCS D50TT05-POCFAC-ET02	BCS D50O006-POFSC-EV02
PNP NO/NC selectable	<b>Ordering code</b>	<b>BCS0084</b>		
	Part number	BCS D50O004-PPCFAC-EV02		
NPN Normally open	<b>Ordering code</b>		<b>BCS0082</b>	<b>BCS00HE</b>
	Part number		BCS D50TT05-NSCFAC-ET02	BCS D50O006-NSFSC-EV02
NPN Normally closed	<b>Ordering code</b>		<b>BCS0083</b>	<b>BCS00C1</b>
	Part number		BCS D50TT05-NOCFAC-ET02	BCS D50O006-NOFSC-EV02
NPN NO/NC selectable	<b>Ordering code</b>	<b>BCS0085</b>		
	Part number	BCS D50O004-NPCFAC-EV02		
PNP/NPN and NO/NC selectable	<b>Ordering code</b>			
Part number				
Supply voltage $U_s$		10...35 V DC	10...35 V DC	10...35 V DC
Voltage drop $U_a$ at $I_o$		≤ 1.8 V	≤ 1.8 V	≤ 1.8 V
Rated insulation voltage $U_i$		75 V DC	75 V DC	75 V DC
Output current max.		300 mA	300 mA	300 mA
No-load supply current $I_o$ max.		≤ 20 mA	≤ 20 mA	≤ 10 mA
Reverse polarity/short circuit protected		yes/yes	yes/yes	yes/yes
Ambient temperature range $T_a$		-10...+60 °C	-10...+60 °C	-10...+60 °C
Switching frequency $f$		2 Hz	2 Hz	2 Hz
Power indicator				
Output function indicator		LED yellow	LED red	LED yellow
Degree of protection per IEC 60529		IP 67	IP 67	IP 67
Material	Housing	POM	PTFE	POM
	Sensing face	POM	PTFE	POM
	Cover	POM	PTFE	POM
Wiring		2 m cable PVC, 3×0.25 mm <sup>2</sup>	2 m cable PTFE, 3×0.2 mm <sup>2</sup>	2 m cable PVC, 3×0.25 mm <sup>2</sup>





# Level Detection

DC 3-wire · **SMARTLEVEL** technology

Micro-Box 16×34×8 mm

M30



**SMARTLEVEL 15**



**SMARTLEVEL 15**



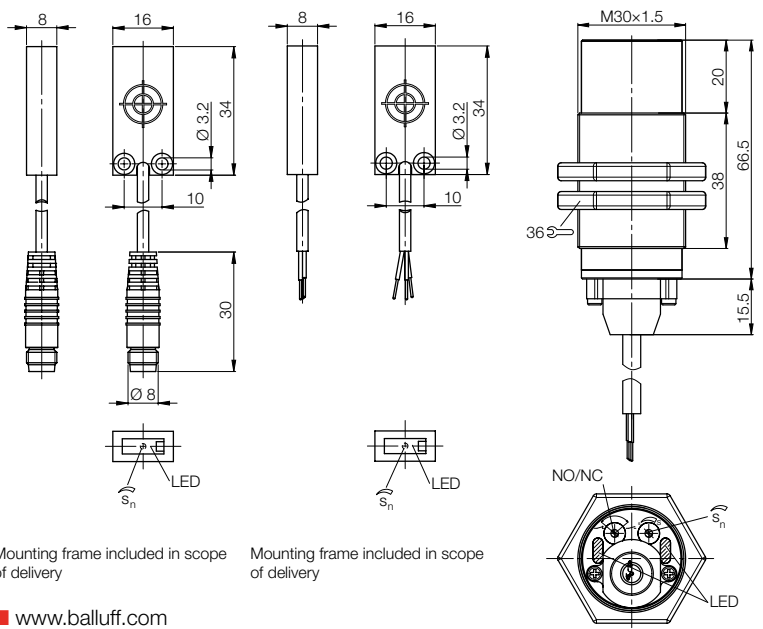
**SMARTLEVEL 500+**

Available starting 2010

16×34×8 mm Micro-Box flush	16×34×8 mm Micro-Box flush	M30×1.5 non-flush		
<b>Self-adjusting</b>	<b>Self-adjusting</b>	<b>Self-adjusting</b>		
<b>BCS008M</b>	<b>BCS008H</b>			
BCS R08RR01-PSMFAC-EP00,2-GS49	BCS R08RR01-PSMFAC-EP02			
<b>BCS008N</b>	<b>BCS008J</b>			
BCS R08RR01-POMFAC-EP00,2-GS49	BCS R08RR01-POMFAC-EP02			
<b>BCS008P</b>	<b>BCS008K</b>			
BCS R08RR01-NSMFAC-EP00,2-GS49	BCS R08RR01-NSMFAC-EP02			
<b>BCS008R</b>	<b>BCS008L</b>			
BCS R08RR01-NOMFAC-EP00,2-GS49	BCS R08RR01-NOMFAC-EP02			
		<b>BCS008J</b>		
		BCS M30T4M3-GPCFVG-EP02		
12...30 V DC	12...30 V DC	10...30 V DC		
≤ 1.5 V	≤ 1.5 V	≤ 3 V		
75 V DC	75 V DC	75 V DC		
50 mA	50 mA	100/100 mA push-pull		
≤ 10 mA	≤ 10 mA	≤ 15 mA		
yes/yes	yes/yes	no/yes		
-30...+70 °C	-30...+70 °C	-10...+60 °C		
2 Hz	2 Hz	2 Hz		
		LED green		
LED yellow	LED yellow	LED yellow		
IP 67	IP 67	IP 67		
PP	PP	V2A		
PP	PP	PTFE		
PP	PP	PBT/PE		
0.2 m cable PUR, 3×0.14 mm <sup>2</sup> with M8 connector, 3-pin	2 m cable PUR, 3×0.14 mm <sup>2</sup>	2 m cable PUR, 3×0.34 mm <sup>2</sup>		

**DC 3-wire**  
Tubular housings  
**SMARTLEVEL-technology**  
High temperature rated styles  
Leak sensor

**AC/DC 2-wire**  
Tubular housings



Electrical devices, connectors and holders see Accessories section starting **page 69**

