



# CAPACITIVE SENSORS

Capacitive sensors detect the presence of any object into the sensing area. They have a higher sensitivity when detecting metal objects or materials with a high content of water or which have a high dielectric constant.

## WORKING PRINCIPLE

An electrostatic field is generated in the sensing area. When an object enters in the sensing area a change in the capacitive value takes place, the oscillator stage starts oscillating, creating commutation of the output stage. It's possible to adjust the sensing distance of capacitive sensors varying the potentiometer on the rear plastic cap or from the side in the connector versions. The factory setting is the maximum value of the range declared in the catalogue.



## CAPACITIVE SENSORS

**AKS** = amplified a.c.  
**BKS** = amplified d.c.  
**NKS** = NOT amplified d.c. NAMUR series

Diameter of cylindrical sensor.  
 For other types, change the number with the following:

**7530** = rectangular aluminium housing 75 x 30 x 20

**P** = plastic housing

**4** = flush mounting  
**5** = non flush mounting

<b>BKS</b>	<b>18</b>	<b>P/</b>	<b>4</b>	<b>6</b>	<b>0</b>	<b>9</b>	<b>KS</b>	<b>-5</b>	<b>PUR</b>
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**3** = with connector M12 x 1  
**6** = standard type cable output  
**\*** = male connector cabled on sensor (see pag. H-1)

**0** = NO (normally open output)  
**1** = NC (normally closed output)  
**2** = NO + NC (complementary outputs)  
**C** = NC (normally closed output on pin 2 of connector)

**0** = NAMUR series 2-wire  
**8** = NPN with pull-up resistor  
**2** = NPN open collector  
**9** = PNP with pull-down resistor  
**1** = PNP open collector  
**9** = 20 ÷ 240 V. for a.c. sensors

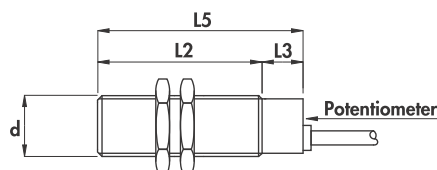
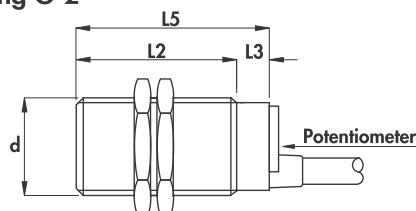
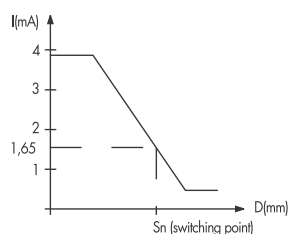
**K** = protection against short circuit and overload  
**S** = LED output status

Cable length (if required different than standard 2m)

For Polyurethane cable add PUR



**NAMUR SERIES •**  
**Non-amplified in d.c. 2-wire •**  
**Cable output •**

**Housing C-1****Housing G-2****Typical curve**

Diameter		M18 x 1	M30 x 1,5
Nut	Size	SW24	SW36
	Thickness mm	4	5
Max tightening torque Nm		35	80

**Materials:**

- Cable: 2 m PVC CEI 20 - 22 II; 90°C; 300 V; O.R.
- Housing: nickel plated brass
- Sensing face: plastic

**General Features:**

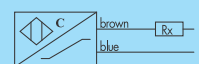
Capacitive sensors are suitable for any material detection. Some materials, mostly if liquids, can be detected also through plastic or glass walls. They can be used for many different applications: level controls on storage bin or tanks; detection of presence or filling of bottles; rain sensor; anti-vandal key; etc. The adjustment of the sensing distance is possible via the potentiometer on the rear cap.

**Safety parameters:**

- Working voltage:  $7 \div 30 \text{ Vdc}$
- Supply voltage according to NAMUR:  $7,7 \div 9 \text{ Vdc}$
- Max ripple: 10%
- Consumption at 8,2 V with  $R_x = 1000 \Omega$ 
  - with metal:  $\geq 2,2 \text{ mA}$
  - without metal:  $\leq 1 \text{ mA}$
- Temperature range:  $-25^\circ \div +70^\circ \text{C}$
- Max thermal drift of sensing distance  $S_n$ :  $\pm 20\%$
- Repeat accuracy (R): 4%
- Degree of protection: IP65
- Cable conductor cross section: 0,75 mm<sup>2</sup>
- According to EN60947-5-6
- Electromagnetic compatibility (EMC) according to EN60947-5-2
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6
- For certified ATEX version see ATEX Catalogue



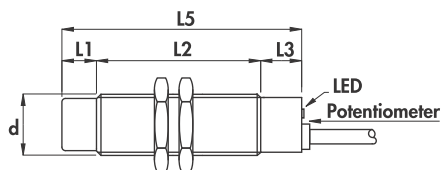
Housing	Flush mounting Non flush mounting	L1	L2	L3	L4	L5	Cable diameter	Body diameter (d)	Max switching frequency (f)	Nominal sensing distance ( $S_n$ ) $\pm 10\%$	ORDERING REFERENCES
		mm	mm	mm	mm	mm	mm	mm	Hz	mm	
C - 1	•	-	50	10	-	60	5	M18 x 1	100	2 ÷ 5	<b>NKS18/4600</b>
G - 2	•	-	50	10	-	60	5	M30 x 1,5	100	4 ÷ 10	<b>NKS30/4600</b>



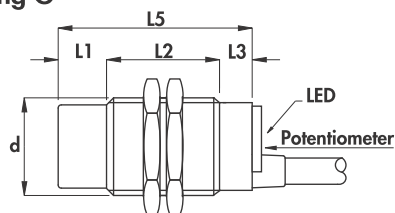
## CYLINDRICAL CAPACITIVE SENSORS IN METAL HOUSING

- Diameters 18 - 30 mm
- Amplified in d.c. 4-wire
- Cable output

**Housing C**



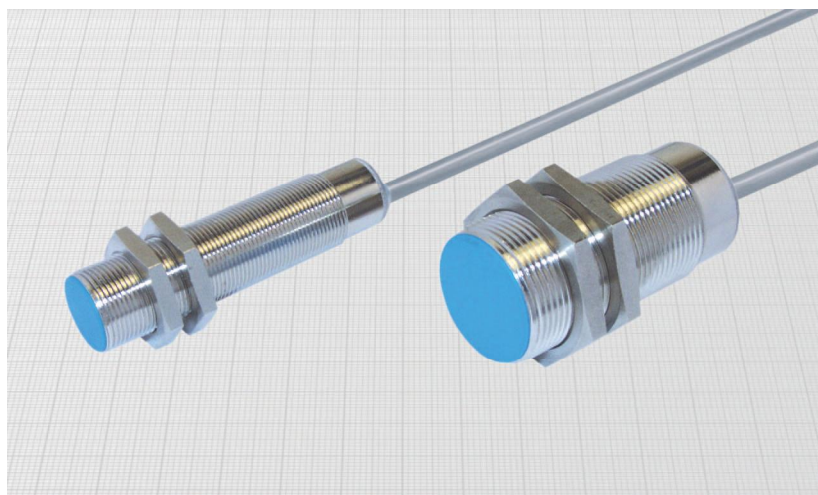
**Housing G**



Diameter		M18 x 1	M30 x 1,5
Nut	Size	SW24	SW36
	Thickness mm	4	5
Max tightening torque Nm		35	80

### Materials:

- Cable: 2 m PVC CEI 20 - 22 II; 90°C; 300 V; O.R.
- Housing: nickel plated brass
- Sensing face: plastic



### General Features:

Capacitive sensors are suitable for any material detection. Some materials, mostly if liquids, can be detected also through plastic or glass walls. They can be used for many different applications: level controls on storage bin or tanks; detection of presence or filling of bottles; rain sensor; anti-vandal key; etc.

The adjustment of the sensing distance is possible via the potentiometer on the rear cap close to the LED.

### Technical data:

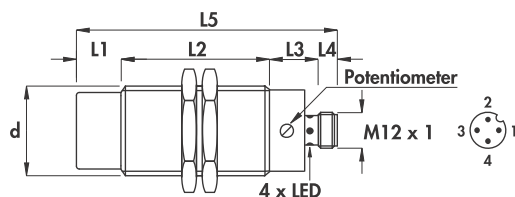
- Supply voltage ( $U_B$ ): 10 ÷ 60 Vdc
- Max ripple: 10%
- No-load supply current ( $I_0$ ): ≤ 10 mA
- Voltage drop ( $U_d$ ): ≤ 2,2 V
- Temperature range: - 25° ÷ + 70°C
- Max thermal drift of sensing distance  $S_p$ : ± 20%
- Repeat accuracy (R): 4%
- Switching hysteresis max (H): 15%
- Degree of protection: IP65
- Switch status indicator: yellow LED
- Cable conductor cross section: 0,35 mm<sup>2</sup> on 18 mm  
0,50 mm<sup>2</sup> on 30 mm

- Protected against short-circuit and overload
- Protected against any wrong connection
- Suppression of initial false impulse
- Electromagnetic compatibility (EMC) according to EN60947-5-2
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6

Housing	Flush mounting Non flush mounting	L1	L2	L3	L4	L5	Cable diameter	Body diameter (d)	Max switching frequency (F)	Rated operational current (I <sub>e</sub> )	Nominal sensing distance (S <sub>n</sub> ) ± 10%	ORDERING REFERENCES	
		mm	mm	mm	mm	mm	mm	mm	Hz	mA	mm	PNP (positive switching)	
C	•	-	50	10	-	60	5	M18 x 1	100	400	2 ÷ 5		
C	•	10	40	10	-	60	5	M18 x 1	100	400	3 ÷ 10		
G	•	-	50	10	-	60	6	M30 x 1,5	100	400	3 ÷ 10	<b>BKS18/4629KS</b> <b>BKS18/5629KS</b>  <b>BKS30/4629KS</b> <b>BKS30/5629KS</b>	
G	•	15	35	10	-	60	6	M30 x 1,5	100	400	5 ÷ 20		
												NPN (negative switching)	
												Use the above mentioned part number changing the last number 9 with 8 (ie. BKS18/4628KS)	

**Diameter 30 mm •**  
**Amplified in d.c. •**  
**Connector output M12 x 1 •**

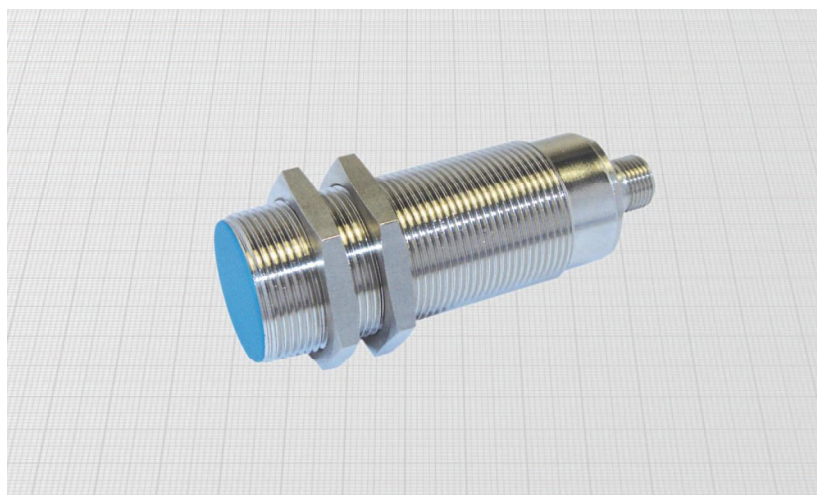
## Housing I-2



Diameter	M30 x 1,5	
Nut	Size	SW36
	Thickness mm	5
Max tightening torque Nm	80	

## Materials:

- Housing: nickel plated brass
- Sensing face: plastic

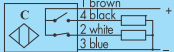
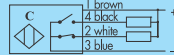


## General Features:

Capacitive sensors are suitable for any material detection. Some materials, mostly if liquids, can be detected also through plastic or glass walls. They can be used for many different applications: level controls on storage bin or tanks; detection of presence or filling of bottles; rain sensor; anti-vandal key; etc. The adjustment of the sensing distance is possible via the potentiometer on the smooth part of the housing.

## Technical data:

- Supply voltage ( $U_B$ ): 10 ÷ 60 Vdc
- Max ripple: 10%
- No-load supply current ( $I_0$ ): ≤ 10 mA
- Voltage drop ( $U_d$ ): ≤ 2,2 V
- Temperature range: - 25° ÷ + 70°C
- Max thermal drift of sensing distance  $S_r$ : ± 20%
- Repeat accuracy (R): 4%
- Switching hysteresis max (H): 15%
- Degree of protection: IP65
- Switch status indicator: yellow LED
- Protected against short-circuit and overload
- Protected against any wrong connection
- Suppression of initial false impulse
- Electromagnetic compatibility (EMC) according to EN60947-5-2
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6

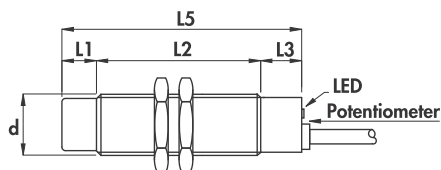
Housing	Flush mounting Non flush mounting	L1	L2	L3	L4	L5	Female connector	Body diameter (d)	Max switching frequency (f)	Rated operational current (I <sub>e</sub> )	Nominal sensing distance (S <sub>n</sub> ) ±10%	ORDERING REFERENCES	
												PNP (positive switching)	
												<div>NO + NC</div> 	
I-2	•	-	50	18	8	76	6-8B-10	M30 x1,5	100	400	3 ÷ 10	<b>BKS30S/4329KS</b>	
I-2	•	15	35	18	8	76	6-8B-10	M30 x1,5	100	400	5 ÷ 20	<b>BKS30S/5329KS</b>	
												NPN (negative switching)	
												Use the above mentioned part number changing the last number 9 with 8 (ie. BKS30S/4328KS)	
												<div>NO + NC</div> 	



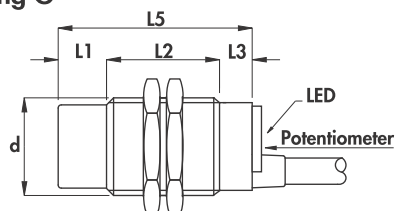
## CYLINDRICAL CAPACITIVE SENSORS IN METAL HOUSING

- Diameters 18 - 30 mm
- Amplified in a.c. 2-wire + earth
- Cable output

Housing C



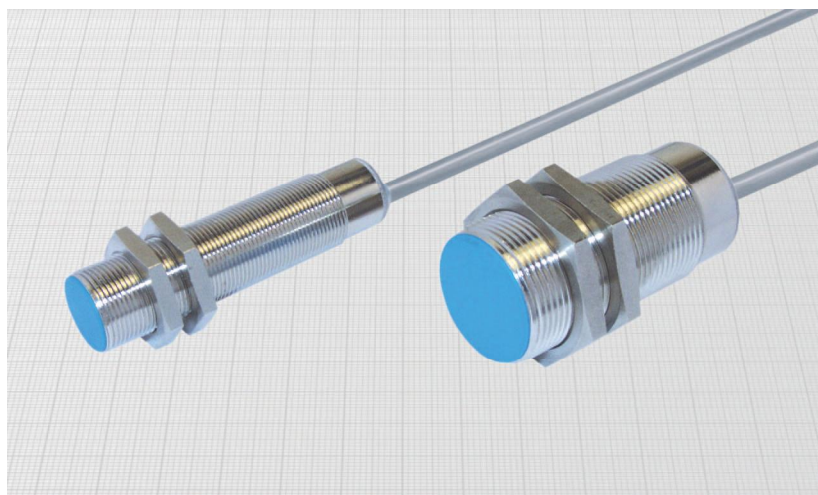
Housing G



Diameter		M18 x 1	M30 x 1,5
Nut	Size	SW24	SW36
	Thickness mm	4	5
Max tightening torque Nm		35	80

### Materials:

- Cable: 2 m PVC CEI 20 - 22 II; 90°C; 300 V; O.R.
- Housing: nickel plated brass
- Sensing face: plastic



### General Features:

Capacitive sensors are suitable for any material detection. Some materials, mostly if liquids, can be detected also through plastic or glass walls. They can be used for many different applications: level controls on storage bin or tanks; detection of presence or filling of bottles; rain sensor; anti-vandal key; etc. The adjustment of the sensing distance is possible via the potentiometer on the rear cap close to the LED.

### Technical data:

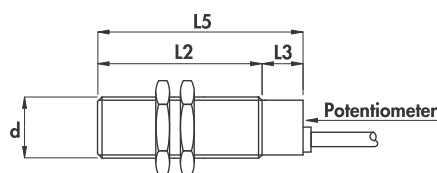
- Supply voltage ( $U_B$ ): 20 ÷ 240 Vac
- Frequenza di rete: 40 ÷ 60 Hz
- Off-state current ( $I_o$ ): ≤ 1,5 mA at 110 Vac
- Minimum operational current ( $I_m$ ): 5 mA
- Voltage drop ( $U_d$ ): ≤ 7 V
- Temperature range: - 25° ÷ + 70°C
- Max thermal drift of sensing distance  $S_p$ : ± 20%
- Repeat accuracy (R): 4%
- Switching hysteresis max (H): 15%
- Degree of protection: IP65
- Switch status indicator: yellow LED
- Cable conductor cross section: 0,35 mm<sup>2</sup> on 18 mm  
0,75 mm<sup>2</sup> on 30 mm
- Suppression of initial false impulse
- Electromagnetic compatibility (EMC) according to EN60947-5-2
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6

Housing	Flush mounting Non flush mounting	L1	L2	L3	L4	L5	Cable diameter	Body diameter (d)	Max switching frequency (f)	Rated operational current (I <sub>e</sub> )	Nominal sensing distance (S <sub>n</sub> ) ±10%	ORDERING REFERENCES	
		mm	mm	mm	mm	mm	mm	mm	Hz	mA	mm		
C	•	-	50	10	-	60	5	M18 x1	10	250	2 ÷ 5	<b>AKS18/4609S</b> <b>AKS18/5609S</b>	<b>AKS18/4619S</b> <b>AKS18/5619S</b>
C	•	10	40	10	-	60	5	M18 x1	10	250	3 ÷ 10		
G	•	-	50	10	-	60	6	M30 x1,5	10	250	3 ÷ 10	<b>AKS30/4609S</b> <b>AKS30/5609S</b>	<b>AKS30/4619S</b> <b>AKS30/5619S</b>
G	•	15	35	10	-	60	6	M30 x1,5	10	250	5 ÷ 20		

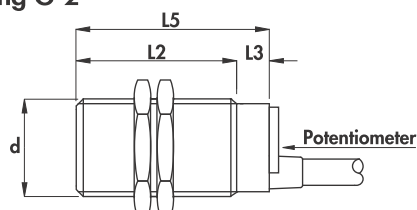


## NAMUR SERIES - diameters 18 - 30 mm • Non-amplified in d.c. 2-wire • Cable output •

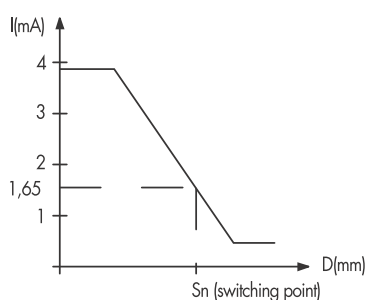
**Housing C-1**



**Housing G-2**



**Typical curve**



Diameter		M18 x 1	M30 x 1,5
Nut	Size	SW24	SW36
	Thickness mm	4	5
Max tightening torque Nm		5	20

### Materials:

- Cable: 2 m PVC CEI 20 - 22 II; 90°C; 300 V; O.R.
- Housing: plastic
- Sensing face: plastic

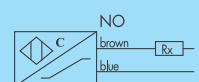
### General Features:

Capacitive sensors are suitable for any material detection. Some materials, mostly if liquids, can be detected also through plastic or glass walls. They can be used for many different applications: level controls on storage bin or tanks; detection of presence or filling of bottles; rain sensor; anti-vandal key; etc.  
The adjustment of the sensing distance is possible via the potentiometer on the rear cap.

### Safety parameters:

- Working voltage:  $7 \div 30 \text{ Vdc}$
- Supply voltage according to NAMUR:  $7,7 \div 9 \text{ Vdc}$
- Max ripple: 10%
- Consumption at 8,2 V with  $R_x = 1000 \Omega$ 
  - with metal:  $\geq 2,2 \text{ mA}$
  - without metal:  $\leq 1 \text{ mA}$
- Temperature range:  $-25^\circ \div +70^\circ \text{C}$
- Max thermal drift of sensing distance  $S_r$ :  $\pm 20\%$
- Repeat accuracy (R): 4%
- Degree of protection: IP65
- Cable conductor cross section: 0,75 mm<sup>2</sup>
- According to EN60947-5-6
- Electromagnetic compatibility (EMC) according to EN60947-5-2
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6
- For certified ATEX version see ATEX Catalogue

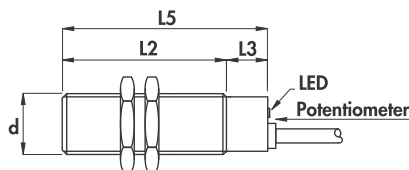
Housing	Flush mounting Non flush mounting	L1	L2	L3	L4	L5	Cable diameter	Body diameter (d)	Max switching frequency (f)	Nominal sensing distance (S <sub>n</sub> ) $\pm 10\%$	ORDERING REFERENCES
		mm	mm	mm	mm	mm	mm	mm	Hz	mm	
C-1	•	-	50	10	-	60	5	M18 x 1	100	2 ÷ 5	<b>NKS18P/4600</b>
G-2	•	-	50	10	-	60	5	M30 x 1,5	100	4 ÷ 10	<b>NKS30P/4600</b>



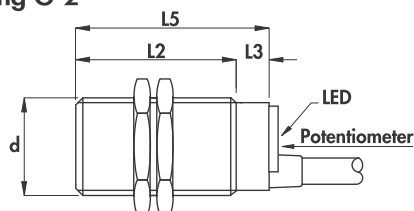
## CYLINDRICAL CAPACITIVE SENSORS IN PLASTIC HOUSING

- Amplified in d.c. 4-wire
- Diameters 18 - 30 - 34 mm
- Cable output

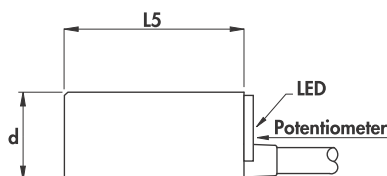
Housing C-1



Housing G-2



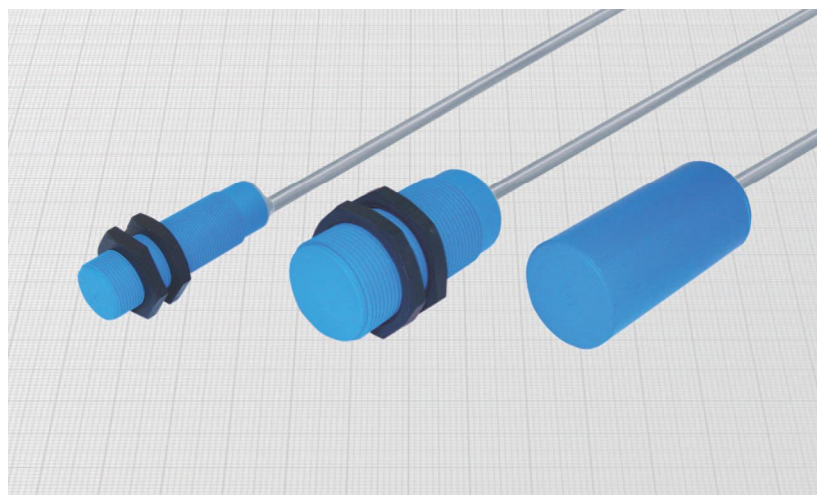
Housing A-8



Diameter		M18 x 1	M30 x 1,5
Nut	Size	SW24	SW36
	Thickness mm	4	5
Max tightening torque Nm		5	20

### Materials:

- Cable: 2 m PVC CEI 20 - 22 II; 90°C; 300 V; O.R.
- Housing: plastic
- Sensing face: plastic



### General Features:

Capacitive sensors are suitable for any material detection. Some materials, mostly if liquids, can be detected also through plastic or glass walls. They can be used for many different applications: level controls on storage bin or tanks; detection of presence or filling of bottles; rain sensor; anti-vandal key; etc. The adjustment of the sensing distance is possible via the potentiometer on the rear cap close to the LED.

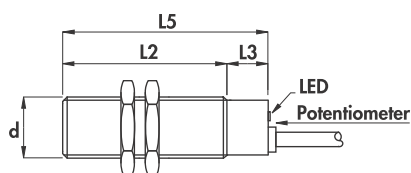
### Technical data:

- Supply voltage ( $U_B$ ): 10 ÷ 60 Vdc
- Max ripple: 10%
- No-load supply current ( $I_0$ ): ≤ 10 mA
- Voltage drop ( $U_d$ ): ≤ 2,2 V
- Temperature range: - 25° ÷ + 70°C
- Max thermal drift of sensing distance  $S_T$ : ± 20%
- Repeat accuracy (R): 4%
- Switching hysteresis max (H): 15%
- Degree of protection: IP65
- Switch status indicator: yellow LED
- Cable conductor cross section: 0,50 mm<sup>2</sup>
- Protected against short-circuit and overload
- Protected against any wrong connection
- Suppression of initial false impulse
- Electromagnetic compatibility (EMC) according to EN60947-5-2
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6

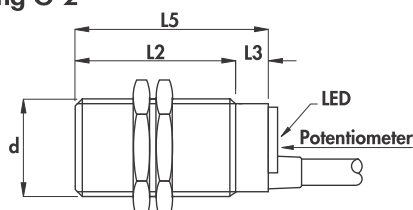
Housing	Flush mounting Non flush mounting		L1	L2	L3	L4	L5	Cable diameter	Body diameter (d)	Max switching frequency (F)	Rated operational current ( $I_e$ )	Nominal sensing distance ( $S_n$ ) ± 10%	ORDERING REFERENCES	
			mm	mm	mm	mm	mm						PNP (positive switching)	
C-1	•	-	50	10	-	60	5	M18 x 1	100	400	2 ÷ 5			
C-1	•	-	40	10	-	60	5	M18 x 1	100	400	3 ÷ 10			
G-2	•	-	50	10	-	60	6	M30 x 1,5	100	400	3 ÷ 10		<b>BKS18P/4629KS</b> <b>BKS18P/5629KS</b>	
G-2	•	-	35	10	-	60	6	M30 x 1,5	100	400	5 ÷ 20			
A-8	•	-	-	-	-	70	6	34	100	400	3 ÷ 20		<b>BKS30P/4629KS</b> <b>BKS30P/5629KS</b>  <b>BKS34P/5629KS</b>	
													NPN (negative switching)	
													Use the above mentioned part number changing the last number 9 with 8 (ie. BKS18P/4628KS)	

Amplified in a.c. 2-wire •  
 Diameters 18 - 30 mm •  
 Cable output •

Housing C-1



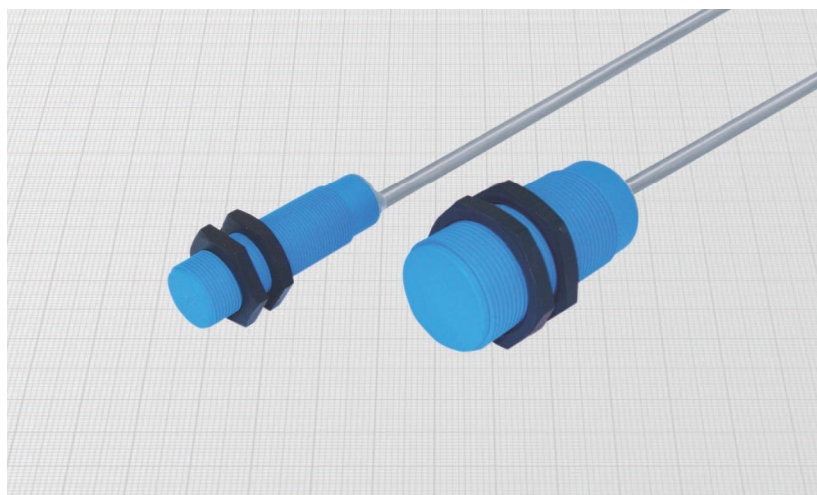
Housing G-2



Diameter		M18 x 1	M30 x 1,5
Nut	Size	SW24	SW36
	Thickness mm	4	5
Max tightening torque Nm		5	20

#### Materials:

- Cable: 2 m PVC CEI 20 - 22 II; 90°C; 300 V; O.R.
- Housing: plastic
- Sensing face: plastic



#### General Features:

Capacitive sensors are suitable for any material detection. Some materials, mostly if liquids, can be detected also through plastic or glass walls. They can be used for many different applications: level controls on storage bin or tanks; detection of presence or filling of bottles; rain sensor; anti-vandal key; etc.

The adjustment of the sensing distance is possible via the potentiometer on the rear cap close to the LED.

#### Technical data:

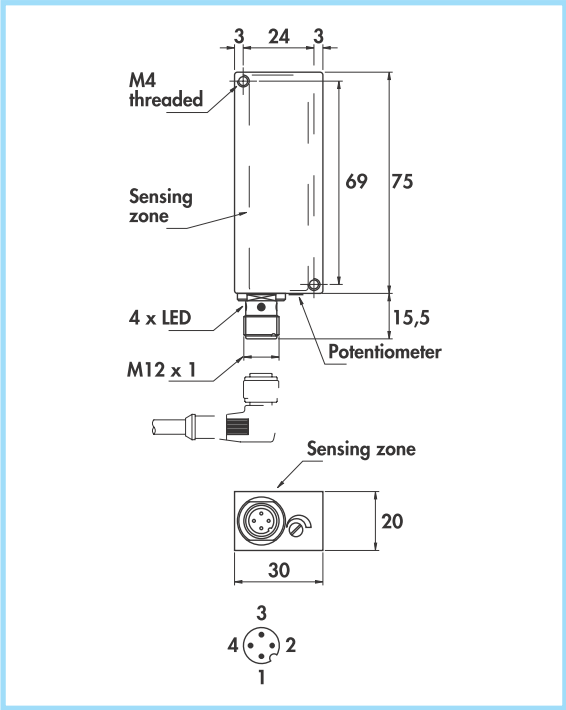
- Supply voltage ( $U_B$ ): 20 ÷ 240 Vac
- Electrical system frequency: 40 ÷ 60 Hz
- Off-state current ( $I_o$ ): ≤ 1,5 mA at 110 Vac
- Minimum operational current ( $I_m$ ): 5 mA
- Voltage drop ( $U_d$ ): ≤ 7 V
- Temperature range: - 25° ÷ + 70°C
- Max thermal drift of sensing distance  $S_r$ : ± 20%
- Repeat accuracy (R): 4%
- Switching hysteresis max (H): 15%
- Degree of protection: IP65
- Switch status indicator: yellow LED
- Cable conductor cross section: 0,50 mm<sup>2</sup> on 18 mm  
0,75 mm<sup>2</sup> on 30 mm

- Suppression of initial false impulse
- Class 2 equipment according to EN61140
- Shock and vibration according to EN60068-2-27 EN60068-2-6
- Electromagnetic compatibility (EMC) according to EN60947-5-2

Housing	Flush mounting Non flush mounting	L1	L2	L3	L4	L5	Cable diameter	Body diameter (d)	Max switching frequency (f)	Rated operational current (I <sub>e</sub> )	Nominal sensing distance (S <sub>n</sub> ) ± 10%	ORDERING REFERENCES	
		mm	mm	mm	mm	mm	mm	mm	Hz	mA	mm	NO	NC
C-1	•	-	50	10	-	60	5	M18 x1	10	250	2 ÷ 5	AKS18P/4609S AKS18P/5609S	AKS18P/4619S AKS18P/5619S
C-1	•	-	50	10	-	60	5	M18 x1	10	250	3 ÷ 10		
G-2	•	-	50	10	-	60	6	M30 x1,5	10	250	3 ÷ 10	AKS30P/4609S AKS30P/5609S	AKS30P/4619S AKS30P/5619S
G-2	•	-	50	10	-	60	6	M30 x1,5	10	250	5 ÷ 20		

RECTANGULAR CAPACITIVE SENSORS IN METAL HOUSING

- Amplified in d.c.
- Wide sensing surface
- Connector output



General Features:

This capacitive sensor allows the detection of parts made in every shape and material within an extended sensing area. It can be used whereas the object to be detected can be wherever in the sensing area. It's possible to put side by side more sensors in order to increase the sensing area. It is also possible to adjust the switching point turning the sensitivity potentiometer.

Possible applications:

- Detection of presence of parts inside locking devices, clamps
- Level detection on tanks or bins
- Detection of passing parts

Technical data:

- Supply voltage ( $U_B$ ): 10 ÷ 60 Vdc
- Max ripple: 10%
- No-load supply current ( $I_0$ ): ≤ 10 mA
- Voltage drop ( $U_d$ ): ≤ 2,2 V
- Temperature range: - 25° ÷ + 70°C
- Max thermal drift of sensing distance  $S_r$ : ± 20%
- Repeat accuracy (R): 4%
- Switching hysteresis max (H): 15%
- Degree of protection: IP65
- Switch status indicator: yellow LED
- Protected against short-circuit and overload
- Protected against any wrong connection
- Suppression of initial false impulse
- Electromagnetic compatibility (EMC) according to EN60947-5-2
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6

Flush mounting Non Flush mounting	Sensing zone area	Max switching frequency (f)	Rated operational current ( $I_e$ )	Nominal sensing distance ( $S_n$ ) ± 10%	Female connector	ORDERING REFERENCES
						PNP (positive switching)
	mm	KHz	mA	mm	n°	
•	70 x 17	0,1	400	5 - 10	15 - 16	<b>BKS7530/4329KS</b>
						NPN (negative switching)
						Use the above mentioned part number changing the last number 9 with 8 (ie. BKS7530/4328KS)