

# SPEED SENSORS

- BRS** = for toothed wheels, single output, aligned mounting
- BRUS** = for toothed wheels, single output, non aligned mounting
- BRDS** = for toothed wheels, double output A+B, aligned mounting
- DSD** = with integrated control in d.c.
- ASD** = with integrated control in a.c.

Diameter

- X** = sensor with stainless steel housing

<b>BRS</b>	<b>18</b>	<b>X/</b>	<b>4</b>	<b>6</b>	<b>0</b>	<b>9</b>	<b>KJ</b>	<b>-5</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** = 1 output
- 2** = 2 outputs A+B

- 8** = NPN
- 9** = PNP

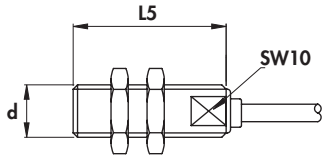
- J** = degree of protection IP68
- K** = protection against short circuit and overload
- T** = high temperatures version
- S** = LED output status

Cable length (if required different than standard 2m)

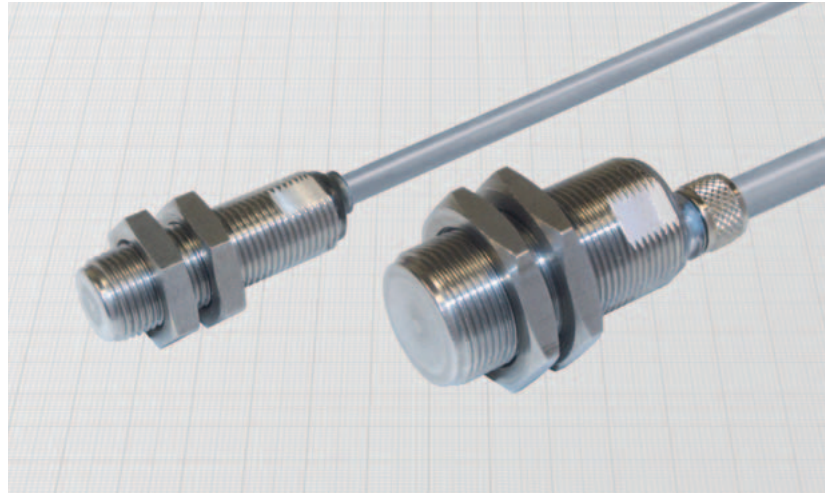
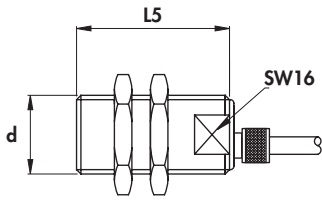


- Aligned mounting •
- For teeth  $\geq 2$  mm •
- Cable output •

**Housing B-12**



**Housing B-13**



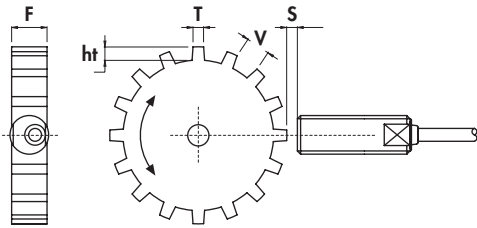
Diameter	M12 x 1	M18 x 1
Nut	Size	SW17
	Thickness mm	4
Max tightening torque Nm	20	50

**Materials:**

- Cable: 2 m thermoplastic, 300 V; O.R.
- Housing: stainless steel
- Back cap: plastic

**Mounting and teeth dimension:**

The sensor axis must be perpendicular to the rotation axis of the gear.  
Flat faces must be parallel to the rotation plane of the gear.



Valley depth	ht	> 2 mm
Valley width	V	> 2 mm
Tooth width	T	> 2 mm
Gear thickness	F	> 3 mm
Operating distance	S	0 $\pm$ 1,5 mm

**General Features:**

This sensor allows the detection with extremely high precision of the rotation of a ferrous toothed wheel and reference marks. The frequency of the digital output signal is proportional to the rotation speed starting from zero. The output is open collector. The extremely strong construction allows the use in the most difficult conditions even with high pressures on the housing. The sensor must be aligned to the rotation axis of the wheel.

**Technical data:**

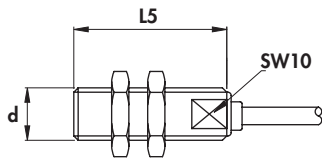
- Supply voltage: 5  $\div$  25 Vdc
- No load supply current:  $\leq 17$  mA
- Voltage drop:  $\leq 0,4$  V
- Temperature range max: - 40  $\div$  +120°C
- Degree of protection: IP68
- Max pressure on front side: 150 bar
- Protected against short-circuit and overload
- Protected against any wrong connection
- Electromagnetic compatibility (EMC) according to EN60947-5-2
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6
- Cable conductor cross section: 0,35 mm<sup>2</sup> on 12 mm  
0,50 mm<sup>2</sup> on 18 mm

Housing	L1	L2	L3	L4	L5	Cable diameter	Body diameter (d)	Max switching frequency (f)	Rated operational current (I <sub>e</sub> )	ORDERING REFERENCES			
										PNP		NPN	
B-12	-	-	-	-	35	4	M12 x 1	20	100	<b>BRS12X/4609KJ</b>	<b>BRS12X/4608KJ</b>		
B-13	-	-	-	-	35	5	M18 x 1	20	100	<b>BRS18X/4609KJ</b>	<b>BRS18X/4608KJ</b>		

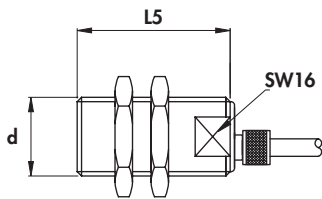
## SPEED SENSORS FOR TOOTHED WHEELS

- Non aligned mounting
- For teeth  $\geq 5$  mm
- Cable output

Housing B-12



Housing B-13



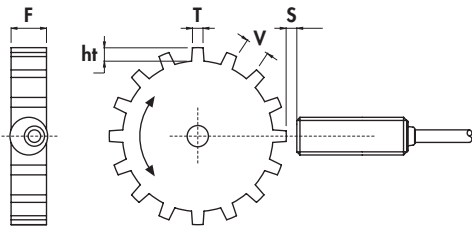
Diameter	M12 x 1	M18 x 1
Nut	Size	SW17
	Thickness mm	4
Max tightening torque Nm	20	50

### Materials:

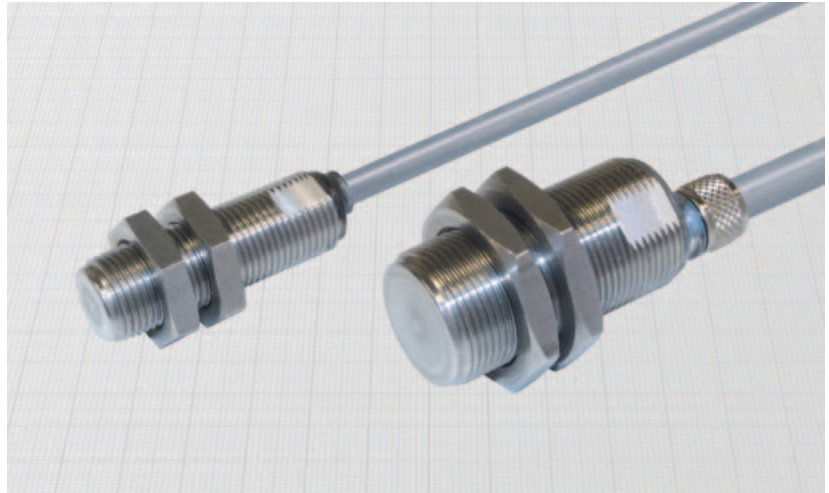
- Cable: 2 m thermoplastic, 300 V; O.R.
- Housing: stainless steel
- Back cap: plastic

### Mounting and teeth dimension

The sensor axis must be perpendicular to the rotation axis of the gear.  
Flat faces can be at any position respect the rotation plane of the gear.



Valley depth	ht	$\geq 5$ mm
Valley width	V	$\geq 13$ mm
Tooth width	T	$\geq 5$ mm
Gear tickness	F	$\geq 5$ mm
Operating distance	S	$0 \div 1,5$ mm



### General Features:

This sensor allows the detection with extremely high precision of the rotation of a ferrous toothed wheel and reference marks. Since it detects even frontal approaching of the target, it can be used as proximity switch. The frequency of the digital output signal is proportional to the rotation speed starting from zero. The output is open collector. The extremely strong construction allows the use in the most difficult conditions even with high pressures on the housing. The sensor does not require any alignment to the rotation axis of the wheel.

### Technical data:

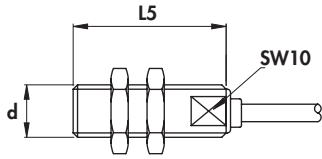
- Supply voltage:  $5 \div 25$  Vdc
- No load supply current:  $\leq 12$  mA
- Voltage drop:  $\leq 0,4$  V
- Max temperature range:  $-40^{\circ} \div +120^{\circ}$  C
- Degree of protection: IP68
- Max pressure on front side: 150 bar
- Protected against short-circuit and overload
- Protected against any wrong connection
- Electromagnetic compatibility (EMC) according to EN60947-5-2
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6
- Cable conductor cross section:  $0,35$  mm<sup>2</sup> on 12 mm  
 $0,50$  mm<sup>2</sup> on 18 mm

Housing	L1	L2	L3	L4	L5	Cable diameter	Body diameter (d)	Max switching frequency (f)	Rated operational current (I <sub>e</sub> )	ORDERING REFERENCES			
										PNP		NPN	
B-12	-	-	-	-	35	4	M12 x 1	25	100	<b>BRUS12X/4609KJ</b>	<b>BRUS12X/4608KJ</b>		
B-13	-	-	-	-	35	5	M18 x 1	25	100	<b>BRUS18X/4609KJ</b>	<b>BRUS18X/4608KJ</b>		

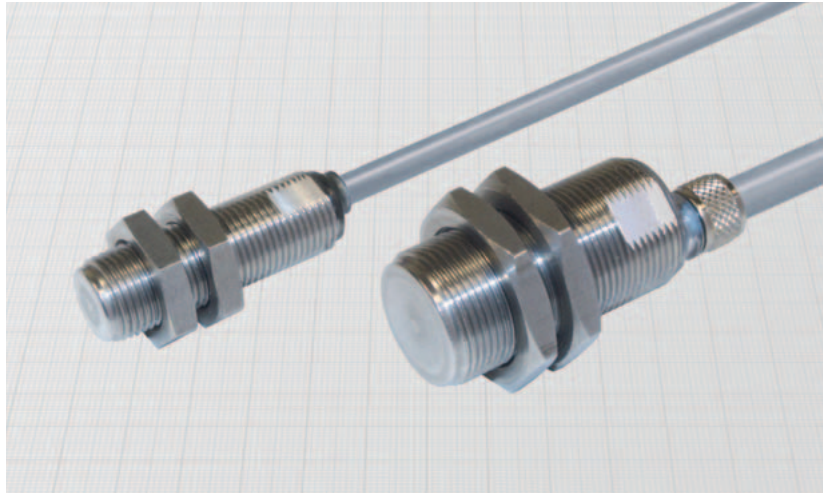
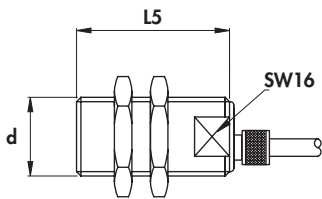
Double output A + B •

Cable output •

Housing B-12



Housing B-13



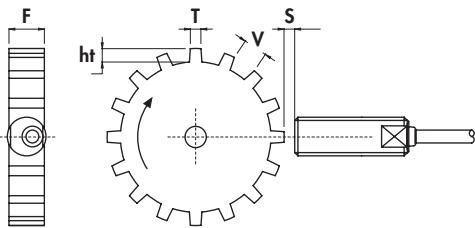
Diameter		M12 x 1	M18 x 1
Nut	Size	SW17	SW24
	Thickness mm	4	4
Max tightening torque Nm		20	50

Materials:

- Cable: 2 m thermoplastic, 300 V; O.R.
- Housing: stainless steel
- Back cap: plastic

Mounting and teeth dimension

The sensor axis must be perpendicular to the rotation axis of the gear. Flat faces must be parallel to the rotation plane of the gear.



Valley depth	ht	≥ 3 mm
Valley width	V	≥ 3 mm
Tooth width	T	≥ 3 mm
Gear thickness	F	≥ 6 mm
Operating distance	S	0 ± 1,5 mm

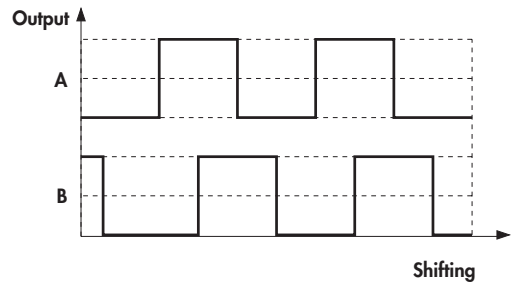
General Features:

This sensor gives two separated signals shifted which allow to detect not only the rotation speed but also the direction of a ferrous toothed wheel or reference marks. The frequencies of the digital output signals are proportional to the rotation speed starting from zero. The outputs are NPN open collector. The extremely strong construction allows the use in the most difficult conditions even with high pressures on the housing. The sensor must be aligned to the rotation axis of the wheel.

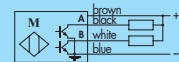
Technical data:

- Supply voltage: 5 ÷ 25 Vdc
- No load supply current: ≤ 21 mA
- Voltage drop (I<sub>o</sub>=10mA): ≤ 1,2 V
- Temperature range: - 40 ÷ +120°C
- Degree of protection: IP68
- Max pressure on front side: 150 bar
- Protected against short-circuit and overload
- Protected against any wrong connection
- Electromagnetic compatibility (EMC) according to EN60947-5-2
- Shock and vibration resistance according to EN60068-2-27
- Cable conductor cross section: 0,25 mm<sup>2</sup>

Output Signals



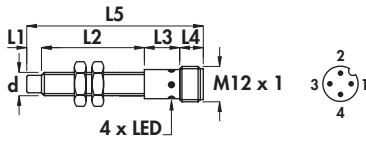
Housing	L1	L2	L3	L4	L5	Cable diameter	Body diameter (d)	Max switching frequency (f)	Rated operational current (I <sub>o</sub> )	ORDERING REFERENCES
	mm	mm	mm	mm	mm					NPN
B-12	-	-	-	-	35	4	M12 x 1	6	20	BRDS12X/4628KJ
B-13	-	-	-	-	35	5	M18 x 1	6	20	BRDS18X/4628KJ



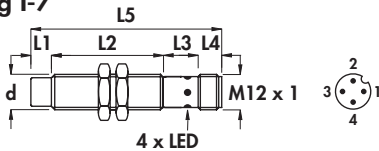
## SPEED SENSORS

- Speed sensors with integrated control
- 3 wires - d.c.
- Connector output M12 x 1

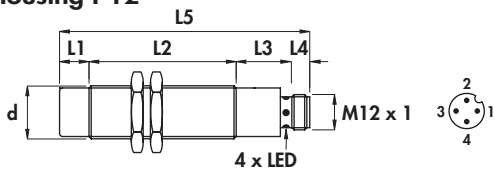
### Housing I-11



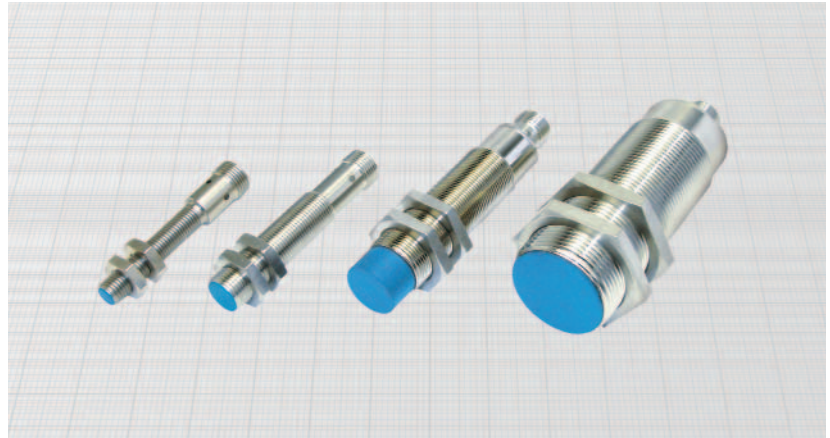
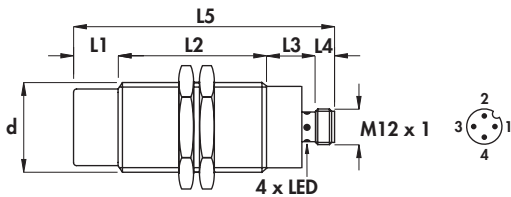
### Housing I-7



### Housing I-12



### Housing I-2



### General Features:

These sensors allow to control with extremely high precision the rotation of a toothed wheel or reference marks, switching off the load or giving an alarm in case the speed goes down the minimum threshold. Thanks to the extremely wide measuring range they can be even used to control repetitive operations, signalling in case of unavoided stops. Further delays or other special functions are implementable upon specific request.

The output is protected against connection mistakes, overvoltages on lines, and short circuit of the load. The connection is possible with a 4 wires M12x1 connector which must be ordered separately.

### Technical data:

- Working voltage: 10 ÷ 30 Vdc
- Max ripple: 10%
- No-load supply current: < 15 mA
- Rated operational current (I<sub>0</sub>): 200 mA
- Voltage drop: < 1,5 V
- Switching hysteresis (H): < 10% S<sub>n</sub>
- Repeat accuracy (R): < 2% S<sub>n</sub>
- Maximum detectable interval (between two pulses): 2 min
- Detectable start-up time (T<sub>1</sub>): 0 ÷ 1 min (default 2 sec.)
- Temperature range: -20 ÷ +70°C
- Max thermal drift of sensing distance S<sub>n</sub>: ±10%
- Degree of protection: IP67
- Status indicator: yellow LED = out ON; frequency over the threshold
- Protected against short-circuit and overload
- Electromagnetic compatibility (EMC) according to EN60947-5-2
- Shock and vibration resistance according to EN60068-2-27 e EN60068-2-6

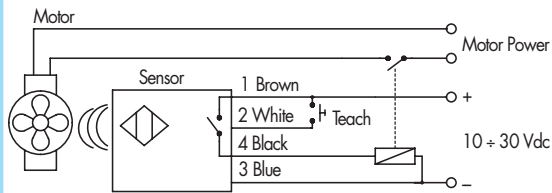
Diameter	M8 x 1	M12 x 1	M18 x 1	M30 x 1,5
Nut	Size	SW13	SW17	SW24
	Thickness mm	4	4	4
Max tightening torque Nm	10	15	35	80

### Materials:

- Housing 8 mm: stainless steel
- Housing 12 - 18 - 30 mm: nickel plated brass
- Sensing face: plastic

Housing	Flush mounting Non flush mounting	L1	L2	L3	L4	L5	Female connector (see page H-1)	Body diameter (d)	Max detectable frequency	Nominal sensing distance (S <sub>n</sub> ) ±10%	ORDERING REFERENCES	
											PNP (positive switching)	
I-11	•	-	40	12	8	60	6-8B-10	M8 x 1	1	1,5	<b>DSD8/4309KS</b>	
I-11	•	5	35	12	8	60	6-8B-10	M8 x 1	1	2,5	<b>DSD8/5309KS</b>	
I-7	•	-	43	15	8	66	6-8B-10	M12 x 1	1	2	<b>DSD12/4309KS</b>	
I-7	•	7	36	15	8	66	6-8B-10	M12 x 1	1	4	<b>DSD12/5309KS</b>	
I-12	•	-	50	19	8	77	6-8B-10	M18 x 1	1	5	<b>DSD18/4309KS</b>	
I-12	•	10	50	19	8	87	6-8B-10	M18 x 1	1	8	<b>DSD18/5309KS</b>	
I-2	•	-	65	17	8	90	6-8B-10	M30 x 1,5	0,8	10	<b>DSD30/4309KS</b>	
I-2	•	15	50	17	8	90	6-8B-10	M30 x 1,5	0,4	15	<b>DSD30/5309KS</b>	

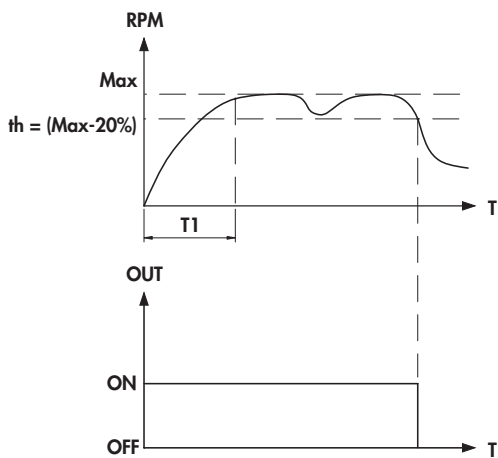
**Example of application**



**Use of the sensor:**

On power on, the yellow LED goes on and the output switches in ON state, driving the relay, which will drive the motor. After a start up delay time (T1) the sensor measures the speed of the motor and compare it to the threshold value. If the speed is under the threshold value, the output goes OFF, turning off the LED. The minimum threshold can be either factory presetted or can be acquired from the sensor directly on the application with no need to perform any measurement.

**Procedure 1**



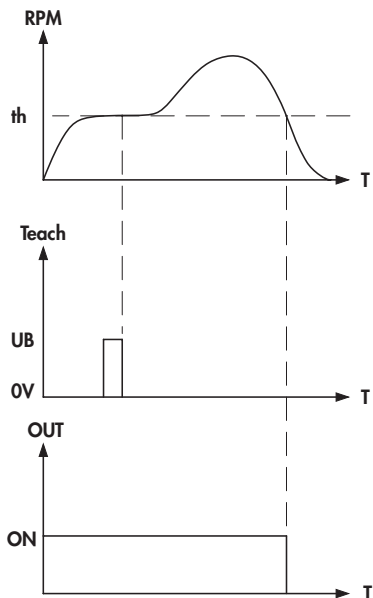
**Threshold self-teaching procedure:**

There are two different ways to perform the self-teaching of the threshold:

**1 - Acquisition of start up time and calculation of the threshold from the maximum speed:**

- a) connect the Teach input (white) to the positive of power supply (brown) before to turn on the power
- b) Turn on the power supply to the machine and to the sensor and wait the speed gets the nominal value
- c) Turn off the power supply
- d) At this stage the sensor acquired the start up time (T1) and calculated the threshold as the maximum value of the speed reduced of -20%
- e) Disconnect the Teach in from the positive of power supply before to run the machine again.

**Procedure 2**



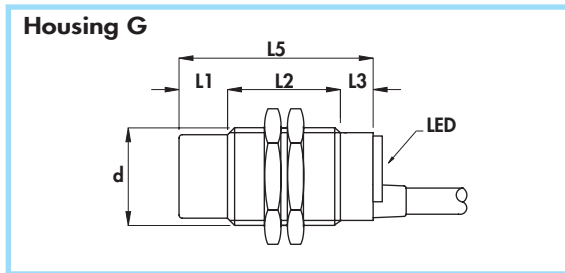
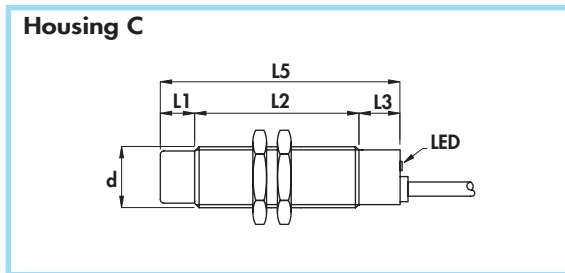
**2 - Acquisition of a known threshold (start up time is not modified):**

- a) Turn the power supply on to the machine and sensor and go to the speed you want to get as threshold (th)
- b) Connect temporarily the Teach input (white) to the positive of power supply. This operation can be easily done with a push-button on the operator panel of the machine.
- c) At this stage the current speed becomes the minimum threshold (th), under of which the sensor goes in OFF state.

Both of the procedures can be repeated unlimited times.

## SPEED SENSORS

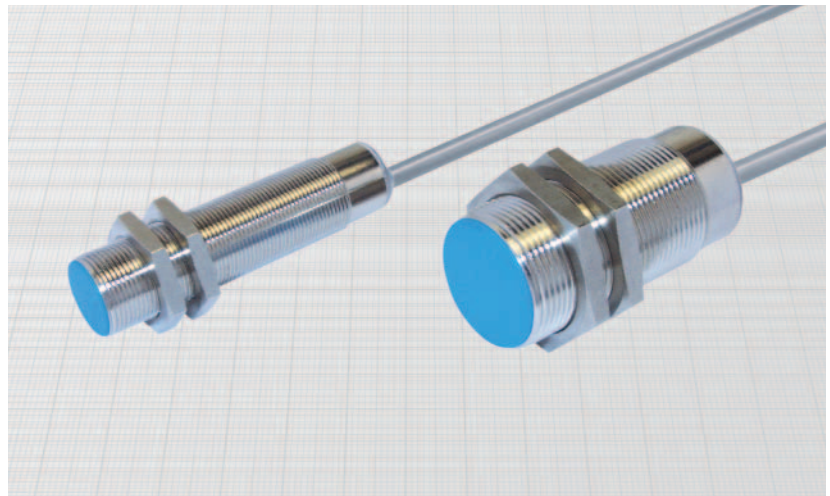
- Speed sensors with integrated control
- 2 wires - a.c.
- Cable output



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

### Materials:

- Cable: 2m PVC - CEI 2022 II- 90°C 300V-O.R.
- Housing: nickel plated brass
- Sensing face: plastic



### General Features:

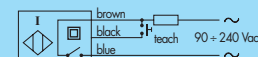
These sensors allow to control with extremely high precision the rotation of a toothed wheel or reference marks, switching off the load in case of the speed goes down the minimum threshold. Thanks to the extremely wide measuring range they can be even used to control repetitive operations, signalling in case of unavoids stops. They are able to drive directly a.c. relays from 90 to 240 Vac with no need of external power supply or amplifiers.

Further delays or other special functions are implementable upon specific request. The output is protected against connection mistakes, overvoltages on lines, and short circuit of the load.

### Technical data:

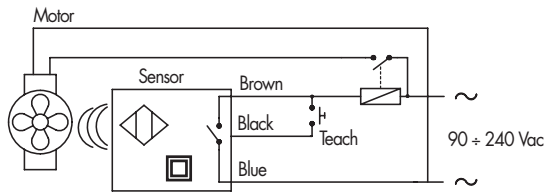
- Working voltage: 90 ÷ 240 Vac
- Electrical system frequency: 40 ÷ 60 Hz
- Off-state current at 220 V: <2,2 mA
- Minimum operational current: 8 mA
- Voltage drop: <8V
- Switching hysteresis (H): < 10% S<sub>n</sub>
- Repeat accuracy (R): < 2% S<sub>n</sub>
- Maximum detectable interval (between two pulses): 2 min
- Detectable start-up time (T1): 0 ÷ 1 min (default 2 sec.)
- Temperature range: -20 ÷ +70°C
- Max thermal drift of sensing distance S<sub>n</sub>: ±10%
- Degree of protection: IP67
- Cable conductor cross section: 0,50mm<sup>2</sup>
- Status indicator: yellow LED = out ON; frequency over the threshold  
red LED = out OFF; frequency under the threshold  
blinking red LED = out OFF; short circuit on the output
- Protected against short-circuit and overload
- Class 2 equipment according to IEC 536
- 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 detectable frequency	Rated operational current (I <sub>e</sub> )	Nominal sensing distance (S <sub>n</sub> ) ± 10%	ORDERING REFERENCES
		mm	mm	mm	mm	mm						
C	•	-	58	12	-	70	5	M18 x 1	800	200	5	ASD18/4609KS ASD18/5609KS
C	•	10	48	12	-	70	5	M18 x 1	400	200	8	
G	•	-	50	10	-	60	6	M30 x 1,5	400	200	10	ASD30/4609KS ASD30/5609KS
G	•	15	35	10	-	60	6	M30 x 1,5	200	200	15	





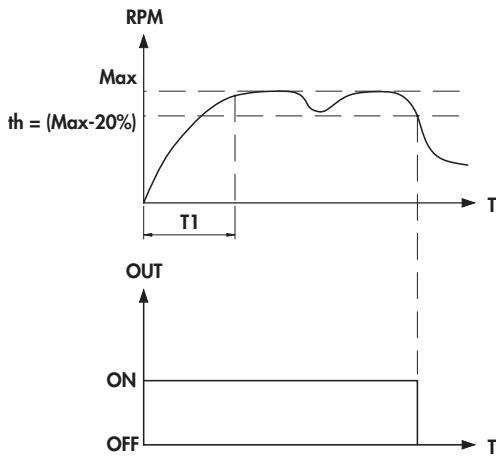
**Example of application**



**Use of the sensor:**

On power on, the yellow LED goes on and the output switches in ON state, driving the relay, which will drive the motor. After a start up delay time (T1) the sensor measures the speed of the motor and compares it to the threshold value. If the speed is under the threshold value, the output goes OFF, giving an alarm indication with the red LED. The minimum threshold can be either factory presetted or can be acquired from the sensor directly on the application with no need to perform any measurement.

**Procedure 1**



**Threshold self-teaching procedure:**

There are two different ways to perform the self-teaching of the threshold:

**1 - Acquisition of start up time and calculation of the threshold from the maximum speed:**

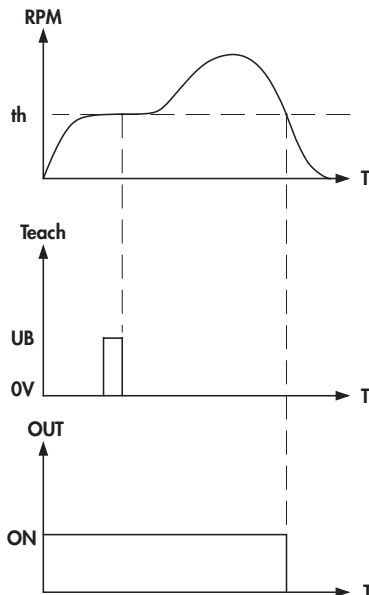
- a) connect the Teach input (black) to the brown before to turn on the power
- b) Turn on the power supply to the machine and to the sensor and wait the speed gets the nominal value
- c) Turn off the power supply
- d) At this stage the sensor acquired the start up time (T1) and calculated the threshold as the maximum value of the speed reduced of -20%
- e) Disconnect the Teach in from the brown wire before to run the machine again.

**2 - Acquisition of a known threshold (start up time is not modified):**

- a) Turn the power supply on to the machine and sensor and go to the speed you want to get as threshold (th).
- b) Connect temporarily the Teach input (black) to the brown wire. This operation can be easily done with a push-button on the operator panel of the machine.
- c) At this stage the current speed becomes the minimum threshold (th), under of which the sensor goes in OFF state.

Both of the procedures can be repeated unlimited times.

**Procedure 2**



# ACCELERATION SENSORS

Acceleration is a physical quantity related to any event of motion, rotation, vibration and inclination. Monitoring accelerations is an optimal way to gather reliable information on working process. Generally these information cannot be easily obtained by other sensor systems.

This kind of information is useful to make reliable automatic control diagnostic and supervision systems.

Accelerometers are inertial sensors that supply proportional electrical signal to accelerations applied to the device in specific directions.

Signal analysis and calculations are performed internally by the sensor, not requiring then external additional modules or software. The application is therefore very simple.

**IS** = inclination sensor  
**VS** = vibration sensor

**X** = rectangular plastic 25 x 50 x 10

n° detection axis

<b>VS</b>	<b>X</b>	<b>/</b>	<b>2</b>	<b>6</b>	<b>02</b>	<b>S</b>	<b>-5</b>	<b>PUR</b>
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**6** = standard type cable output  
**\*** = male connector wired on sensor (see pag. H-1)

Full scale measuring in g or inclination in degrees (±)

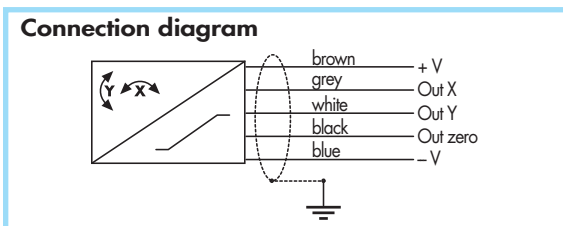
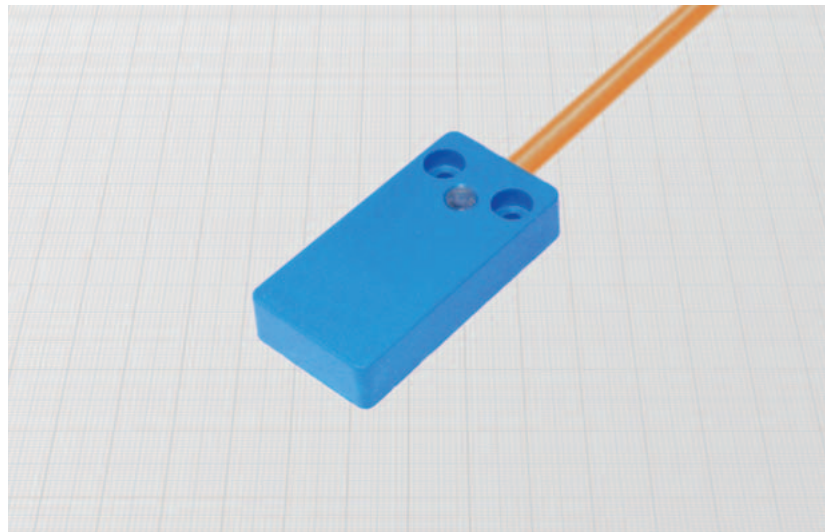
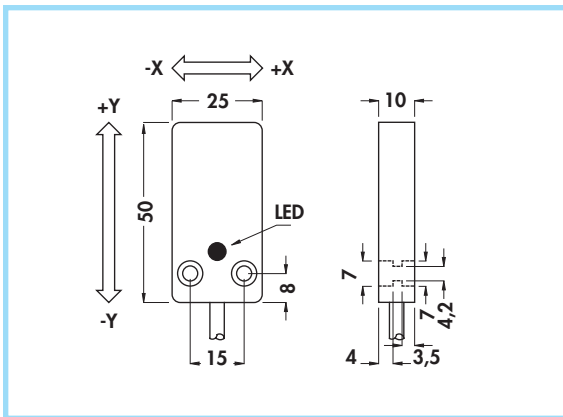
**S** = LED output status

Cable length (if required different than standard 2m)

For Polyurethane cable add PUR



**2 AXIS INCLINATION SENSORS (-60° ÷ + 60°) •**  
**Analog linear output •**  
**Cable output •**



**Materials:**

- Cable: 2 m PVC CEI 20 - 22 II; 90°C
- Housing: plastic

**General Features:**

These sensors give two output signals from 0,7 to 4,3 V proportional to the inclination of the X and Y axis respect the earth axis. An inclination of 0° gives on the outputs + 2,5 V respect to the negative of power supply (blue wire) or 0 V respect to the OUT zero.

Other outputs such as temperature and ON/OFF alarms, which are factory preset at specified thresholds, are available upon request.

**Applications:**

- Inclination control on lifting systems
- Vehicles inclination monitoring
- Feedback sensor on self-levelling systems

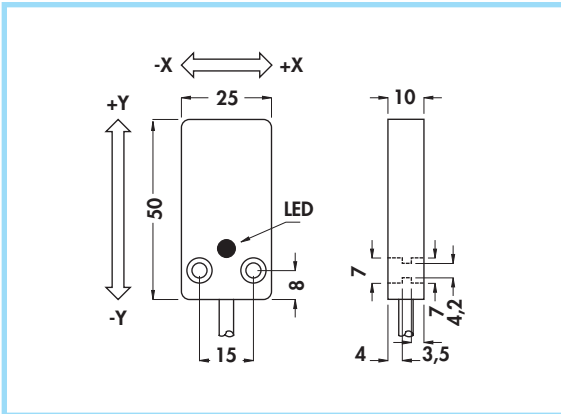
**Technical data:**

- Measuring range: - 60° ÷ + 60°
- Resolution: 0,2°
- Supply voltage: 8 ÷ 30 Vdc
- Power consumption: ≤ 10 mA
- Output voltage range:
  - respect to - V: 0,7 ÷ 4,3 V
  - respect to Out zero: - 1,8 ÷ + 1,8 V
- Sensitivity: 0,03 V/°
- Max thermal drift: 4,5 m V/°C
- Output resistance: 100 Ω
- Response time: 0,1 sec
- Linearity: < 1% full scale
- Hysteresis: < 0,2% full scale
- Cross axis sensitivity: < ± 2%
- Maximum survival shock: 1000 g
- Working temperature: 0 ÷ 70° C
- Storage temperature: - 20° ÷ 100° C
- Degree of protection: IP67
- Cable conductor cross section: 0,22 mm<sup>2</sup> + shield
- LED indication: green = supply voltage
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6
- Electromagnetic compatibility (EMC) according to EN61000-6-2/-4

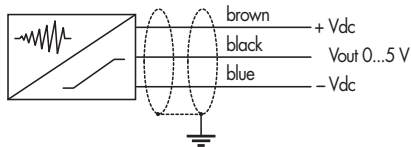
Type	Cable diameter	ORDERING REFERENCES
	mm	
Biaxial	5	ISX/2660S

## ACCELERATION SENSORS

- **2 AXIS VIBRATION SENSORS**
- **Average value output**
- Cable output

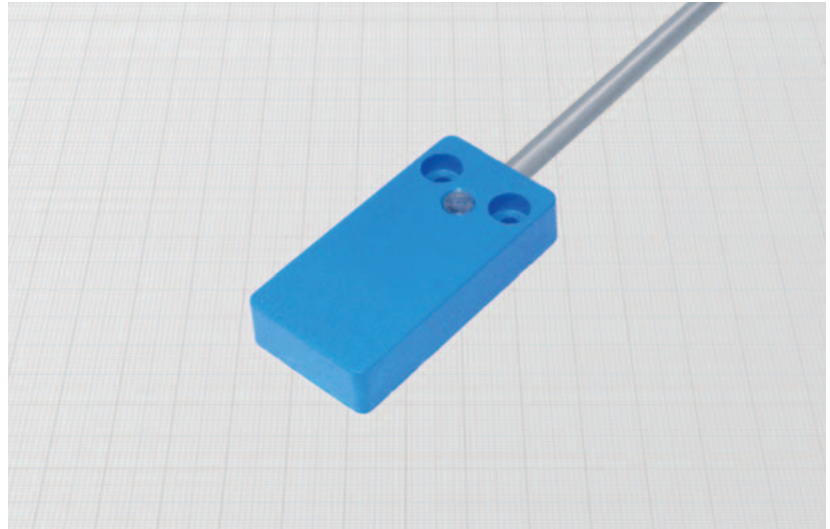


### Connection diagram



### Materials:

- Cable: 2 m PVC CEI 20 - 22 II; 90°C
- Housing: plastic



### General Features:

These sensors give an analog signal proportional to the vibrations on both the X and Y axis. Since the measurement is made from a very low frequency, the gravity acceleration is not detected, so the measurement is not affected by the mounting position. The output voltage from 0 to 5 V is proportional to the average value of the sum of the accelerations measured on the X and Y axis. Other outputs such as temperature and ON/OFF alarms, which are factory preset at specific thresholds, are available upon request.

### Applications:

- Alarm or feedback on the control for excessive vibrations
- Shock and collision amplitude indication
- Harmful unbalancing detection of the tool and tool holder in milling and grinding machines.

### Technical data:

- Measuring range:  $\pm 2; \pm 5; \pm 18$  g
- Supply voltage:  $8 \div 30$  Vdc
- Power consumption:  $\leq 12$  mA
- Output voltage range:  $0 \div 5$  V
- Sensitivity:
  - 2 g full scale: 2,5 V/g
  - 5 g full scale: 1 V/g
  - 18 g full scale: 0,27 V/g
- Output resistance: 100  $\Omega$
- Frequency range:  $2 \div 500$  Hz
- Cross axis sensitivity:  $< \pm 2$  %
- Maximum survival shock: 1000 g
- Working temperature:  $-20^\circ \div +70^\circ$  C
- Storage temperature:  $-40^\circ \div +100^\circ$  C
- Degree of protection: IP67
- Cable conductor cross section:  $0,35$  mm<sup>2</sup> + shield
- LED indication: green = power supply  
yellow = vibration level >1% full scale
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6
- Electromagnetic compatibility (EMC) according to EN61000-6-2/-4 **CE**

Type	Cable diameter	Full scale measure	ORDERING REFERENCES
	mm	g	
Biaxial	5	2 g	<b>VSX/2602S</b>
Biaxial	5	5 g	<b>VSX/2605S</b>
Biaxial	5	18 g	<b>VSX/2618S</b>