

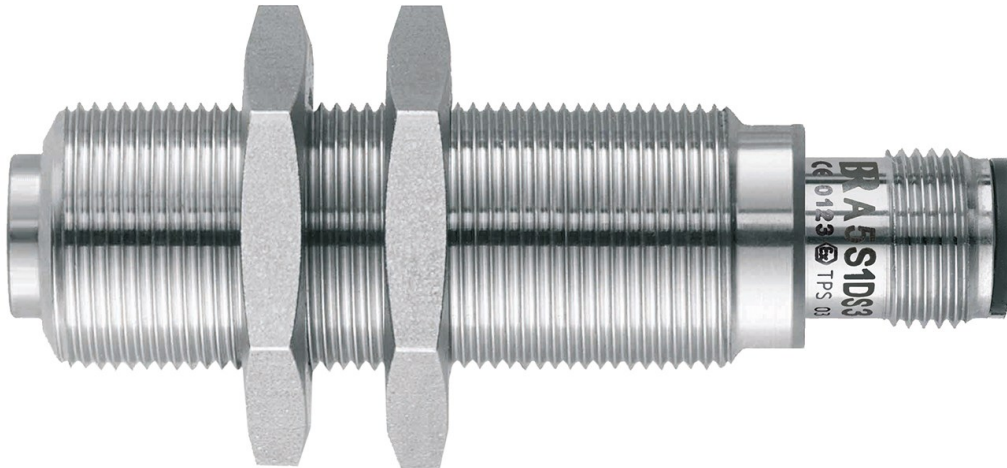
**Manual****Exec Sensors Series A5S1...-n (increased safety)**

(Original operating manual)

**valid for versions**

<b>A5S1DD0...-n</b>	(1x speed,	signal range 0 Hz...25 kHz)
<b>A5S1DD3...-n</b>	(1x speed / 1x direction,	signal range 0 Hz...25 kHz)
<b>A5S1DD4...-n</b>	(2x speed, phase-shifted,	signal range 0 Hz...25 kHz)
<b>A5S1DS0...-n</b>	(1x speed,	signal range 0 Hz...12 kHz)
<b>A5S1DS3...-n</b>	(1x speed / 1x direction,	signal range 0 Hz...12 kHz)
<b>A5S1DS4...-n</b>	(2x speed, phase-shifted,	signal range 0 Hz...12 kHz)

(valid from Serial-No. 1602050001)



A5S view  
(version A5S1DS0M2210B48-n shown)

## Speed Sensors for Hazardous Areas zone 2 based on Differential-Hall-Effect Principle

TÜV certified for IEC 61508:2010; SIL 3

EN ISO 13849-1:2015; PL e; Cat. 4

EN ISO 13849-2:2012; PL e; Cat. 4

IEC 62061:2021; SIL<sub>CL</sub> 3

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# 1 General Information

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## 1.2 List of Abbreviations

Abbreviation	Meaning
altern.	alternative
API	Technical standards of the "American Petroleum Institute"
A5S	BRAUN GmbH Sensor series
ATEX	stands for ATmosphère Explosibles (meaning the ATEX EU directives for explosion protection)
DIN	German Institute for Standardisation (Deutsches Institut für Normung)
EMC	Electromagnetic compatibility
EN	European Norm
Ex ec	Type of protection "increased safety", approval for hazardous areas zone 2
F/R	Forward/Reverse (Forward/Backward)
IEC	International Electrotechnical Commission
incl.	inclusive
IPxx	Ingress Protection Number xx according to DIN EN 60529
ISO	International Organization for Standardization
max.	maximum
min.	minimum
MTTFd	Mean Time To Failure dangerous
n	Short term for Speed
NEMAx	National Electrical Manufacturers Association Number x
Nm	Newton meter
PELV	Protective Extra Low Voltage
PFDavg	Probability of Failure on Demand average
RPM	Revolutions Per Minute
sec	second
SELV	Safety Extra Low Voltage
SILx	Safety Integrity Level x
TMR	Triple Modular Redundant
Ub	+ supply voltage
UL	Underwriter Laboratories
Vdc or V dc	Volt direct current

### 1.3 Application characteristics

Speed sensors for applications such as turbines, compressors, expanders, etc. in hazardous areas of zones 2. The sensors are approved as "increased safety" equipment with protection class Ex ec IIC, temperature class T4 (at  $T_a = -40\text{ }^\circ\text{C}$  to  $+125\text{ }^\circ\text{C}$ ) or temperature class T6 (at  $T_a = -20\text{ }^\circ\text{C}$  to  $+40\text{ }^\circ\text{C}$ ). The power supply must comply with the regulations for this (see chapter 4.2 "Power supply" or Chapter 3 "Safety instructions"). Safety classification up to SIL 3 / IEC 61508:2010 resp. EN ISO 13849-1:2015 PL e Kat. 4, EN ISO 13849-2:2012 PL e Kat. 4 and IEC 62061:2021; useable in applications up to SIL<sub>CL</sub> 3 as speed sensors.

Their low end of 0 Hz allows monitoring the machine down to zero speed. They are contact-free, wear-free, maintenance-free and unsusceptible versus external magnetic stray fields and machine vibration.

#### Sensors A5S1DD0...-n and A5S1DS0...-n for detection of rotational speed

Single Channel, the output provides the rotational speed as a single-track frequency signal.

#### Sensors A5S1DD3...-n and A5S1DS3...-n for detection of rotational speed and direction of rotation

Dual Channel, 1 track = rotational speed as frequency, 1 track = F/R status as binary signal.

#### Sensors A5S1DD4...-n and A5S1DS4...-n for detection of rotational speed and direction of rotation with two phase-shifted speed signals

Dual Channel, the output provides the rotational speed as a twin-track frequency signal (phase shifted). Suitable for external direction detection with enhanced safety.

### 1.4 Mounting of the Sensor

The sensor should be mounted in radial direction so that it points to the axis of rotation of the rotating profile. An arrangement parallel to the axis of rotation for frontal scanning is also possible. Then, a possible axial displacement in the machine must be considered. All our information applies to radial scanning.

For mounting, it is best to have the same thread in the fixed part. The sensor is then fixed in the correct position with the supplied nut.

The mounting may be made flush in any material; several sensors can also be placed close to each other.

**A solid and vibration-free mounting of the sensor is important.**

#### Adjustment to the profile edges

Mounting preferably in radial direction and in alignment with the profile

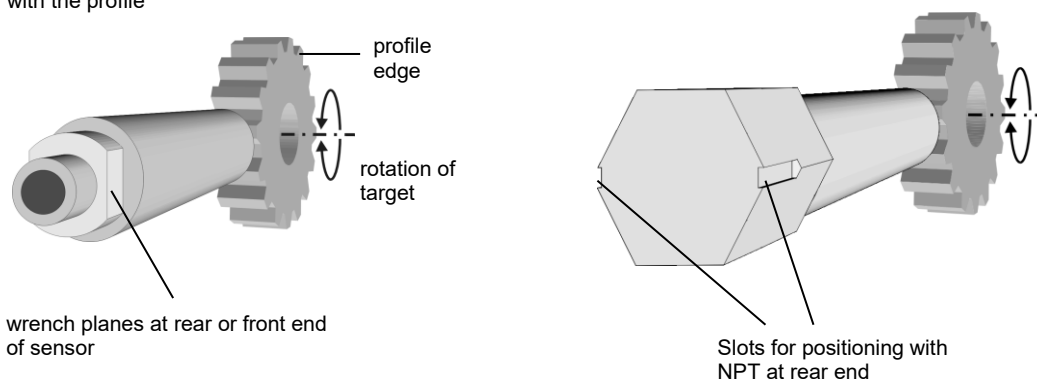


Figure 1: Adjustment to the profile edges

### 1.4.1 Notes on Pole Wheel

The pole wheel must be made of ferromagnetic steel. Non-ferrous material, stainless steel or plastics do not work.

The grooves / bolts of the pole wheel must be equidistant; otherwise, the speed signal will be unsteady.

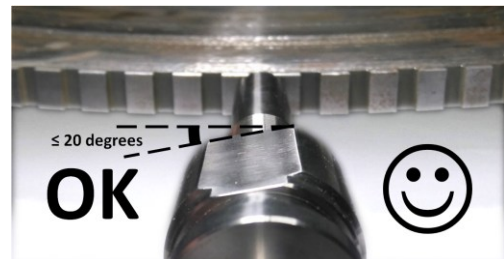
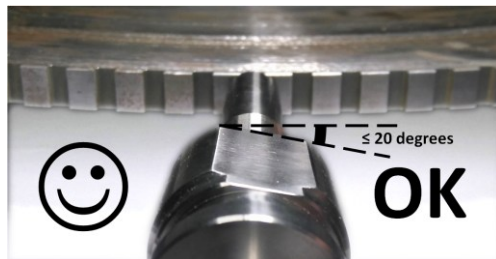
The pole wheel should have no damage or burrs; otherwise, the speed signal can become unsteady. If there is any damage, increasing the gap in the air can eliminate a possible fault (double pulses).

### 1.4.2 Positioning of Sensor

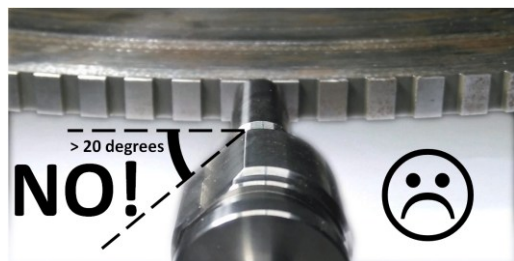
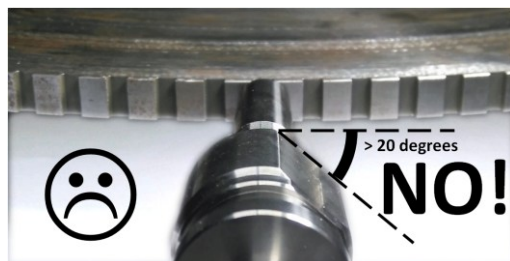
#### 1.4.2.1 Alignment of Sensor

The sensor must be aligned with the flanks of the profile to be scanned. It is correctly installed if the two planes at the end of the sensor (which also serve as wrench planes for screwing in) point in the direction of the profile or perpendicular to the profile edges (for example the tooth flanks of a gear).

A deviation of up to  $\pm 20^\circ$  is permitted.



Correct alignment of the sensor



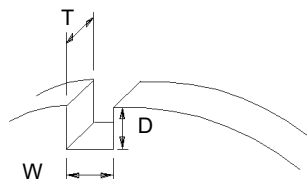
Incorrect alignment of the sensor

Figure 2: Alignment of sensor

### 1.4.2.2 Recommended Air Gap

The recommended air gap between the sensor front surface and the rotating part must be observed. It increases with the size of the profile: For cams or milled grooves with their width, distance and depth, for a gear with its module (= diameter / number of teeth). The field between grooves or cams must be at least as large as the specified width (W), the depth D = at least 3 mm. Thickness of a gear or length (T) of a milled recess of at least 5 mm (plus a possible axial displacement).

The guideline values given below for the profile size (D / W / T) of a rotor are the minimum dimensions, they may be exceeded in any direction. However, the maximum permissible air gap between the sensor and the pole wheel will not increase.



#### Profile size of a grooved wheel

**D = min. 3 mm**  
**W = min. 3 mm**  
**T = min. 5 mm**

Figure 3: Information on profile size

Air gap in dependency of profile size			<b>A5S1DS0...-n</b> <b>A5S1DD0...-n</b>	<b>A5S1DS3...-n and DS4...-n</b> <b>A5S1DD3...-n and DD4...-n</b>
Module of a gear wheel	Diametrical Pitch approx.	min. width W of a groove wheel	Recommended air gap	Recommended air gap
m1	25.40 mm	3 mm	0.5 – 0.8 mm	--
m1.5	16.93 mm	3 mm	0.5 – 1.0 mm	--
m2	12.70 mm	3 mm	0.8 – 1.5 mm	0.3 – 0.8 mm
m3	8.47 mm	3 mm	0.8 – 2.0 mm	0.3 – 1.2 mm
m4	6.35 mm	3 mm	1.0 – 2.5 mm	0.5 – 1.5 mm

### 1.4.3 Maximum fastening torques / wrench sizes / thickness of BRAUN nuts

Nut	Maximum fastening torque	wrench size	thickness (+/- 0.5 mm)
M12 x 1	12 Nm	WS 19	6 mm
M14 x 1	25 Nm	WS 22	4 mm
M14 x 1.5	25 Nm	WS 22	7 mm
3/4"-16	25 Nm	WS 28	10 mm
M16 x 1	35 Nm	WS 24	8 mm
M18 x 1	50 Nm	WS 26	9 mm
3/4"-20	50 Nm	WS 24	6 mm
M18 x 1.5	50 Nm	WS 26	9 mm
5/8"-18	50 Nm	WS 24	10 mm
M22 x 1	75 Nm	WS 30	6 mm

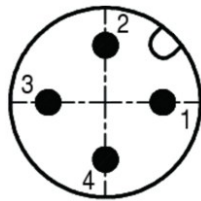
## 1.5 Connection (pin assignment resp. wire assignment)

All sensors described here can have different dimensions and different connection types.

For the connections applies to the different types:

Assignment	with plug pin no.	with open cable ends of <b>BRAUN cables</b> wire color
Signal output 1: (speed signal f1)	4	white
Common zero	3	green
+ sensor supply $U_b$	1	brown
Signal output 2: (speed signal f2 resp. rotation direction signal)	2	red (at Teflon <sup>®</sup> cable) resp. yellow (at PVC cable)
Screen (not connected to sensor housing)		black

## 1.6 Arrangement of Pins in Sensor Plug



The M12 connector uses the A-coding (DIN EN 61076-2-101).

The possible transmission distance is essentially determined by the highest occurring signal frequency, the properties of the transmission line and the input of the connected receiving device.

When connected to our equipment for fixed installation, signal frequency of 25000 Hz can be safely transmitted over a distance of up to 500 m. If the signal frequency is lower, a correspondingly longer transmission distance applies. The cable is based on a 3-core or 4-core shielded version LiYCY or LiTCT with  $3 \times 0.5 \text{ mm}^2$  or  $4 \times 0.5 \text{ mm}^2$ , as supplied by us ( $R < 36 \text{ Ohm / km}$ ,  $C < 150 \text{ pF / m}$ ).

The signal frequency in Hz is calculated with a uniformly divided profile by:

Number of poles x speed / 60.

For narrow poles, the effective frequency must be set higher in accordance with the relationship between pole and gap.

**Important in the transmission:**

A continuous good shielding must be provided. The shield must be connected directly to a shield rail on the receiving side. Never transmit multiple signals under one common screen!

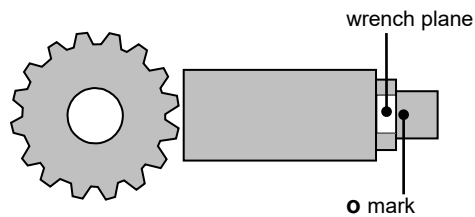
Lay transmission line separately from sources of interference.

## 1.8 Direction of rotation signal for sensor series A5S1DD3...-n / A5S1DS3...-n

The sensor indicates the direction of rotation by a constant signal, which is either high or low depending on the direction (see below for level values). The change is instantaneous as soon as a pole pitch (e.g., 1 tooth) has passed the sensor. At standstill, the last reported direction is retained. A hysteresis in the direction change or the combination with a speed lower limit must be implemented in the connected evaluation unit.

The assignment between the signal level and the direction of rotation results from the installation position of the sensor. For the purpose of predetermination, a mark  $\circ$  is placed on the type strip of the sensor. If the profile wheel rotates clockwise in the viewing direction to this mark, the output has high level, otherwise low level.

### Relationship between mark and direction signal



$\circ$  mark visible and rotation in clockwise direction = direction output high

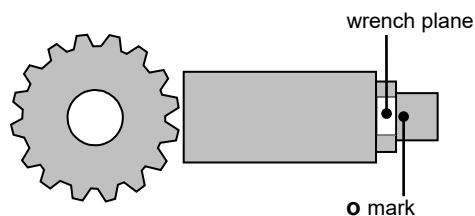
$\circ$  mark visible and rotation in counterclockwise direction = direction output low

$\circ$  mark not visible: output inverse to above

## 1.9 Speed signal f2 (phase-shifted) for sensor series A5S1DD4...-n / A5S1DS4...-n

The sensor provides two phase-shifted frequency signals f1 and f2:

### Relationship between mark and phase position



$\circ$  mark visible and rotation in clockwise direction: f1 is ahead

$\circ$  mark visible and rotation in counterclockwise direction: f2 is ahead

$\circ$  mark not visible: phase position inverse to above

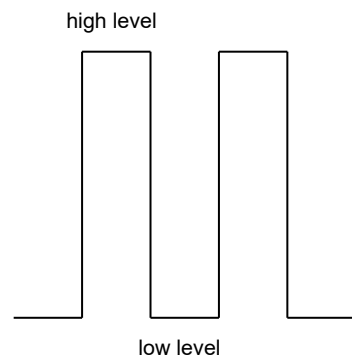
## 1.10 Level and shape of the output signal

Rectangular pulses at low frequencies and with short lines. At higher frequencies and with long lines, the signal at the receiver becomes a saw tooth tread profile.

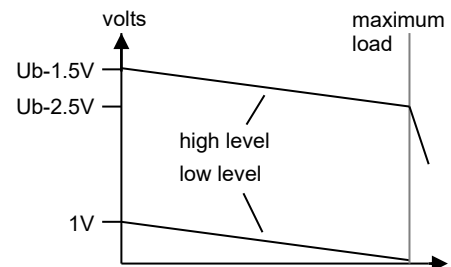
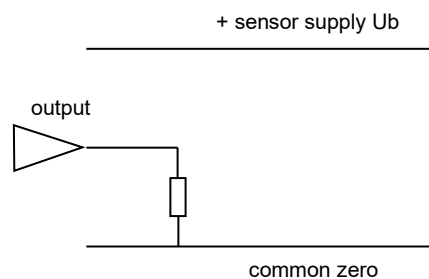
Pulse pitch depends on the profile shape, when sampling a gear wheel profile, it is about 1:1. The level is the same over the entire speed range. The built-in output stage can pull loads to zero and to operating voltage equally strong.

The signal level during no-load running is almost equal to the supply voltage. The diagrams show how it gets smaller when the current load increases (the high-level decreases, the low level becomes higher). If the permissible maximum load of 25 mA is exceeded, the level drops sharply. The sensor is not damaged, the output is short-circuit proof.

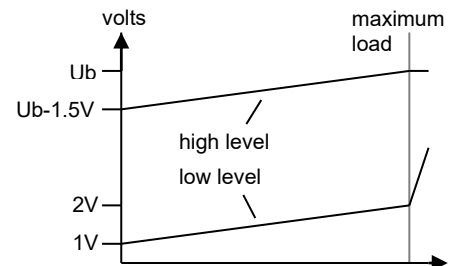
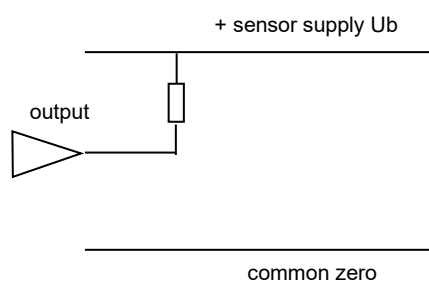
The maximum load corresponds to a load resistance of 1000 ohms at 24 V supply voltage, 500 ohms are permissible with 12 V supply voltage.



### Output level with load against zero



### Output level with load against Ub (+ supply)



A5S1		b	c	d	e	f	g	xm	-n
<b>Signal frequency</b>		<b>Protection Type Ex ec</b>							
b = <b>DD</b> : 0 Hz...25 kHz		Amendment -n only for version Ex ec							
b = <b>DS</b> : 0 Hz...12 kHz		<b>Length of fixed Teflon® cable in m*</b>							
<b>Signal output</b>		Standard lengths for cable:							
c = <b>0</b> : 1x frequency		x = <b>2, 5, 8, 10, 15, 20</b>							
c = <b>3</b> : 1x frequency / 1x direction*		*(omit for versions with screw-plug-in connection)							
c = <b>4</b> : 2x frequency, phase-shifted*		<b>Nominal thread length in mm</b>							
*Minimum nominal thread length 74 mm		Standard length for thread:							
<b>Unit of shaft diameter</b>		g = <b>50, 120</b> : M12x1 (1210)							
d = <b>M</b> : metric		g = <b>80 (if f = T)</b> : M12x1 (1210)							
d = <b>N</b> : inch and ½-NPT at end of sensor		g = <b>90 (if f = B)</b> : M12x1 (1210)							
d = <b>U</b> : inch		g = <b>50, 90, 154</b> : M14x1 (1410)							
<b>Thread of shaft diameter</b>		g = <b>50, 90, 154</b> : M14x1.5 (1415)							
Standard thread:		g = <b>48</b> : M16x1 (1610)							
e = <b>1210</b> : M12x1 (metric)		g = <b>80, 154</b> : M16x1.5 (1615)							
e = <b>1410</b> : M14x1 (metric)		g = <b>48, 94</b> : M18x1 (1810)							
e = <b>1415</b> : M14x1.5 (metric)		g = <b>50, 74, 94</b> : M18x1.5 (1815)							
e = <b>1610</b> : M16x1 (metric)		g = <b>48, 94</b> : M22x1 (2210)							
e = <b>1615</b> : M16x1.5 (metric)		g = <b>90</b> : 3/4"-16 (3416)							
e = <b>1810</b> : M18x1 (metric)		g = <b>90</b> : 3/4"-20 (3420)							
e = <b>1815</b> : M18x1.5 (metric)		g = <b>48, 100, 165</b> : 5/8"-18 (5818)							
e = <b>2210</b> : M22x1 (metric)		other lengths on request							
e = <b>3416</b> : 3/4"-16 (inch)		<b>Connection type</b>							
e = <b>3420</b> : 3/4"-20 (inch)		f = <b>B</b> : screw-plug-in connection							
e = <b>5818</b> : 5/8"-18 (inch)		f = <b>T</b> : fixed Teflon® cable							
other threads or flat shafts on request									

**Examples:**

A5S1DD0M1210B120-n	=	Signal frequency up to 25 kHz, signal output 1x frequency, thread M12x1, screw-plug-in connection, nominal length 120 mm
A5S1DS0M1415B90-n	=	Signal frequency up to 12 kHz, signal output 1x frequency, thread M14x1.5, screw-plug-in connection, nominal length 90 mm
A5S1DD3M1615T80-5m-n	=	Signal frequency up to 25 kHz, signal output 1x frequency / 1x direction, thread M16x1.5, Teflon® cable with 5m length, nominal length 80 mm
A5S1DS3M2210T94-10m-n	=	Signal frequency up to 12 kHz, signal output 1x frequency / 1x direction, thread M22x1, Teflon® cable with 10m length, nominal length 94 mm
A5S1DD4U5818B100-n	=	Signal frequency up to 25 kHz, signal output 2x frequency (phase-shifted), thread UNF5/8-18, screw-plug-in connection, nominal length 100 mm
A5S1DS4M1815T94-2m-n	=	Signal frequency up to 12 kHz, signal output 2x frequency (phase-shifted), thread M18x1.5, Teflon® cable with 2m length, nominal length 94 mm

## **1.12 Safety Data**

See A5S-SIL-Datasheet.

## **1.13 General Certificates / Approvals**

### **1.13.1 Certification IEC 61508:2010; SIL 3**

The A5S... series differential hall effect sensors are TÜV certified according to IEC 61508:2010; suitable up to SIL3 as stand-alone speed sensors for the functions:

- speed monitoring in connection with BRAUN E16 machine protection systems
- output of a correct speed signal (frequency) with an accuracy of +/- 1Hz

### **1.13.2 Certification EN ISO 13849-1:2015; PLe; Cat. 4**

The A5S... series differential hall effect sensors are TÜV certified according to EN ISO 13849-1:2015; suitable up to PLe; Cat. 4 as stand-alone speed sensors for the functions:

- speed monitoring in connection with BRAUN E16 machine protection systems
- output of a correct speed signal (frequency) with an accuracy of +/- 1Hz

### **1.13.3 Certification EN ISO 13849-2:2012; PLe; Cat. 4**


The A5S... series differential hall effect sensors are TÜV certified according to EN ISO 13849-2:2012; suitable up to PLe; Cat. 4 as stand-alone speed sensors for the functions:


- speed monitoring in connection with BRAUN E16 machine protection systems
- output of a correct speed signal (frequency) with an accuracy of +/- 1Hz

### **1.13.4 Certification IEC 62061:2021; SIL<sub>CL</sub> 3**

The A5S... series differential hall effect sensors are TÜV certified according to IEC 62061:2021; suitable in applications up to SIL<sub>CL</sub> 3 as stand-alone speed sensors for the functions:

- speed monitoring in connection with BRAUN E16 machine protection systems
- output of a correct speed signal (frequency) with an accuracy of +/- 1Hz





# Certificate

No. SEBS-A.095133/15, V2.0

TÜV NORD Systems GmbH & Co. KG hereby certifies to

**Braun GmbH**  
Esslinger Straße 26  
71334 Waiblingen-Hegnach

that the Differential-Hall-Effect based Sensor  
**Type Series A5S**

meets the requirements  
listed in the below mentioned standards by external diagnostic

---

- IEC 61508:2010 (capable up to SIL 3)
- EN ISO 13849-1:2015 (capable up to PL e; Cat. 4)
- EN ISO 13849-2:2012 (capable up to PL e; Cat. 4)
- IEC 62061:2021 (capable for applications up to SIL 3)

---

Certification program Leittechnik (SEB-ZE-SEECERT-VA-320-20, Rev. 5.1/04.19)


**Base of certification is the report SEBS-A.095133/15TB and the tracking list in the valid version.**

**This certificate entitles the holder to use the pictured safety approved mark.**

**Valid until: 08-12-2026**  
**File reference: 8119303478**

**Hamburg, 08-12-2021**

  
**Bianca Pfuff**



Certification body SEECERT  
TÜV NORD Systems GmbH & Co. KG  
Große Bahnstraße 31, 22525 Hamburg, Germany

Figure 4: SIL 3 Certificate



Protecting Your Rotating Equipment

**BRAUN GmbH Industrie-Elektronik, Esslinger Str. 26, 71334 Waiblingen, Germany**  
 erklärt in alleiniger Verantwortung, declares in its sole responsibility,

dass das Produkt: <i>that the product:</i>	<b>Hall-Effekt Drehzahl-Sensor</b> <i>Hall-Effect Speed Sensor</i>
Typ(en), types:	<b>A5S1...-n</b>

den genannten Europäischen Richtlinien und harmonisierten Normen entspricht, is in conformity with the listed European Directives and harmonized standards.

EU-Richtlinie(n) / EU-Directive(s)	Norm(en), Standard(s)
2014/34/EU ATEX-Produkttrichtlinie 2014/34/EU ATEX Product Directive	EN IEC 60079-0:2018 EN IEC 60079-7:2015+A1:2018

Kennzeichnung, marking:  II 3 G Ex ec IIC T\* Gc   
 (T\* = T4 or T6)

Konformitätsbescheinigung Nr.: <i>Type Examination Certificate No:</i>	<b>CML 14ATEX4076X</b>
Aussteller, notified Body:	Eurofins CML B.V. Koopvaardijweg 32 4906CV Oosterhout The Netherlands 2776
Benannte Stelle Nr., notified Body No:	

EU-Richtlinie(n) / EU-Directive(s)	Norm(en), Standard(s)
2014/30/EU EMV-Richtlinie 2014/30/EU EMC Directive	EN 61326-1:2013 EN IEC 61326-3-2:2018
2014/35/EU Niederspannungsrichtlinie 2014/35/EU Low Voltage Directive (LVD)	EN 61010-1:2010+A1:2019
2011/65/EU RoHS-Richtlinie 2011/65/EU RoHS Directive	EN IEC 63000:2018

Diese Erklärung gilt für alle Sensoren der Baureihe A5S1...-n, die mit Typenschildern der oben genannten Typen versehen sind. Zusatzbezeichnungen an Stelle von ... stehen für die spezifische Ausführung.  
 This declaration is valid for all sensors of series A5S1...-n, which are provided with type labels of the types mentioned above. Suffixes instead of ... are dummy variables for the specific model.

Unbedingte Beachtung aller Punkte der mitgelieferten Betriebsanleitung ist hierbei Voraussetzung.  
 Strict observance of the operation manual is an indispensable precondition, hereto.

Unterzeichnet für und im Namen der BRAUN GmbH / Signed for and on behalf of BRAUN GmbH

Waiblingen, 14-JAN-2026

Ort und Datum  
*Place and date*

  
 Albrecht Braun  
 Geschäftsführer  
 Managing Director



Figure 5: EU Declaration of Conformity

## 2 Hazardous protection


The safety requirements as determined by EN 1127-1, as well as the corresponding national regulations, are to be complied with regarding primary explosion protection, i.e. measures which prevent or restrict the formation of a hazardous explosive atmosphere.

In the case of secondary hazardous protection, i.e. measures that prevent the ignition of an explosive atmosphere surrounding electrical equipment, the series of standards applicable to EN 60079 and the relevant national regulations must be observed.

### 2.1 Relevant technical Data for Hazardous Area

See the following certificates from chapter 2.3.1

### 2.2 ATEX Certification of the Input Circuit

 II 3 G Ex ec IIC T4/T6 Gc

Type Examination Certificate: CML 14ATEX4076X

### 2.3 Explosive relevant Certificates / Approvals

#### 2.3.1 ATEX

The series A5S1...-n Differential Hall Effect Ex sensors are certified according to ATEX Type Examination Certificate No. CML 14ATEX4076X and are compliant according to ATEX Product Directive 2014/34/EU.

Marking see ATEX Type Examination Certificate chapter 2.3.7.

#### 2.3.2 IECEX

The series A5S1...-n Differential Hall Effect Ex sensors are certified according to IECEX Certificate of Conformity No. CML 14.0030X.

Marking see IECEX Certificate of Conformity chapter 2.3.8.

#### 2.3.3 USA (NEC) and Canada (CEC)

The series A5S1...-n Differential Hall Effect Ex sensors are certified for the USA and Canada according to QPS Certificate of Conformity No. LR 1323-1.

Marking see NEC/CEC Certificate of Conformity chapter 2.3.9.

#### 2.3.4 EAC Ex

There is currently no valid certificate for EAC Ex.

#### 2.3.5 UKEX

The series A5S1...-n Differential Hall Effect Ex sensors are certified for UKEX according to UKEX Type Examination Certificate No. CML 21UKEX4050X and are compliant according to SI 2016 No. 1107.

Marking see UKEX Type Examination Certificate chapter 2.3.11.

#### 2.3.6 KCs

The series A5S1...-n Differential Hall Effect Ex sensors are certified for South Korea according to KCs certificate No. 21-AV4BO-0342X by KOSHA.

Marking see KCs certificate chapter 2.3.12.



## 11 Description

The A5S1 Series Hall-effect Sensors are non-contact measuring head sensors used to detect the movement of rotating ferromagnetic parts with profiling, eg rotating cog wheels. The measuring head contains a hall-effect sensor, magnet and amplifier circuit encapsulated in a cylindrical stainless-steel enclosure with end cap. The power supply and signal output connections are made using either an attached cable or plug and socket connector depending on the model.

The A5S1 Series sensor has a number of options defined by the full model number:

### A5S1 b c d e f g - x m - n

- b = Signal frequency (up to 25kHz)
- c = Signal output
- d = Unit of shaft diameter
- e = Thread of shaft diameter
- f = Connection type
- g = Nominal thread length in mm
- x = Length of fixed Teflon® (PTFE/FEP) cable in m
- n = Protection Type Ex ec

Alternative model coding may be used in line with specific customer orders. The Sensors have the following ratings,

- Rated voltage = 32Vdc
- Rated current = 40mA/60mA/120mA

### Variation 1:

This variation introduces the following modifications:

- i. To transfer the certificate to Eurofins CML B.V.

### Variation 2:

This variation introduces the following modifications:

- i. Standards update:
  - a. Update to EN IEC 60079-0:2018.
  - b. Update to EN IEC 60079-7:2015+A1:2018. Marking update from "Ex nA" to "Ex ec".
- ii. Trademark update.
- iii. Address correction.
- iv. Modification of AMB42 documents.

## 12 Certificate history and evaluation reports

Issue	Date	Associated report	Notes
0	13 Nov 2014	R217B/00	Issue of the prime certificate
1	22 Apr 2021	R13681D/00	Introduction of Variation 1 Transfer to CML B.V.
2	10 Dec 2025	R18858A/00	Introduction of Variation 2

Note: Drawings that describe the equipment or component are listed in the Annex.

Figure 7: ATEX Type Examination Certificate part 2

**13 Conditions of Manufacture**

The following conditions are required of the manufacturing process for compliance with the certification.

- i. The equipment shall be subjected to an electric strength test using a test voltage of 500 VAC or a 40% higher DC voltage may be applied between the circuit and earth for 60s. Alternatively, a voltage of 20% higher may be applied for 1s. There shall be no evidence of flashover or breakdown and the maximum current flowing shall not exceed 5mA.

**14 Specific Conditions of Use (Special Conditions)**

The following conditions relate to safe installation and/or use of the equipment.

- i. The following ambient temperature and supply input limits are to be applied to the sensor arrangement as applicable:

Connection /Type	Temperature class	Minimum ambient temperature	Maximum ambient temperature	Maximum temperature at end cap	Ratings
PTFE/FEP cable	T4	-40°C	+125°C	+125°C	32Vdc 40mA
			+115°C		32Vdc 60mA
			+100°C		32Vdc 120mA
PTFE/FEP cable with plug/socket	T4	-40°C	+85°C	+125°C	32Vdc 120mA
PVC cable	T4	-5°C if cable flexed -30°C if cable fixed	70°C if cable flexed 80°C if cable fixed	+125°C	32Vdc 60mA
All Ex ec types	T6	≥-5°C	+70°C	+80°C	32Vdc 60mA
	T6	≥-5°C	+60°C	+80°C	32Vdc 120mA
<b>Note: The worst case input limitation and ambient shall always apply if more than one limiting factor present in the sensor arrangement</b>					

Figure 8: ATEX Type Examination Certificate part 3

		<h2 style="margin: 0;">IECEX Certificate of Conformity</h2>	
<b>INTERNATIONAL ELECTROTECHNICAL COMMISSION</b> <b>IEC Certification System for Explosive Atmospheres</b> <small>for rules and details of the IECEX Scheme visit <a href="http://www.iecex.com">www.iecex.com</a></small>			
Certificate No.:	<b>IECEX CML 14.0030X</b>	Page 1 of 4	<u>Certificate history:</u> <a href="#">Issue 0 (2014-11-13)</a>
Status:	<b>Current</b>	Issue No: 1	
Date of Issue:	2025-12-10		
Applicant:	<b>Braun GmbH Industrie-Elektronik</b> Esslinger Straße 26 DE 71334 Waiblingen Germany		
Equipment:	<b>A5S1 Series Hall-Effect Sensors</b>		
Optional accessory:			
Type of Protection:	<b>Intrinsic Safety or Increased Safety</b>		
Marking:	Ex ia IIC T* Ga or Ex ec IIC T* Gc Ta**= Up to -40°C to +125°C  <small>* T4 or T6 depending on supply power and ambient temperature, see Specific Conditions of Use.          ** See Specific Conditions of Use for details.</small>		
Approved for issue on behalf of the IECEX Certification Body:		<b>Stelios Roumbedakis</b>	
Position:		<b>Certification Manager</b>	
Signature: (for printed version)			
Date: (for printed version)		2025-12-10	
1. This certificate and schedule may only be reproduced in full. 2. This certificate is not transferable and remains the property of the issuing body. 3. The Status and authenticity of this certificate may be verified by visiting <a href="http://www.iecex.com">www.iecex.com</a> or use of this QR Code.			
Certificate issued by: <b>Eurofins E&amp;E CML Limited</b> Unit 1, Newport Business Park New Port Road Ellesmere Port, CH65 4LZ United Kingdom		 	

Figure 9: IECEX Certificate of Conformity part 1



## IECEX Certificate of Conformity

Certificate No.: **IECEX CML 14.0030X**

Page 2 of 4

Date of issue: 2025-12-10

Issue No: 1

Manufacturer: **Braun GmbH Industrie-Elektronik**  
Esslinger Straße 26  
DE 71334  
Waiblingen  
Germany

Manufacturing locations: **Braun GmbH Industrie-Elektronik**  
Esslinger Straße 26  
DE 71334  
Waiblingen  
Germany

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEX Quality system requirements. This certificate is granted subject to the conditions as set out in IECEX Scheme Rules, IECEX 02 and Operational Documents as amended

### STANDARDS :

The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

[IEC 60079-0:2017](#) Explosive atmospheres - Part 0: Equipment - General requirements  
Edition:7.0

[IEC 60079-11:2011](#) Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"  
Edition:6.0

[IEC 60079-7:2017](#) Explosive atmospheres - Part 7: Equipment protection by increased safety "e"  
Edition:5.1

This Certificate does not indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

### TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Reports:

[GB/CML/ExTR14.0019/00](#)

[GB/CML/ExTR25.0139/00](#)

Quality Assessment Report:

[DE/TPS/QAR12.0006/13](#)

Figure 10: IECEX Certificate of Conformity part 2



## IECEX Certificate of Conformity

Certificate No.: **IECEX CML 14.0030X**

Page 3 of 4

Date of issue: 2025-12-10

Issue No: 1

**EQUIPMENT:**

Equipment and systems covered by this Certificate are as follows:

The A5S1 Series Hall-effect Sensors are non-contact measuring head sensors used to detect the movement of rotating ferromagnetic parts with profiling, eg rotating cog wheels.

**See Certificate Annex for full Product Description and Conditions of Manufacture.**

**SPECIFIC CONDITIONS OF USE: YES as shown below:**

**See Certificate Annex.**

Figure 11: IECEX Certificate of Conformity part 3



# IECEX Certificate of Conformity

Certificate No.: **IECEX CML 14.0030X**

Page 4 of 4

Date of issue: 2025-12-10

Issue No: 1

## DETAILS OF CERTIFICATE CHANGES (for issues 1 and above) Issue 1

This issue introduced the following changes:

1. Standards update: Update to IEC 60079-0:2017:Ed.7.0, Update to IEC 60079-7:2017 Ed. 5.1 standards; as a result, the marking was updated from "Ex nA" to "Ex ec", Removal of IEC 60079-26 standard from the scope.
2. Trademark update.
3. Modification of AMB42 documents.

### Annex:

[Certificate Annex IECEX CML 14.0030X Issue 1.pdf](#)

Figure 12: IECEX Certificate of Conformity part 4

**Annexe to:** IECEx CML 14.0030X Issue 1  
**Apparatus:** A5S1 Series Hall-effect Sensor  
**Applicant:** Braun GmbH Industrie-Elektronik



## Description

The A5S1 Series Hall-effect Sensors are non-contact measuring head sensors used to detect the movement of rotating ferromagnetic parts with profiling, eg rotating cog wheels. The measuring head contains a hall-effect sensor, magnet and amplifier circuit encapsulated in a cylindrical stainless-steel enclosure with end cap. The power supply and signal output connections are made using either an attached cable or plug and socket connector depending on the model. The measuring head is supplied either as an intrinsically safe version (Ex ia) or an increased safety version (Ex ec). The design and construction of both versions are identical.

The A5S1 Series sensor has a number of options defined by the full model number:

### A5S1 b c d e f g - x m -n

- b = Signal frequency (up to 25kHz)
- c = Signal output
- d = Unit of shaft diameter
- e = Thread of shaft diameter
- f = Connection type
- g = Nominal thread length in mm
- x = Length of fixed Teflon® (PTFE/FEP) cable in m
- n = Protection Type Ex ec (none for Ex ia)

Alternative model coding may be used in line with specific customer orders.

### I.S Versions (Ex ia):

The I.S versions are supplied from an intrinsically safe power source and connect to monitoring equipment located outside the hazardous area. The Sensors have the following safety description,

- U<sub>i</sub> = 17V
- I<sub>i</sub> = 100mA
- P<sub>i</sub> = 125mW/250mW/500mW
- C<sub>i</sub> = 0.131µF (including cable capacitance for up to 100m of attached cable)
- L<sub>i</sub> = 0

### Increased Safety Versions (Ex ec):

The Sensors have the following ratings,

- Rated voltage = 32Vdc
- Rated current = 40mA/60mA/120mA



Certificate Annex IECEx  
Version: 12.0 Approval: Approved



1 of 3

Figure 13: IECEx Certificate of Conformity part 5



### Conditions of Manufacture

The following conditions are required of the manufacturing process for compliance with the certification.

- i. The equipment shall be subjected to an electric strength test using a test voltage of 500 Vac or a 40% higher d.c voltage may be applied between the circuit and earth for 60 s. Alternatively, a voltage of 20% higher may be applied for 1 s. There shall be no evidence of flashover or breakdown and the maximum current flowing shall not exceed 5 mA.

For Ex ia Sensors only:

- ii. When alternative model coding is used in line with specific customer orders, details of the specific construction shall be provided.

### Specific Conditions of Use

The following conditions relate to safe installation and/or use of the equipment.

- i. The following ambient temperature and supply input limits are to be applied to the sensor arrangement as applicable:

**a. Intrinsically Safe Modules (Ex ia):**

Connection /Type	Temperature class	Minimum ambient temperature	Maximum ambient temperature	Maximum temperature at end cap	Pi
PTFE/FEP cable	T4	-40°C	+125°C	+125°C	125mW
			+115°C		250mW
			+100°C		500mW
PTFE/FEP cable with plug/socket	T4	-40°C	+85°C	+125°C	500mW
PVC cable	T4	-5°C if cable flexed -30°C if cable fixed	+70°C if cable flexed +80°C if cable fixed	+125°C	500mW
All Ex ia types	T6	≥-5°C	+60°C	+80°C	500mW
	T6	≥-5°C	+70°C	+80°C	250mW

**Note: The worst-case limitation of power and ambient shall always apply if more than one limiting factor is present in the sensor arrangement**

**b. Increased Safety Modules (Ex ec):**

Connection /Type	Temperature class	Minimum ambient temperature	Maximum ambient temperature	Maximum temperature at end cap	Ratings
PTFE/FEP cable	T4	-40°C	125°C	+125°C	32Vdc 40mA
			115°C		32Vdc 60mA
			100°C		32Vdc 120mA
PTFE/FEP cable with plug/socket	T4	-40°C	85°C	+125°C	32Vdc 120mA
PVC cable	T4	-5°C if cable flexed -30°C if cable fixed	+70°C if cable flexed +80°C if cable fixed	+125°C	32Vdc 60mA
All Ex ec types	T6	≥-5°C	+70°C	+80°C	32Vdc 60mA
	T6	≥-5°C	+60°C	+80°C	32Vdc 120mA

**Note: The worst case input limitation and ambient shall always apply if more than one limiting factor present in the sensor arrangement**



Certificate Annex IECEX  
Version: 12.0 Approval: Approved



**Eurofins E&E CML Limited**  
Newport Business Park, New Port Road  
Ellesmere Port, CH65 4LZ, UK

Figure 14: IECEX Certificate of Conformity part 6



For Ex ia Sensors only:

- ii. If a charge-generating mechanism is present, the exposed unearthed/ungrounded metallic enclosure is capable of storing a level of charge that could become incendive for IIC gases. Therefore, the user/installer shall implement precautions to prevent the build-up of electrostatic charge, e.g. earthing the metallic part. This is particularly important if the equipment is installed in a zone 0 location.

**Components used which are covered by Ex Certificates issued to older editions of Standards**

None.



Certificate Annex IECEx  
Version: 12.0 Approval: Approved



**Eurofins E&E CML Limited**  
Newport Business Park, New Port Road  
Ellesmere Port, CH65 4LZ, UK

Figure 15: IECEx Certificate of Conformity part 7



**QPS Evaluation Services Inc.**  
 Testing, Certification and Field Evaluation Body  
 Accredited in Canada, the USA, and Internationally

File
LR 1323

<b>CERTIFICATE OF COMPLIANCE</b> (ISO TYPE 3 CERTIFICATION SYSTEM)	
Issued to	Braun GmbH Industrie-Elektronik
Address	Esslinger Straße 26, DE 71334 Waiblingen Germany
Project Number	<b>LR 1323-1R1</b>
Product	Sensor
Model Number	Type A5S0***** ** (OrdLoc) Type A5S1***** ** (HazLoc) Type A5S1*****-n** (HazLoc)
Ratings	<p><b>Note:</b> The A5S Series sensor has a number of options defined by the full Type coding (see report)</p> <p><b>Canada:</b>  <b>Sensor type A5S1***** **</b>                      Class I, Div 1, Groups A, B, C, D, Temperature code T6/T4, 'Intrinsically safe'                      Class I, Zone 0, Ex ia IIC T6/T4 Ga  <b>Sensor type A5S1*****-n**</b>                      Class I, Div 2, Groups A, B, C, D, Temperature code T6/T4, 'Non-incendive'                      Class I, Zone 2, Ex nA IIC T6/T4 Gc</p> <p><b>US:</b>  <b>Sensor type A5S1***** **</b>                      Class I, Div 1, Groups A, B, C, D, Temperature code T6/T4, 'Intrinsically safe'                      Class I, Zone 0, AEx ia IIC T6/T4  <b>Sensor type A5S1*****-n**</b>                      Class I, Div 2, Groups A, B, C, D, Temperature code T6/T4, 'Non-incendive'                      Class I, Zone 2, AEx nA IIC T6/T4</p> <p><b>Note:</b> complete electrical ratings ("See instruction manual" – detailed in the instructions and can be identified from model number)</p>
Applicable Standards	<p><b>Canadian standards</b>                      Canadian Electrical Code (CEC) dated 2012                      CSA C22.2 No. 60079-0:11                      CSA C22.2 No. 60079-11:11                      CSA C22.2 No. 60079-15:12                      CSA C22.2 No. 157-92, (R2012)                      CSA C22.2 No. 213-1987 (R2013)                      CSA-C22.2 No.61010-1-12, edition 3</p>



The SCC and IAS Accreditation Symbols are official symbols of the respective accreditation bodies, used under license.  
 81 Kelfield St., Unit 8, Toronto, ON, M9W 5A3, Canada Tel: 416-241-8857; Fax: 416-241-0682

[www.qps.ca](http://www.qps.ca)





Figure 16: NEC/CEC Certificate of Conformity part 1



**QPS Evaluation Services Inc.**  
 Testing, Certification and Field Evaluation Body  
 Accredited in Canada, the USA, and Internationally

File  
 LR 1323

Page 2 of 2

	<p><b>US standards</b>          National Electrical Code (NEC) dated 2014          UL 60079-0 (12.00.01) -2013          UL 60079-11 (12.02.01) -2013          UL 60079-15 (12.12.02) -2012          UL 913 – 8<sup>th</sup> edition          ISA 12.12.01 – 2013          UL-61010-1 (82.02.,01), edition 3</p>
Factory/Manufacturing Location	Braun GmbH Industrie-Elektronik Esslinger Straße 26, DE 71334 Waiblingen Germany
<p><b>Statement of Compliance:</b> The product(s) identified in this Certificate and described in the Report covered under the above referenced project number have been investigated and found to be in compliance with the relevant requirements of the above referenced standard(s). As such, they are eligible to bear the QPS Certification Mark shown below, in accordance with the provisions of QPS's Service Agreement.</p>	
	
<p>Issued By: <b>D. Adams, P.Eng.</b>          Certification Manager, Hazardous Locations Dept. [Ex Equipment]</p>	
Signature: 	Date: March 19, 2024



The SCC and IAS Accreditation Symbols are official symbols of the respective accreditation bodies, used under license.  
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[www.qps.ca](http://www.qps.ca)



QSD 34

Rev 05

Figure 17: NEC/CEC Certificate of Conformity part 2

### **2.3.10 EAC Ex TR CU Certificate**

There is currently no valid certification for EAC Ex.



## Type Examination Certificate CML 21UKEX4050X Issue 1

### United Kingdom Conformity Assessment

- 1 Product or Protective System Intended for use in Potentially Explosive Atmospheres UKSI 2016:1107 (as amended)
- 2 Equipment **A5S1 Series Hall-Effect Sensors**
- 3 Manufacturer **Braun GmbH Industrie-Elektronik**
- 4 Address **Esslinger Straße 26  
DE 71334 Waiblingen,  
Germany**

5 The equipment is specified in the description of this certificate and the documents to which it refers.

6 Eurofins E&E CML Limited, Newport Business Park, New Port Road, Ellesmere Port, CH65 4LZ, United Kingdom, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Schedule 1 of the Regulations.

The examination and test results are recorded in the confidential reports listed in Section 12.

7 If an 'X' suffix appears after the certificate number, it indicates that the equipment is subject to specific conditions of use (affecting correct installation or safe use). These are specified in Section 14.

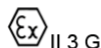
8 This Type Examination certificate relates only to the design and construction of the specified equipment. Further requirements of the Regulations apply to the manufacturing process and supply of the product. These are not covered by this certificate.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the confidential report, has been demonstrated through compliance with the following documents:

EN IEC 60079-0:2018

EN IEC 60079-7:2015+A1:2018

10 The equipment shall be marked with the following:



Ex ec IIC T\* Gc

Ta\*\*= Up to -40°C to +125°C

\* *T4 or T6 depending on supply power and ambient temperature, see Specific Conditions of Use*

\*\* *See Specific Conditions of Use for details*



This certificate shall only be copied  
in its entirety and without change

[www.CMLEx.com](http://www.CMLEx.com)

1 of 3

S. Roumbedakis  
Certification Manager

Figure 18: UKEX Type Examination Certificate part 1



CML 21UKEX4050X  
Issue 1

## 11 Description

The A5S1 Series Hall-effect Sensors are non-contact measuring head sensors used to detect the movement of rotating ferromagnetic parts with profiling, eg rotating cog wheels. The measuring head contains a hall-effect sensor, magnet and amplifier circuit encapsulated in a cylindrical stainless-steel enclosure with end cap. The power supply and signal output connections are made using either an attached cable or plug and socket connector depending on the model.

The A5S1 Series sensor has a number of options defined by the full model number:

### A5S1 b c d e f g - x m - n

- b = Signal frequency (up to 25kHz)
- c = Signal output
- d = Unit of shaft diameter
- e = Thread of shaft diameter
- f = Connection type
- g = Nominal thread length in mm
- x = Length of fixed Teflon® (PTFE/FEP) cable in m
- n = Protection Type Ex ec

Alternative model coding may be used in line with specific customer orders. The Sensors have the following ratings,

- Rated voltage = 32Vdc
- Rated current = 40mA/60mA/120mA

### Variation 1:

This variation introduces the following modifications:

- i. Standards update:
  - a. Update to EN IEC 60079-0:2018.
  - b. Update to EN IEC 60079-7:2015+A1:2018. Marking update from “Ex nA” to “Ex ec”.
- ii. Trademark update.
- iii. Address correction.
- iv. Modification of AMB42 documents.

## 12 Certificate history and evaluation reports

Issue	Date	Associated report	Notes
0	22 Apr 2021	R13681A/00	Issue of Prime Certificate
1	10 Dec 2025	R18858A/00	Introduction of Variation 1

Note: Drawings that describe the equipment are listed in the Annex.

This certificate shall only be copied  
in its entirety and without change  
[www.CMLEx.com](http://www.CMLEx.com)

2 of 3

Type Examination Certificate – Equipment  
Version: 9.0 Approval: Approved

Figure 19: UKEX Type Examination Certificate part 2



CML 21UKEX4050X  
Issue 1

### 13 Conditions of Manufacture

The following conditions are required of the manufacturing process for compliance with the certification.

- i. The equipment shall be subjected to an electric strength test using a test voltage of 500 VAC or a 40% higher DC voltage may be applied between the circuit and earth for 60s. Alternatively, a voltage of 20% higher may be applied for 1s. There shall be no evidence of flashover or breakdown and the maximum current flowing shall not exceed 5mA.

### 14 Specific Conditions of Use

The following conditions relate to safe installation and/or use of the equipment.

- i. The following ambient temperature and supply input limits are to be applied to the sensor arrangement as applicable:

Connection /Type	Temperature class	Minimum ambient temperature	Maximum ambient temperature	Maximum temperature at end cap	Ratings
PTFE/FEP cable	T4	-40°C	+125°C	+125°C	32Vdc 40mA
			+115°C		32Vdc 60mA
			+100°C		32Vdc 120mA
PTFE/FEP cable with plug/socket	T4	-40°C	+85°C	+125°C	32Vdc 120mA
PVC cable	T4	-5°C if cable flexed -30°C if cable fixed	+70°C if cable flexed +80°C if cable fixed	+125°C	32Vdc 60mA
All Ex ec types	T6	≥-5°C	+70°C	+80°C	32Vdc 60mA
	T6	≥-5°C	+60°C	+80°C	32Vdc 120mA
<b>Note: The worst case input limitation and ambient shall always apply if more than one limiting factor present in the sensor arrangement</b>					

This certificate shall only be copied in its entirety and without change  
[www.CMLEx.com](http://www.CMLEx.com)

3 of 3

Type Examination Certificate – Equipment  
Version: 9.0 Approval: Approved

Figure 20: UKEX Type Examination Certificate part 3

제 2021-BO-0342-1 호



# 안전인증서

BRAUN GmbH

Esslinger Strasse 26, 71334 Waiblingen, Germany

위 사업장에서 제조하는 아래의 품목이 산업안전보건법 제84조(안전인증) 및 시행규칙 제110조(안전인증 심사의 종류 및 방법) 제4항(인증서 교부)에 따른 안전인증 심사 결과 안전·보건 기준에 적합하므로 안전인증표시의 사용을 인증합니다.

품 목	
방폭구조	전기기계·기구(Hall-Effect Sensors)
형식·모델·용량·등급/인증번호	
형식·모델	인증번호
A5S1*****n*	21-AV4BO-0342X
용량·등급	Ex nA IIC T4 or T6
정 격	32Vdc, 40mA/60mA/120mA -40℃≤Tamb≤+125℃
인증기준	
방호장치 안전인증 고시(노동부고시 제2021-22호)	
인증조건	
(뒤쪽) 참조	

2021.12.23 최초발급  
2022.02.07 재발급(정정)

2022년 02월 07일

## 한국산업안전보건공단 이사장



Figure 21: KCs Certificate part 1

# KC<sup>s</sup> 인 증 조 건

(뒤쪽)

1. 제조공장

- 'BRAUN GmbH', Esslinger Strasse 26, 71334 Waiblingen, Germany 에서 생산하는 제품에 한함.

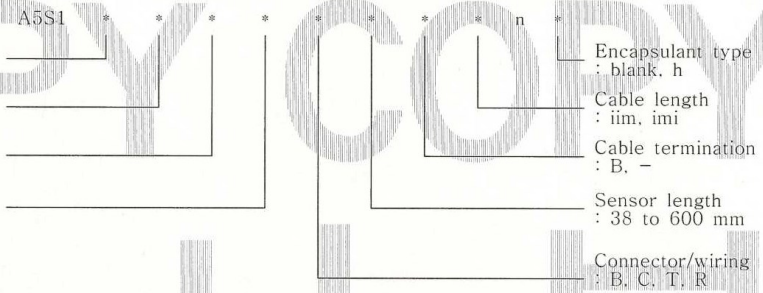
2. 동일형식

Speed : DD,DS

Functional : 0, 3, 4

Mechanical general : M,F,U,N

Mechanical thread :  
1210,1410,1415,1500,1600,  
1610,1615,1810,1815,2000,  
2200,2210,2500,3400,3416,  
3420,5818



Connection/Type	Temperature class	Minimum ambient temperature	Maximum ambient temperature	Maximum temperature at end cap	Rated
PTFE cable without connector	T4	-40℃	125℃	125℃	32Vdc 40mA
			115℃		32Vdc 60mA
			100℃		32Vdc 120mA
PTFE cable with connector	T4	-40℃	85℃	125℃	32Vdc 120mA
PVC cable or with connector	T4	-5℃ if cable flexed -30℃ if cable fixed	70℃ if cable flexed 80℃ if cable fixed	125℃	32Vdc 60mA
All Ex nA types	T6	-5℃	70℃	80℃	32Vdc 60mA
	T6	-5℃	60℃	80℃	32Vdc 120mA

\*PVC cable의 특성상 낮은 온도에서 절연성능이 저하되기 때문에 케이블의 고정설치 여부에 따라 온도범위를 다르게 설정.

4. 안전한 사용을 위한 조건

- 전하생성 메커니즘이 존재하는 경우, 접지되지 않은 금속 용기는 IIC 가스를 발화시킬 수 있으니, 사용자/설치자는 금속부를 접지하는 등 정전하가 충전되지 않도록 주의할 것.

5. 인증(변경)사항

- 없음.

6. 그 밖의 사항

- 안전인증품의 품질관리, 확인심사 수검, 변경사항 신고 등 인증 받은 자의 의무 준수.

Figure 22: KCs Certificate part 2

## 3 Safety Notes for Installation and Operation

### 3.1 General Instructions

The sensors of series A5S1...-n are built and tested according to standards DIN EN 61010-1 (VDE 0411-1) and have left the factory in a perfectly safe condition. To maintain this condition and to ensure safe operation, the user must follow the instructions contained in this manual. Connection and maintenance work may only be performed by adequately qualified personnel and only when the power supply is switched off.

**Important:**

**If the safety instructions are not followed, it is possible that the sensor will not deliver a speed signal !!!**

### 3.2 EMI

The sensor complies with all relevant regulations, as determined by the Policy of the European Committee for Electrotechnical Standardization (CENELEC), for the Electromagnetic Compatibility (2014/30/EU). Testing and inspection have been performed according to Standards EN 61326-1 and EN IEC 61326-3-2. Therefore, the product meets all requirements to be marked by the CE sign.

For space reasons, the sensor is marked by its model No. but does not carry the CE-mark.

### 3.3 Safety note about metallic abrasion in the machine

Metallic (ferromagnetic) abrasion may adhere to the front of the sensors when the machine is at standstill. It must be ensured by appropriate measures (oil filter, if the sensors are mounted in oil or mounting the sensors on the top of the machine) that this does not happen.

Otherwise, it is possible that the sensor will not provide a speed signal when the machine restarts.

In general, the circulation of the oil or the air draft when starting the machine removes the metal abrasion from the sensor. Subsequently, the sensor must be recalibrated by switching off and on its power supply.

### 3.4 Safety Notes on Installation

#### 3.4.1 Initial Commissioning and Installation

After the sensor has been mounted and the air gap checked, the sensor must be recalibrated to the current air gap.

**The sensor is recalibrated by switching off and on its power supply.**

### 3.5 Safety Notes on Operation

Chapter 3.3 has to be observed, too.

#### 3.5.1 Machine Maintenance or Overhaul

If the air gap has been changed or the air gap has been checked, e.g. with a feeler gauge, the sensor must be recalibrated to the current air gap.

**The sensor is recalibrated by switching off and on its power supply.**

#### 3.5.2 No speed pulses after Stop and Restart of the machine

If the machine has been stopped for longer, metallic debris may have accumulated in front of the sensor. If the sensor does not give pulses after the restart, it must be recalibrated.

Note: the turning rotor of the machine normally removes the debris in front of the sensor.

**The sensor is recalibrated by switching off and on its power supply.**

## 4 Technical Specifications

### 4.1 Conformity to Standards

#### EU-Directive(s)

2014/34/EU ATEX product directive

2014/30/EU EMC directive

2014/35/EU Low voltage directive

2011/65/EU RoHS directive

#### Standard(s)

EN IEC 60079-0

EN IEC 60079-7

EN 61326-1, EN IEC 61326-3-2

EN 61010-1

EN IEC 63000

#### UK statutory requirements

SI 2016 No. 1107 (amended by SI 2019 No. 696)

#### Standard(s)

BS EN IEC 60079-0

BS EN IEC 60079-7

### 4.2 Power Supply

Supply voltage: + 6 V... + 30 V DC.

Max. supply current: see certificates from chapter 2.3.

For use in zone 2: see certificates from chapter 2.3.

The sensors of the A5S1...-n series may only be operated in hazardous area zone 2.

Current consumption: approx. 15 mA (one channel sensor) resp. 25 mA (two channel sensor), plus load (can increase up to 60 mA with long transmission length and high signal frequency).

If power supply isn't provided by a BRAUN device, a PELV resp. SELV power supply has to be used.

### 4.3 Signal Output

Rectangular pulses with constant high level and low level over the entire speed range.

Push-Pull amplified output. Maximum load 20 mA.

The signal output is short circuit proof and protected against polarity error.

### 4.4 Speed (Frequency-) Range

Speeds with a maximum signal frequency of:

A5S1DS...-n: 0 Hz...12 kHz

A5S1DD...-n: 0 Hz...25 kHz

### 4.5 Recommended cable type for long cable lengths

Cable in shielded version LIYCY with  $3 \times 0.5 \text{ mm}^2$ , resp.  $4 \times 0.5 \text{ mm}^2$  with  $R < 36 \text{ Ohm/km}$  and  $C < 150 \text{ pF/m}$ .

### 4.6 Electrical Protective Measures

Protection class: no protection needed

IP code: IP67, pressure-tight stainless-steel housing (1.4305)

### 4.7 Connection

Connection with screw-plug-in connection (straight or angled) or with fixed PVC (up to 85°C) or Teflon® (up to 125°C) cable.

### 4.8 Permissible Ambient Temperature

See certificates from chapter 2.3.

## 4.9 Installation Dimensions

The sensors are available with different installation threads (D) metric, resp. inch, resp. inch with NPT, and each with a number of different nominal lengths (L). This is the length from the front surface of the sensor to the end of the mounting thread (see figures on chapter 7).

## 4.10 Cable diameters of BRAUN Cables

L3A: PVC 3-wire (LiYCY 3x0.5 mm<sup>2</sup>) : approx. 5.4 mm (+/- 0.5 mm)  
L4A: PVC 4-wire (LiYCY 4x0.5 mm<sup>2</sup>) : approx. 5.8 mm (+/- 0.5 mm)  
L3T: Teflon® 3-wire (LiTCT 3x0.34 mm<sup>2</sup>) : approx. 4.6 mm (+/- 0.5 mm)  
L3T: Teflon® 4-wire (LiTCT 4x0.34 mm<sup>2</sup>) : approx. 4.6 mm (+/- 0.5 mm)

## 4.11 Weight

The weight depends on the length and shaft diameter of the sensor and the length of fixed cables.

## 4.12 Vibration and Shock Immunity

Vibration immunity: 5 g<sub>n</sub> in the range 5...2000 Hz  
Shock immunity: 20 g during 20 ms, half-sine wave

## 5 Accessories (optional)

### Cable with connector:

**L3A22BO-xm:** PVC sensor connection cable (3-wire) with straight plastic connector  
**L3A23BO-xm:** PVC sensor connection cable (3-wire) with angled plastic connector  
**L3T24MO-xm:** Teflon® sensor connection cable (3-wire) with straight metal connector  
**L3T25MO-xm:** Teflon® sensor connection cable (3-wire) with angled metal connector  
**L4A08BO-xm:** PVC sensor connection cable (4-wire) with straight plastic connector  
**L4A06BO-xm:** PVC sensor connection cable (4-wire) with angled plastic connector  
**L4T09MO-xm:** Teflon® sensor connection cable (4-wire) with straight metal connector  
**L4T10MO-xm:** Teflon® sensor connection cable (4-wire) with angled metal connector  
x = cable length in meters

### Only connector:

**Bi4F/01:** straight connector (plastic body)  
**Bi4F/02:** angled connector (plastic body)  
**Bi4F/05:** straight connector (metal body)  
**Bi4F/04:** angled connector (metal body)

## 6 Useful Lifetime, Proof Test Interval and periodic replacement of A5S sensors

The Useful Life Time of A5S... sensors are 20 years.  
The Proof Test Interval of A5S... sensors are 20 years.  
The A5S... sensors are maintenance free in principle and only need replacement if a fault occurs.

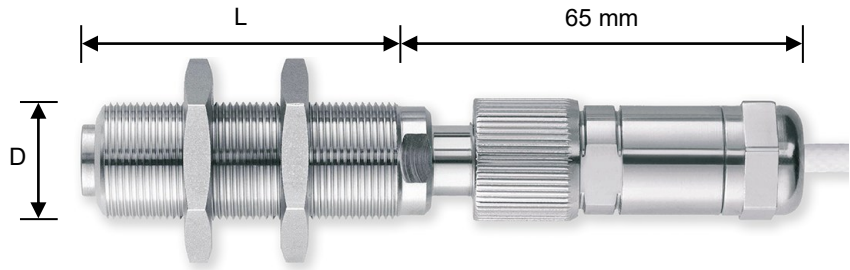
The normal lifetime of A5S sensors (by design but not guaranteed) at operation temperatures up to 60 °C is 20 years.

At higher operation temperatures or if the availability is crucial, we suggest a periodic replacement of the sensors after 5 years of operation during a regular revision of the machine.

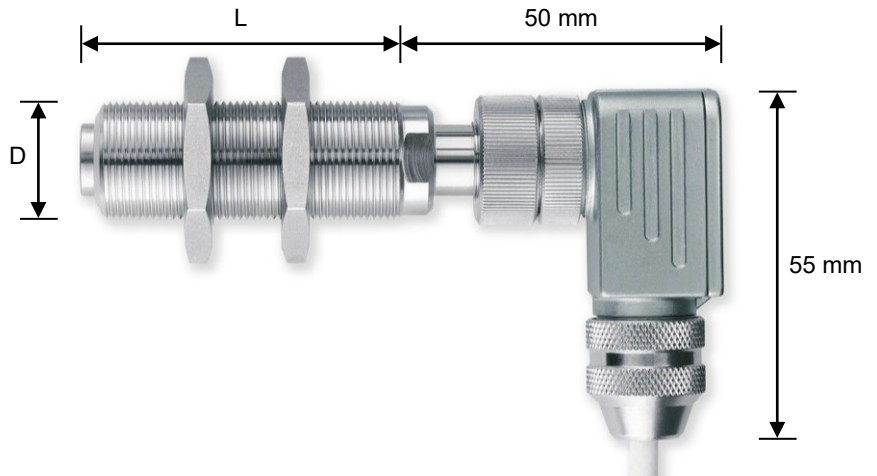
7

Dimensions at different Connection Types

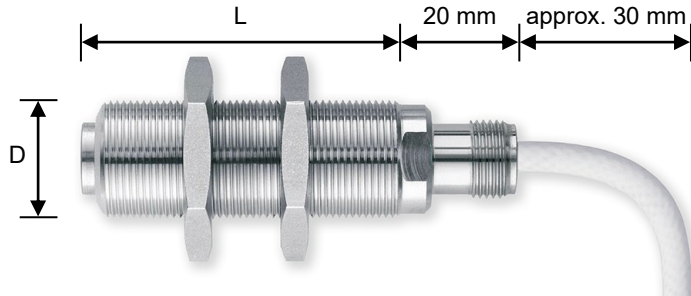
Sensor with screwed on straight mating connector Bi4F/05 resp. cable L3T24MO-xm resp. cable L4T09MO-xm



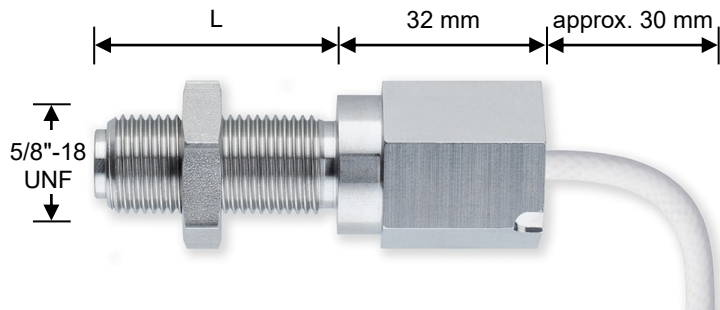
Sensor with screwed on angled mating connector Bi4F/04 resp. cable L3T25MO-xm resp. cable L4T10MO-xm



Sensor with fix mounted connecting Teflon® cable



Sensor (NPT version) with fixed Teflon® cable, only for 5/8"-18 (inch) thread



Also see chapter 1.11 (Ordering keys for available shaft diameters D and nominal lengths L)

Figure 23: Dimensions at different connection types

## Note:

At editorial changes only the release date is updated.

At technical changes the release date is updated and the revision index is increased.

Date	Rev.	Modification
14.09.2018	00	<b>First edition</b>
17.04.2019	01	Manual changed to Bookmark Format. Combining the operating manuals A5S1DD0...-n, A5S1DS0...-n, A5S1DD3... -n, A5S1DS3...-n, A5S1DD4...-n and A5S1DS4...-n into one integrated manual.
28.06.2019	01	<b>Editorial:</b> New Chapter 2.3.3 NEC/CEC and 2.3.9 NEC/CEC Certificate of Conformity inserted.
30.07.2020	02	<b>Technical:</b> Chapter 4.2 amended with: Supply voltage: + 6 V... + 30 Vdc. Max. supply current: see certificates from chapter 2.3.
19.01.2021	02	<b>Editorial:</b> EU Declaration of Conformity in chapter 1.13.6 adapted.
28.04.2021	02	<b>Editorial:</b> New Chapter 2.3.5 UKEX and 2.3.11 UKEX Type Examination Certificate inserted.
29.06.2021	02	<b>Editorial:</b> Chapter 1.11 adapted.
13.10.2021	02	<b>Editorial:</b> New Chapter 4.12 inserted.
18.03.2022	03	<b>Editorial:</b> New SIL3 certificate added to chapter 1.13.5 and standards adapted. New Chapter 2.3.6 (KCs), 2.3.12 (KCs Certificate) and 3.5.2 inserted. Addition in chapter 1.6.
05.05.2023	03	<b>Editorial:</b> Chapters 2.3.4 adjusted. There is currently no valid certification for EAC Ex.
07.05.2024	04	<b>Technical:</b> Chapter 1.11: Thread M12x1 with nominal length of 80 mm and screw-plug-in connection (f = B) is obsolete and replaced by nominal length of 90 mm.
27.11.2024	04	<b>Editorial:</b> Connector and cable designations added to the dimensions in chapters 4.10 and 7.
14.01.2026	05	<b>Editorial:</b> Transition of the type of protection from Ex nA to Ex ec due to the transition from standard EN 60079-15 to EN 60079-7; therefore, change to the contents of sections 1.13.6, 2.3.7, 2.3.8, 2.3.11, and 4.1.



Protecting Your Rotating Equipment

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