Manual
Ex ia Sensors Series A5S1 (intrinsically safe)
(Original operating manual)

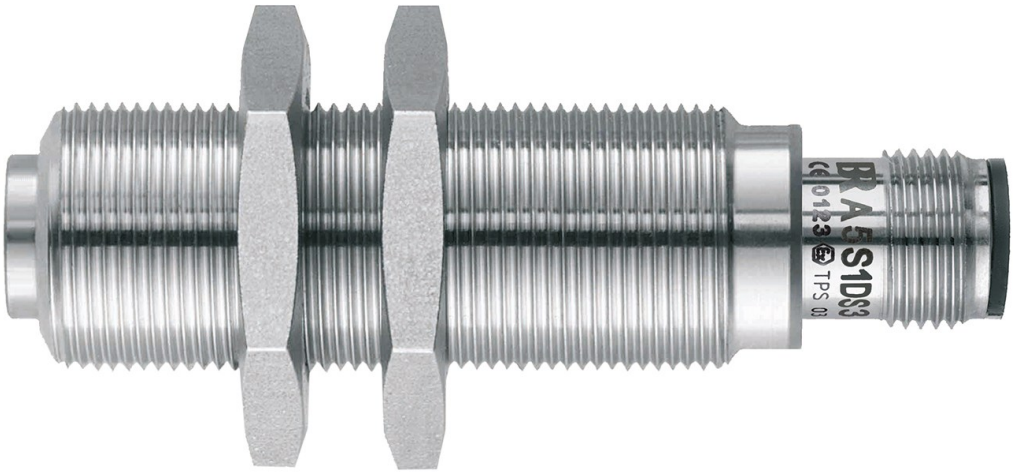
valid for versions

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

also valid for sensors with previous order code:

A5S10 to A5S13	(1x speed,	signal range 0 Hz…12 kHz)
A5S14 to A5S17	(1x speed / 1x direction,	signal range 0 Hz…12 kHz)

(valid from Serial-No. 1002050001)



A5S view
(version A5S1DS0M2210B48 shown)

Speed Sensors
for Hazardous Areas zone 0 resp. 1
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_{CL} 3

Table of Contents

1 General Information

1.1 List of Figures

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	Electro magnetic compatibility
EN	European Norm
Ex ia	Type of protection "Intrinsically Safe", approval for hazardous areas zone 0 resp. 1
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 0 resp. 1. The sensors are approved as intrinsically safe equipment with protection class Ex ia IIC, temperature class T4 (at Ta = -40 ° C to +125 ° C) or temperature class T6 (at Ta = -20 ° C to + 40 ° 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; usable in applications up to SIL_{CL} 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 to external magnetic stray fields and machine vibrations.

Sensors A5S1DD0 and A5S1DS0 and A5S10…13 for detection of rotational speed
Single Channel, the output provides the rotational speed as a single-track frequency signal.

Sensors A5S1DD3 and A5S1DS3 and A5S14…17 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 and A5S1DS4 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 a 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

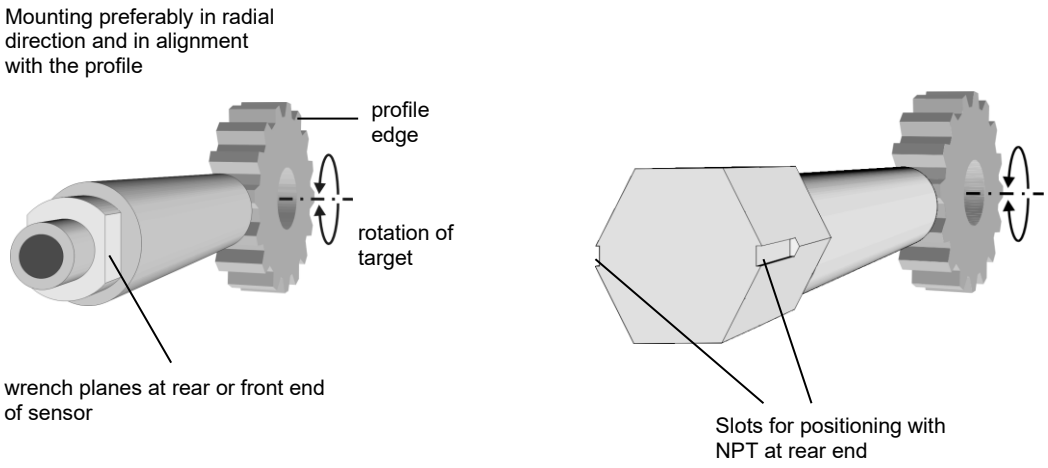


Figure 1: Adjustment to the profile edges

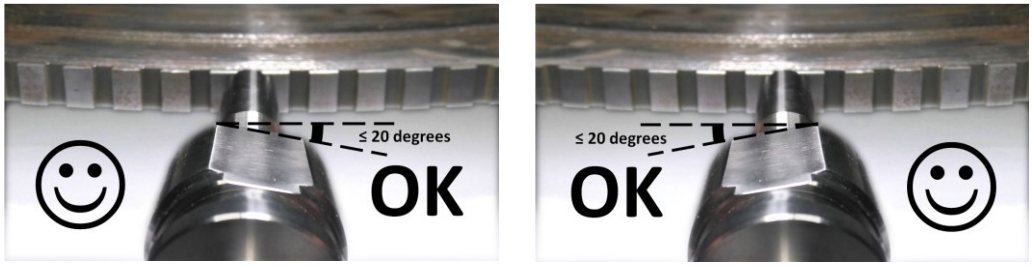
1.4.1 Notes on Pole Wheel

The pole wheel must be made of ferromagnetic steel. Non-ferrous materials, such as 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 air gap can eliminate a possible fault (double pulses).

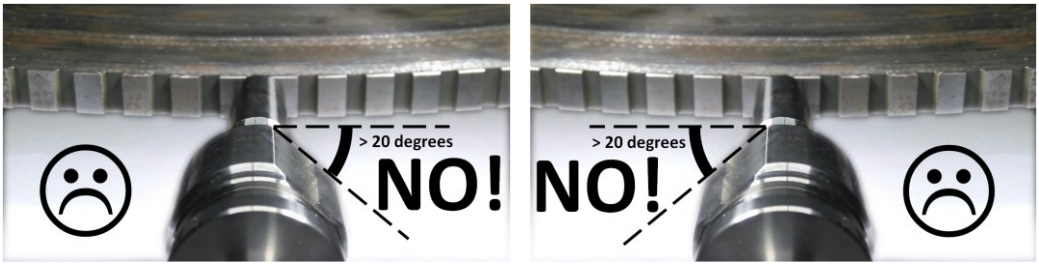
1.4.2 Positioning of Sensor

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 ± 20 ° is permitted.



Correct alignment of the sensor

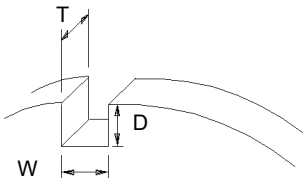


Incorrect alignment of the sensor

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			**A5S1DS0 A5S1DD0 A5S10 … A5S13**	**A5S1DS3 and DS4 A5S1DD3 and DD4 A5S14 … A5S17**
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

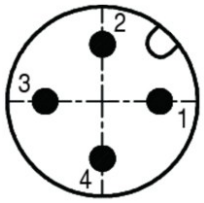
1.5 Connection (pin assignment resp. wire assignment)

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 BRAUN cables** wire color
Signal output 1: (speed signal f1)	4	white
Common zero	3	green
+ sensor supply Ub	1	brown
Signal output 2: (speed signal f2 resp. rotation direction signal)	2	red (at Teflon® 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).

1.7 Signal Transmission

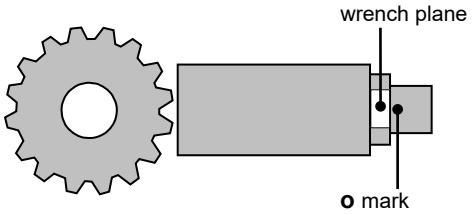
The possible transmission distance is essentially determined by the highest-occurring signal frequency, the properties of the transmission line and the input of the connected receiving device.
When connected to our Isolating Barrier D461R1…, a signal frequency of 25000 Hz can be safely transmitted over 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 3x0.5 mm^2 or 4x0.5 mm^2, as supplied by us (R <36 Ohm / km, C <150 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 pole-to-gap ratio.

Important in the transmission:
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 / A5S1DS3 / A5S14 / A5S15 / A5S16

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 o 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



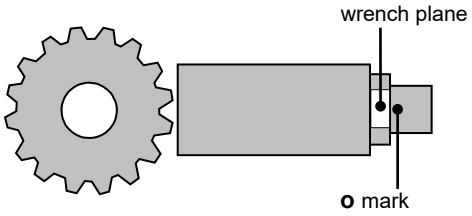
o mark visible and rotation in clockwise direction = direction output high
o mark visible and rotation in counterclockwise direction = direction output low

o mark not visible: output inverse to above

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

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

Relationship between mark and phase position

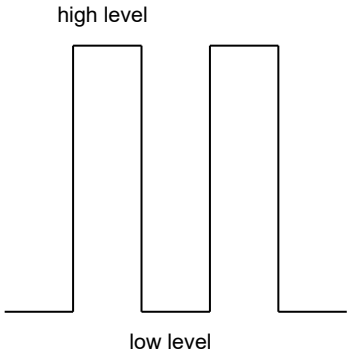


o mark visible and rotation in clockwise direction: f1 is ahead
o mark visible and rotation in counterclockwise direction: f2 is ahead

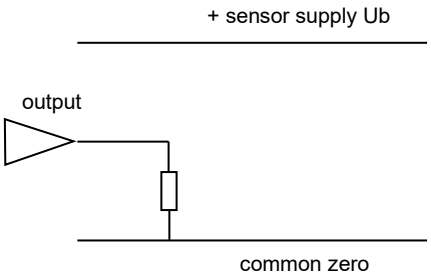
o mark not visible: phase position inverse to above

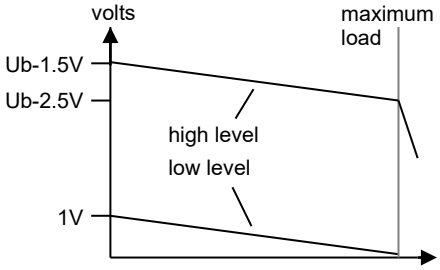
1.10 Level and shape of the output signal

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.

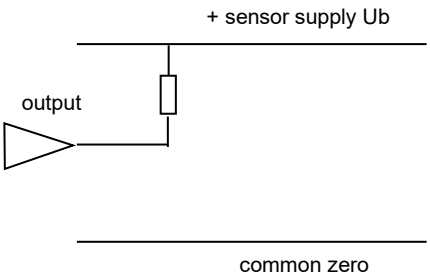


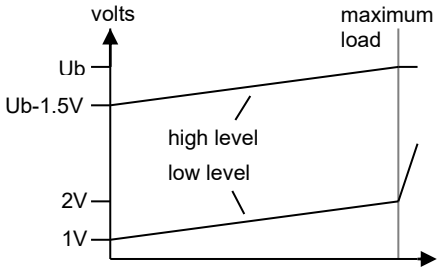
Output level with load against zero





Output level with load against Ub (+ supply)





1.11 Ordering Key for Sensors of A5S1… Series

A5S1 b c d e f g - xm

Signal frequency
b = **DD** : 0 Hz…25 kHz
b = **DS** : 0 Hz…12 kHz

Signal output
c = **0** : 1x frequency
c = **3** : 1x frequency / 1x direction*
c = **4** : 2x frequency, phase-shifted*
***minimum nominal thread length 74 mm**

Unit of shaft diameter
d = **M** : metric
d = **N** : inch and ½-NPT at end of sensor
d = **U** : inch

Thread of shaft diameter
Standard thread:
e = **1210** : M12x1 (metric)
e = **1410** : M14x1 (metric)
e = **1415** : M14x1.5 (metric)
e = **1610** : M16x1 (metric)
e = **1615** : M16x1.5 (metric)
e = **1810** : M18x1 (metric)
e = **1815** : M18x1.5 (metric)
e = **2210** : M22x1 (metric)
e = **3416** : 3/4“-16 (inch)
e = **3420** : 3/4“-20 (inch)
e = **5818** : 5/8“-18 (inch)
other threads or flat shafts on request

Length of fixed Teflon® cable in m*
Standard lengths for cable:
x = **2, 5, 8, 10, 15, 20**
*(omit for versions with screw-plug-in connection)

Nominal thread length in mm
Standard length for thread:
g = **50, 120** : M12x1 (1210)
g = **80** **(**if f **= T)** : M12x1 (1210)
g = **90** **(**if f **= B)** : M12x1 (1210)
g = **50, 90, 154** : M14x1 (1410)
g = **50, 90, 154** : M14x1.5 (1415)
g = **48** : M16x1 (1610)
g = **80, 154** : M16x1.5 (1615)
g = **48, 94** : M18x1 (1810)
g = **50, 74, 94** : M18x1.5 (1815)
g = **48, 94** : M22x1 (2210)
g = **90** : 3/4“-16 (3416)
g = **90** : 3/4“-20 (3420)
g = **48, 100, 165** : 5/8“-18 (5818)
other lengths on request

Connection type
f = **B** : screw-plug-in connection
f = **T** : fixed Teflon® cable

Examples:

A5S1DD0M1210B120 = Signal frequency up to 25 kHz, signal output 1x frequency, thread M12x1, screw-plug-in connection, nominal length 120 mm

A5S1DS0M1415B90 = Signal frequency up to 12 kHz, signal output 1x frequency, thread M14x1.5, screw-plug-in connection, nominal length 90 mm

A5S1DD3M1615T80-5m = 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 = Signal frequency up to 12 kHz, signal output 1x frequency / 1x direction, thread M22x1, Teflon® cable with 10m length, nominal length 94 mm

A5S1DD4U5818B100 = 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 = Signal frequency up to 12 kHz, signal output 2x frequency (phase-shifted), thread M18x1.5, Teflon® cable with 2m length, nominal length 94 mm

1.11.1 Ordering Key old / current

The following table is used to better allocate the old and current ordering keys.

Old standard ordering keys	Corresponding current ordering keys
A5S10…	A5S1DS0M1810…
A5S10…A	A5S1DS0U5818…
A5S10…C	A5S1DS0N5818…
A5S11…	A5S1DS0M2210…
A5S12…	A5S1DS0M1210…
A5S13…	A5S1DS0M1415…
A5S14…	A5S1DS3M1210…
A5S15…	A5S1DS3M1810…
A5S16…	A5S1DS3M1415…
A5S17…	A5S1DS3M2210…

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_{CL} 3

The A5S… series differential hall effect sensors are TÜV certified according to IEC 62061:2021; suitable in applications up to SIL_{CL} 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

1.13.5 SIL 3 Certificate

TÜV NORD

DAkkS Deutsche Akkreditierungsstelle D-ZE-11074-01-00

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

B. Pfuff

Bianca Pfuff

Voluntary Certification
TÜV NORD
TÜV NORD Systems GmbH & Co. KG
Safety Approved
A5S
IEC 61508:2010 SIL3
EN ISO 13849-1:2016 PLe
EN ISO 13849-2:2012 PLe
IEC 62061:2021 SIL 3
SEBS-A.095133/15

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

Figure 4: SIL 3 Certificate

1.13.6 EU Declaration of Conformity

EU-Konformitätserklärung
EU Declaration of Conformity

BRAUN
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: *that the product:*	**Hall-Effekt Drehzahl-Sensor** *Hall-Effect Speed Sensor*
Typ(en), *types:*	**A5S1…**

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)*
2014/30/EU *2014/30/EU*	**EMV-Richtlinie** *EMC Directive*	EN 61326-1:2013 EN IEC 61326-3-2:2018
2014/35/EU *2014/35/EU*	**Niederspannungsrichtlinie** *Low Voltage Directive (LVD)*	EN 61010-1:2010+A1:2019
2011/65/EU *2011/65/EU*	**RoHS-Richtlinie** *RoHS Directive*	EN IEC 63000:2018
2014/34/EU *2014/34/EU*	**ATEX-Produktrichtlinie** *ATEX Product Directive*	EN IEC 60079-0:2018 EN 60079-11:2012
Kennzeichnung, *marking:*		Ⓔx II 1 G Ex ia IIC T* Ga (T* = T4 or T6) CE 0123
EU-Baumusterprüfbescheinigung Nr.: *EU Type Examination Certificate No:*		**CML 14ATEX2075X**
Aussteller, *notified Body:*		Eurofins CML B.V. Koopvaardijweg 32 4906CV Oosterhout The Netherlands
Benannte Stelle Nr., *notified Body No:*		2776

BRAUN erklärt hiermit, dass das Produkt nur von kleineren oder formalen Änderungen in Bezug auf die neue Ausgabe der Normen betroffen ist. Diese Änderungen sind nicht relevant für die Konformität mit den wesentlichen Gesundheits- und Sicherheitsanforderungen. Das Produkt erfüllt nach wie vor die ATEX-Richtlinie. Diese Erklärung gilt auch, wenn die Kennzeichnung und die Zertifikate des aufgeführten Geräts vorangegangenen Normenständen entsprechen.
BRAUN declares that the product is only affected by minor or formal changes with respect to the new edition of the standards. These changes are not relevant for compliance with the essential health and safety requirements. The product still complies with the ATEX Directive. This declaration is also valid if the marking and the certificates of the listed device corresponds to previous editions of standards.

Diese Erklärung gilt für alle Sensoren der Baureihe A5S1…, 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…, 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, must be complied with regarding primary explosion protection, i.e., measures that 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 1 G Ex ia IIC T4/T6 Ga

Marking of notified Body: CE0123
EU Type Examination Certificate: CML 14ATEX2075X

2.2.1 Ex marking of the sensor

The sensor itself is ex-technically marked only with the logo of the inspection body QPS and the project number LR 1323-1 (see also chapter 2.3.9).
On request, an additional adhesive label in the size 60 x 60 mm is available, on which all ex-relevant markings are printed.
Otherwise, the sensor is only marked by its model number, serial number and CE mark.

2.3 Explosive relevant Certificates / Approvals

2.3.1 ATEX

The series A5S1... Differential Hall Effect Ex sensors are certified according to ATEX EU Type Examination Certificate No. CML 14ATEX2075X and are compliant according to ATEX Product Directive 2014/34/EU.
Ex-relevant information, see ATEX EU Type Examination Certificate chapter 2.3.7.

2.3.2 IECEx

The series A5S1... Differential Hall Effect Ex sensors are certified according to IECEx Certificate of Conformity No. CML 14.0030X.
Ex-relevant information, see IECEx Certificate of Conformity chapter 2.3.8.

2.3.3 USA (NEC) and Canada (CEC)

The series A5S1... Differential Hall Effect Ex sensors are certified for the USA and Canada according to QPS Certificate of Conformity No. LR 1323-1.
Ex-relevant information, 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... Differential Hall Effect Ex sensors are certified for UKEX according to UKEX UK Type Examination Certificate No. CML 21UKEX2051X and are compliant according to UK statutory requirements SI 2016 No. 1107.
Ex-relevant information, see UKEX UK Type Examination Certificate chapter 2.3.11.

2.3.6 KCs

The series A5S1... Differential Hall Effect Ex sensors are certified for South Korea according to KCs certificate No. 21-AV4BO-0341X by KOSHA.
Ex-relevant information, see KCs certificate chapter 2.3.12.

2.3.7 ATEX EU Type Examination Certificate

EU Type Examination Certificate CML 14ATEX2075X Issue 2

1 Equipment intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU

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 CML B.V., Chamber of Commerce No 67386717, Koopvaardijweg 32, 4906CV Oosterhout, The Netherlands, Notified Body Number 2776, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, 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 Annex II to the Directive.

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 conditions of safe use (affecting correct installation or safe use). These are specified in Section 14.

8 This EU Type Examination certificate relates only to the design and construction of the specified equipment or component. Further requirements of Directive 2014/34/EU Article 13 apply to the manufacture of the equipment or component and are separately certified.

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 60079-11:2012

10 The equipment shall be marked with the following:

Ex II 1 G

Ex ia IIC T* Ga

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***

S. Roumbedakis
Certification Manager

Figure 6: ATEX EU Type Examination Certificate part 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 - xm

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

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

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

Ui	=	17V
Ii	=	100mA
Pi	=	125mW/250mW/500mW
Ci	=	0.131µF (including cable capacitance for up to 100m of attached cable)
Li	=	0

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. Removal of EN/IEC 60079-26 standard from the scope.
ii. Trademark update.
iii. Address correction.
iv. Modification of AMB42 documents.

Figure 7: ATEX EU Type Examination Certificate part 2

12 Certificate history and evaluation reports

Issue	Date	Associated report	Notes
0	13 Nov 2014	R217B/00	Issue of the prime certificate
1	21 Jan 2019	R12231A/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.

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 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.

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

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	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					

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.

Figure 8: ATEX EU Type Examination Certificate part 3

2.3.8 IECEx Certificate of Conformity

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	**IECEx CML 14.0030X**	Page 1 of 4	Certificate history:
Status:	**Current**	Issue No: 1	Issue 0 (2014-11-13)
Date of Issue:	2025-12-10		
Applicant:	**Braun GmbH Industrie-Elektronik** Esslinger Straße 26 DE 71334 Waiblingen **Germany**		
Equipment:	**A5S1 Series Hall-Effect Sensors**		
Optional accessory:			
Type of Protection:	**Intrinsic Safety or Increased Safety**		
Marking:	Ex ia IIC T* Ga or 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.*		

Approved for issue on behalf of the IECEx Certification Body:	**Stelios Roumbedakis**
Position:	**Certification Manager**
Signature: (for printed version)	S.Roumbedakis
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 www.iecex.com or use of this QR Code.

Certificate issued by:

Eurofins E&E CML Limited
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 Edition:7.0 — Explosive atmospheres - Part 0: Equipment - General requirements

IEC 60079-11:2011 Edition:6.0 — Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

IEC 60079-7:2017 Edition:5.1 — Explosive atmospheres - Part 7: Equipment protection by increased safety "e"

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 - xm -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,

Ui	=	17V
Ii	=	100mA
Pi	=	125mW/250mW/500mW
Ci	=	0.131µF (including cable capacitance for up to 100m of attached cable)
Li	=	0

Increased Safety Versions (Ex ec):

The Sensors have the following ratings,

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

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	+70°C if cable flexed	+125°C	32Vdc 60mA
		-30°C if cable fixed	+80°C if cable fixed		
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					

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.

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

Figure 15: IECEx Certificate of Conformity part 7

2.3.9 NEC/CEC Certificate of Conformity

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

File
LR 1323

CERTIFICATE OF COMPLIANCE
(ISO TYPE 3 CERTIFICATION SYSTEM)

Issued to	Braun GmbH Industrie-Elektronik
Address	Esslinger Straße 26, DE 71334 Waiblingen Germany
Project Number	**LR 1323-1R1**
Product	Sensor
Model Number	Type A5S0********** ** (OrdLoc) Type A5S1********** ** (HazLoc) Type A5S1**********-n** (HazLoc) **Note:** The A5S Series sensor has a number of options defined by the full Type coding (see report)
Ratings	**Canada:** **Sensor type A5S1********** ** 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 **Sensor type A5S1**********-n**** 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 **US:** **Sensor type A5S1********** ** Class I, Div 1, Groups A, B, C, D, Temperature code T6/T4, 'Intrinsically safe' Class I, Zone 0, AEx ia IIC T6/T4 **Sensor type A5S1**********-n**** Class I, Div 2, Groups A, B, C, D, Temperature code T6/T4, 'Non-incendive' Class I, Zone 2, AEx nA IIC T6/T4 **Note:** complete electrical ratings ("See instruction manual" – detailed in the instructions and can be identified from model number)
Applicable Standards	**Canadian standards** 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

Figure 16: NEC/CEC Certificate of Conformity part 1

	US standards 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 – 8th edition ISA 12.12.01 – 2013 UL-61010-1 (82.02,.01), edition 3
Factory/Manufacturing Location	Braun GmbH Industrie-Elektronik Esslinger Straße 26, DE 71334 Waiblingen Germany

Statement of Compliance: 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.

CERTIFIED
ELECTRICAL SAFETY

Issued By: **D. Adams, P.Eng.**
Certification Manager, Hazardous Locations Dept. [Ex Equipment]

Signature: Date: March 19, 2024

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.

2.3.11 UKEX UK Type Examination Certificate

UK Type Examination Certificate CML 21UKEX2051X Issue 1

United Kingdom Conformity Assessment

1 Product or Protective System Intended for use in Potentially Explosive Atmospheres UKSI 2016:1107 (as amended) – Schedule 3A, Part 1

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, Approved Body Number 2503, in accordance with Regulation 42 of the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016, UKSI 2016:1107 (as amended), 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 UK 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 60079-11:2012

10 The equipment shall be marked with the following:

II 1 G

Ex ia IIC T* Ga

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***

8175

This certificate shall only be copied in its entirety and without change
www.CMLEx.com

1 of 3

S. Roumbedakis
Certification Manager

Figure 18: UKEX UK Type Examination Certificate part 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 - xm

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

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

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

Ui	=	17V
Ii	=	100mA
Pi	=	125mW/250mW/500mW
Ci	=	0.131µF (including cable capacitance for up to 100m of attached cable)
Li	=	0

Variation 1:

This variation introduces the following modifications:

i. Standards update:
   a. Update to EN IEC 60079-0:2018.
   b. Removal of EN/IEC 60079-26 standard from the scope.
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	R13681B/00	Issue of Prime Certificate
1	10 Dec 2025	R18858A/00	Issue of Variation 1

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

Figure 19: UKEX UK 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 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.

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

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	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					

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.

Figure 20: UKEX UK Type Examination Certificate part 3

2.3.12 KCs Certificate

제 2021-BO-0341 호

안 전 인 증 서

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	인 증 번 호
A5S1********	21-AV4BO-0341X

용량·등급	Ex ia IIC T4 or T6
정 격	Ui=17V, Ii=100mA, Pi=125mW/250mW/500mW, Ci=0.131μF(100m 케이블 정전용량 포함), Li=0, -40℃≤Tamb≤+125℃

인 증 기 준

방호장치 안전인증 고시(노동부고시 제2021-22호)

인 증 조 건

(뒤쪽) 참조

2021년 12월 23일

한국산업안전보건공단 이

Figure 21: KCs Certificate part 1

(뒤쪽)

인 증 조 건

1. 제조공장

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

2. 동일형식

A5S1 * * * * * * * * *

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

Encapsulant type : blank, h

Cable length : iim, imi

Cable termination : B, -

Sensor length : 38 to 600 mm

Connector/wiring : B, C, T, R

Connection/Type	Temperature class	Minimum ambient temperature	Maximum ambient temperature	Maximum temperature at end cap	Pi
PTFE cable without connector	T4	-40℃	125℃	125℃	125mW
			115℃		250mW
			100℃		500mW
PTFE cable with connector	T4	-40℃	85℃	125℃	500mW
PVC cable or with connector	T4	-5℃ if cable flexed -30℃ if cable fixed	70℃ if cable flexed 80℃ if cable fixed	125℃	500mW
All I.S typs	T6	-5℃	60℃	80℃	500mW
	T6	-5℃	70℃	80℃	250mW

*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. (기기를 0종 지역에 설치시 특히 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… 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.

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)		Standard(s)
2014/34/EU	ATEX product directive	EN IEC 60079-0 EN 60079-11
2014/30/EU	EMC directive	EN 61326-1, EN IEC 61326-3-2
2014/35/EU	Low voltage directive	EN 61010-1
2011/65/EU	RoHS directive	EN IEC 63000

UK statutory requirements	Standard(s)
SI 2016 No. 1107 (amended by SI 2019 No. 696)	BS EN 60079-0 BS EN 60079-11

4.2 Power Supply

4.2.1 Power Supply for operation in hazardous area

Supply voltage for use in zones 0 and 1: see approvals from chapter 2.3.
The sensors of the A5S1... series may only be operated in hazardous area zone 0 or 1 if they are supplied by an associated electrical equipment approved for Zone 0 / category 1. The signal wire must also be connected to an intrinsically safe circuit.
This requirement is met with the BRAUN Isolating Barrier D461... series.
The isolating barrier must be installed in a safe (non-hazardous) area.

4.2.2 Power Supply for operation in non-hazardous area

Supply voltage for use in non-hazardous area: max 30 volts dc, no current limitation necessary.
Power supply directly by E16-systems possible.

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: 0 Hz…12 kHz
A5S1DD: 0 Hz…25 kHz

4.5 Recommended cable type for long cable lengths

Cable in shielded version LiYCY with 3x0.5 mm^2, resp. 4x0.5 mm^2 with R < 36 Ohm/km and C < 150 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 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^2) : approx. 5.4 mm (+/- 0.5 mm)
L4A: PVC 4-wire (LiYCY 4x0.5 mm^2) : approx. 5.8 mm (+/- 0.5 mm)
L3T: Teflon® 3-wire (LiTCT 3x0.34 mm^2) : approx. 4.6 mm (+/- 0.5 mm)
L4T: Teflon® 4-wire (LiTCT 4x0.34 mm^2) : 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_n in the range 5…2000 Hz
Shock immunity: 20 g during 20 msec, 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:

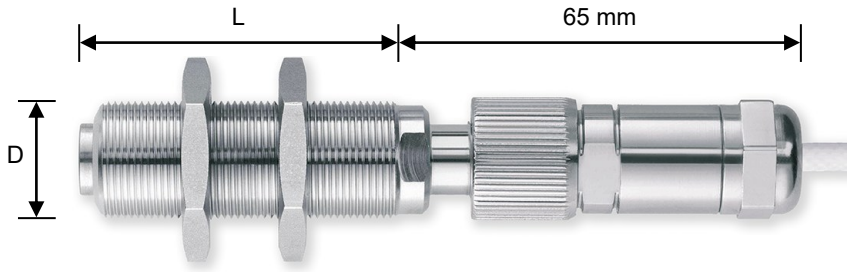
Bi4F/01: straight connector (plastic body)
Bi4F/02: angled connector (plastic body)
Bi4F/05: straight connector (metal body)
Bi4F/04: angled connector (metal body)

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

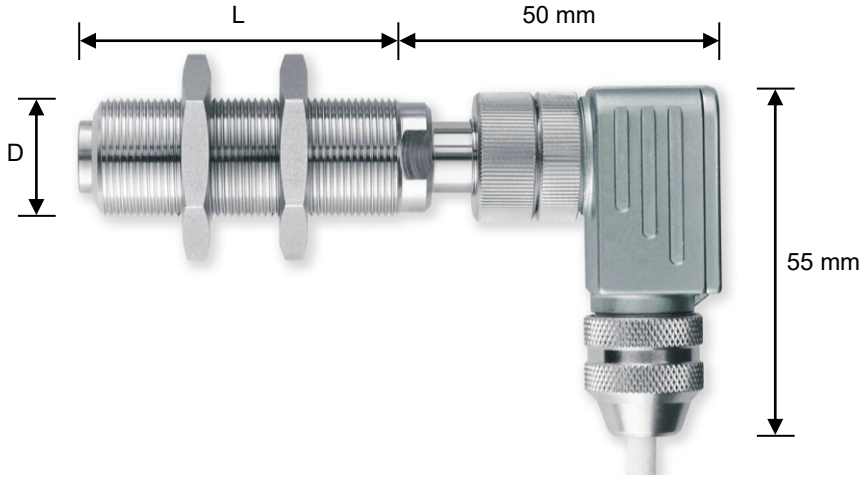
The Useful Life Time of A5S… sensors are 20 years.
The Proof Test Interval of A5S… sensors are 20 years.
The A5S… sensors are maintenance-free in principle and only need replacement if a fault occurs.
The typical lifetime of A5S sensors (by design but not guaranteed) at operating temperatures up to 60 °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

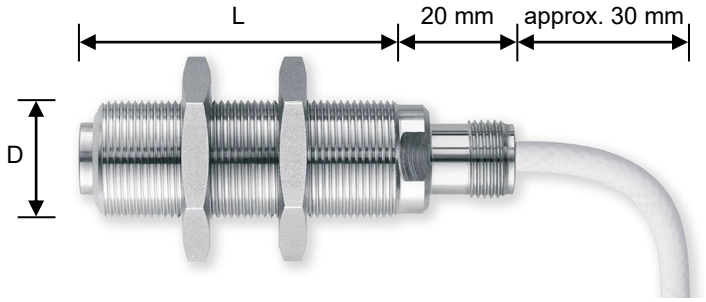
Sensor with screwed on straight
mating connector Bi4F/05
resp. cable L3T24MO-xm
resp. cable L4T09MO-xm



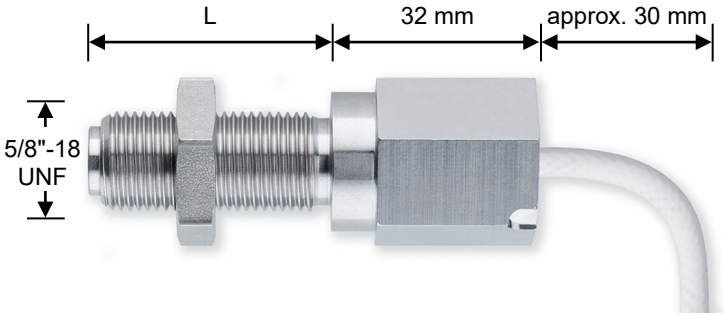
Sensor with screwed on angled
mating connector Bi4F/04
resp. cable L3T25MO-xm
resp. cable L4T10MO-xm



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

8 Revision Notes

Date	Rev.	Modification
13.08.2018	00	**First edition**
13.08.2018	01	Adjustment of revision no. to match German version.
07.12.2018	01	**Editorial:** Chapter 7: Thread diameter for NPT-Version inserted.
23.01.2019	01	**Editorial:** New ATEX EU Type Examination Certificate in chapter 2.3.7 inserted and EU Declaration of Conformity in chapter 1.13.6 adapted.
25.02.2019	01	**Editorial:** New Chapter 1.11.1 inserted.
18.03.2019	01	**Editorial:** Chapter 1.11: additional standard threads and nominal lengths inserted.
17.04.2019	01	**Editorial:** Chapter 1.4.3: additional values for threads 3/4“-16 and 3/4“-20 inserted.
28.06.2019	01	**Editorial:** Chapter 2.3.3 NEC/CEC and 2.3.9 NEC/CEC Certificate of Conformity inserted.
19.01.2021	01	**Editorial:** EU Declaration of Conformity in chapter 1.13.6 adapted.
28.04.2021	01	**Editorial:** Chapter 2.3.5 UKEX and 2.3.11 UKEX UK Type Examination Certificate inserted.
29.06.2021	01	**Editorial:** Chapter 1.11 adapted.
13.10.2021	01	**Editorial:** New Chapter 4.12 inserted.
22.12.2021	02	**Editorial:** New SIL3 certificate added to chapter 1.13.5 and standards adapted. New Chapter 3.5.2, 4.2.1 and 4.2.2 inserted.
11.02.2022	03	**Editorial:** New Chapter 2.3.6 (KCs) and 2.3.12 (KCs Certificate) inserted. Addition in chapter 1.6.
16.05.2022	04	**Editorial:** Chapters 1.13.6, 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.3.5, 2.3.6, and 3.2 slightly adjusted. New Chapter 2.2.1 inserted.
05.05.2023	04	**Editorial:** Chapters 2.3.4 and 3.2 adjusted. There is currently no valid certification for EAC Ex.
07.05.2024	05	**Technical:** 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	05	**Editorial:** Connector and cable designations added to the dimensions in chapters 4.10 and 7.
14.01.2026	06	**Editorial:** Change of the contents of the chapters 1.13.6, 2.3.7, 2.3.8, 2.3.11 and 4.1, due to the adaptation of the standards.

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