

Instruction Manual

Ex Long & Short Stroke – LPI POSITION TRANSMITTER MKII

For linear position measurement in compressors



Revision History

Version	Date	Initials	Description
Version 1.0	12.09.2016	MME	This is the first version of the Ex-manual for SA96DX-I/Ex and SLC-M1/25/Ex
Version 2.0	26.01.2017	MME	ATEX and IECEx certificates updated with issued certification from TÜV
Version 2.1	20.03.2017	MME	Plug for IP67 version is updated with two references
Version 2.2	07.08.2017	MME	Reference for the European parliament and council updated to match the new 2014/34/EU
Version 2.3	13.12.2017	MME	Declaration of conformity updated with reference to EMC directive
Version 2.4	21.06.2018	MME	Updated declaration to point to the conformity assessment procedure
Version 2.5	27.11.2018	MME	Declaration updated with reference to EN60079-x:2012
Version 2.6	06.06.2019	MME	Barrier part number updated.
Version 2.7	09.08.2023	ME	Label change to include "X" and issue no.01
Version 2.8	05.03.2025	HK	New label with new certifying company number
Version 2.9	19.02.2026	JEJ	DoC updated. Supply voltage and load deleted. Issue no. deleted from label. Max pressure changed from 150 to 100 bar. ATEX & IECEx certificates updated. Electrical data updated. Installation Example drawing updated. Added installation text. Following sections have been added: Mechanical Installation, Safety Considerations, Tools, Maintenance, Repairs and Service, Dismantling, Special Conditions for Safe Use (X), Foreseeable Misuse, Required Qualifications.
Version 2.10	14.04.2026	LS	Installation drawing updated to show added SPACERAH component and material change for Plug PG9. Minor reduction of redundant text in sections Repairs and Service as well Maintenance.
Version 2.11	2026-08-07	LS	ATEX & IECEx certificates updated
Version 2.12	2026-08-19	LS	Corrected product name for PEPPERL+FUCHS barrier KFD2-STC4-EX1, part no. 283684 -> KFD2-STC4-EX1-Y2, part no. 283684

Note: For earlier certificate number (certificate is not active anymore): DEMKO 05 ATEX 135657, IECEx ULD 06.0009 refer to old Ex manual:
Ex Long_Short_stroke Manual 130213.pdf

Note: This position sensor is tested to work with a PEPPERL+FUCHS special barrier type KFD2-STC4-EX1-Y2, part no. 283684, KFD2-STC4-EX1, part no. Y204907 & KFD2-STC4-EX1-Y2, part no. 231387, all types are exclusive made for HB Products A/S.

We recommend that you buy this barrier together with the Ex-sensor.

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Introduction

HB Products' linear position sensors designed for position control on industrial compressors

The sensors are unique, with a short body length and fast response time.

Key Features

- Saves on assembly time and manufacturing costs as magnet or target tube need not be installed.
- Small transducer body length to stroke ratio.
- Rugged stainless steel construction
- Produced to comply with ATEX/IECEX and standards.

Measuring Principle

Non-contact True Position Measurement with Inductive Eddy Current Technology.

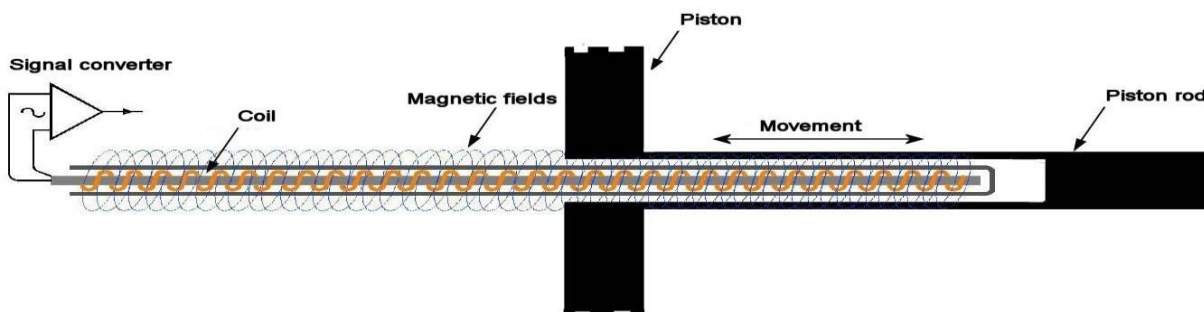
HB Products' innovative electronics has made it possible to use alu as the target material, which in many applications makes it possible to cut down on manufacturing costs and avoid mounting a magnet.

The Eddy Current non-contact measuring principle has been used for displacement and position sensing on industrial applications for more than 30 years.

Function

Eddy current transducer performance is dependent on the impedance coupling between the electromagnetic field in the sensor coil and the eddy currents in the conductive target (see illustration below). Sensor performance is related to the change in sensor coil impedance over the calibrated range of target motion.

The electrical parameters of target material resistivity and permeability determine the performance capability of inductive measuring systems. Both magnetic and nonmagnetic materials can provide high output sensitivity in terms of impedance change per unit of target displacement. Typically, aluminum has been used as the target material since steel has a lower output and needs more accurate circuit tuning. Temperature Compensation is dynamic and measured automatically by the sensor Coil.



Technical Data

Signal output:

4-20 mA

Measuring range:

SA96DX-I/Ex:

100 – 1000mm depending on type

SLCD-M1/25/Ex:

5-100mm depending on type

Device category:

The device category is: 2G for Zone 1

Type of protection:

The type of protection is: ib

Gas resp. gas group:

The gas group is: IIC

Temperature class:

The temperature class is: T5/T6

Ambient temperature range:

The ambient temperature range is:

T5: $-20^{\circ}\text{C} < T_a < +80^{\circ}\text{C}$

T6: $-20^{\circ}\text{C} < T_a < +70^{\circ}\text{C}$

IP-degree:

The IP degree is industrial standard: IP65

In case where a standardised solenoid valve connector e.g. Phonix Contact art. NO. SAC-4P-3,0-PUR/AD - 1438956 or Binder art.

NO. 31 5235 500 000 is used the IP degree is: IP67

Pressure:

Max 100 bar

Current draw:

Max 50 mA

Update time:

50m.sec $\pm$ 10m.sec

Temperature coefficient:

Better than 40ppm/ $^{\circ}\text{C}$

Electrical data

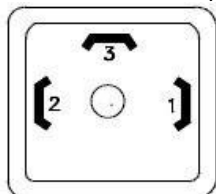
Supply and Signal circuit

(Solenoid valve connector

1=SUPPLY +

2=COMMON -

3=OUT 4...20mA)



Type of protection: Intrinsic safety Ex ib IIC
Only for connection to a certified intrinsically safe circuit.

Maximum values:

$U_i = 28 \text{ V}$

$I_i = 116 \text{ mA}$

$P_i = 585 \text{ mW}$

The effective internal capacitances $C_i = 22 \text{ nF}$

The effective internal inductances $L_i = 1 \text{ mH}$

Approvals

The sensor complies with the approvals below:

IECEX and ATEX

IECEX TUN 16.0001X

TÜV 16 ATEX 173252 X

EMC Test

EMC Emission EN61000-3-2

EMC Immunity EN61000-4-2

Vibration resistance:

IEC 68-2-6, 10g, 10 to 2000Hz

Environmental test, incl.

Damp heat cyclic, Low storage temperature, Sinus vibration, Shock test, Dry heat test, and Cooling test.

Design and Function

The sensor consists of a pressure-proof stainless steel pipe (in which the sensor coil is mounted) connected to the electronic housing by a cable.

All components are fully sealed with two compound potting materials. In the sensor coil, this eliminates any risk of short circuits, and in the electronic housing this eliminates any risk of condensation.

SA96DX-I/Ex sensor has a measuring range from 100 to 1000 mm.

SLCD-M1/25/Ex sensor has a measuring range from 5 to 100 mm.

The signal transmitted is a 4 - 20 mA analogue signal.

Cable connection is via a standardised solenoid valve connector

Marking of Product

HB Products A/S

Bøgekildevej 21

DK-8361 Hasselager

UI 28V, I_i 116mA, P_i 585mW, C_i 22nF, L_i 1mH

Serial no. / year:

Type SA96DX-I /Ex

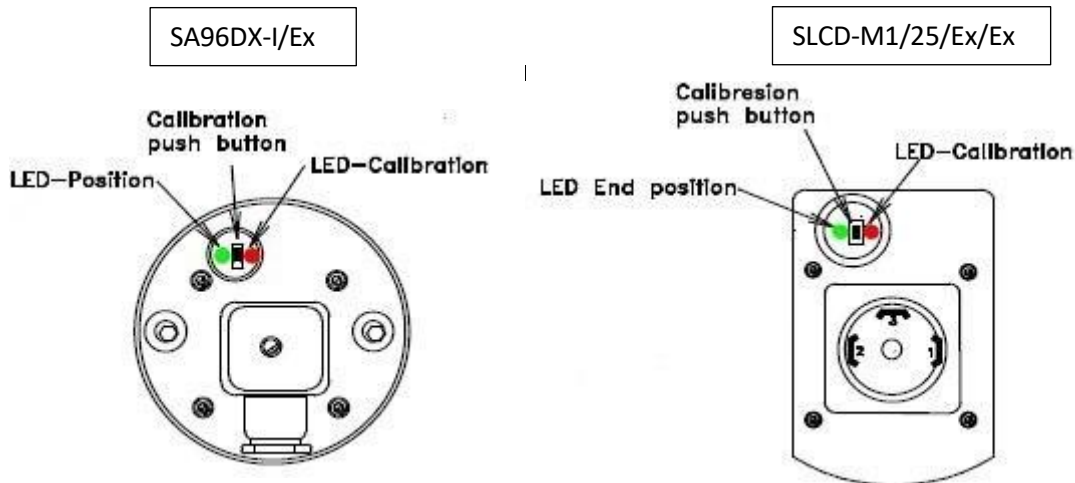


2575  II 2G
Ex ib IIC T5/T6 Gb
TÜV 16 ATEX 173252X
IECEX TUN 16.0001X

LED Indication

Normal operation:

When the sensor is mounted and operating, the compressor capacity is indicated. The position is indicated in a range of 0-100%, corresponding to 4...20 mA.



Calibration instructions

Calibration must be done before operation:

1. Before connecting voltage to the LDS check wiring connections are correct on the plug.
2. Apply supply voltage for a minimum of 1 minute before calibration.
3. Enable calibration mode by pressing the calibration button for 5 seconds.
4. Move slide valve to 0% position and push calibration button ONCE.
5. Observe: The red LED will light up constantly (ON) for some seconds. When the red LED flashes it will indicate that the unit is ready for 100% calibration.
6. Now move the slide valve to 100% position and push the calibration button TWICE. The red LED will flash rapidly.
7. Observe: When the red LED goes off the calibration procedure is complete.

Note:

The LED's power down after 5min (no flashing) To activate the LED's push the button once.

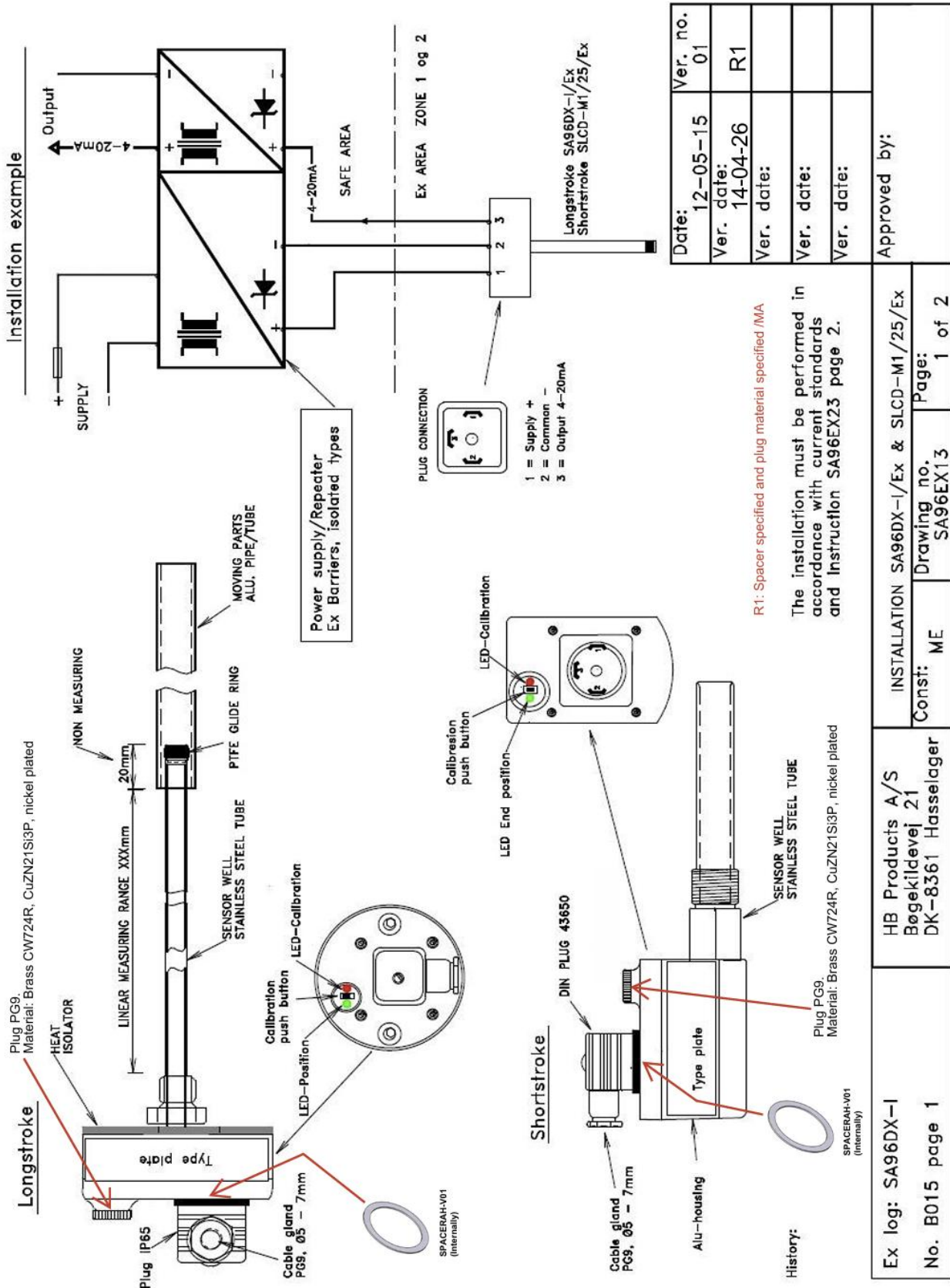
The green LED indicate end position <1% = green LED flash, between 1 to 99% green LED is OFF, >99% = green LED is ON.

The red LED indicates power up and shows status during calibration acc. to the calibration instruction.

Installation

Installation shall be carried out in accordance with EN/IEC 60079-14.

The device shall only be connected to a certified intrinsically safe circuit with output parameters not exceeding U_i , I_i and P_i stated in this manual. The maximum permissible external capacitance and inductance shall be verified in accordance with C_o/L_o of the associated apparatus and C_i/L_i of the transmitter.



Installation Example

Installation example in Ex area zone 1

Power supply/Repeater
Ex Barriers, isolated types



SAFE AREA

Ex AREA ZONE 1

C_cable and L_cable acc. to cable type

Only insulated cables with test voltages at least 500V ac must be used.

IECEX/ ATEX transmitter

Longstroke SA96DX-I/Ex
Shortstroke SLCD-M1/25/Ex

Note:

Installation shall be carried out in accordance with EN/IEC 60079-14.
The device shall only be connected to a certified intrinsically safe circuit with output parameters not exceeding the values stated in Electrical data.

POWER SUPPLY/AMPLIFIER HAS TO MEET FOLLOWING DATA:

SUPPLY VOLTAGE :.....12-26,5V DC
SHORT-CIRCUIT CURRENT :.....min. 50mA
TRANSFORMER TYPE:.....Isolated
APPROVAL:.....IECEX/ATEX

When used in Ex-area the installation has to be carried out according to standards in force for the country in question.

The Equipment must be electrically connected via an approved and certified galvanically isolated interface barrier placed outside the hazardous area.

History:

R2: Descriptions updated. /MA, 190226

Date:	12-05-15	Rev. no.	1.0
Rev. date:	19-02-26		2
Rev. date:			
Rev. date:			

Ex log: SA96DX-I	HB Products A/S Bøgekildevej 21 DK-8361 Hasselager	INSTALLATION: SA96DX-I/Ex & SLCD-M125/Ex	Const: ME	Drawing no. SA96EX23	Page: 2 of 2	Approved by:
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Mechanical Installation

The sensor consists of a mechanical sensor pocket and the transmitter (long stroke or short stroke version).

1. The sensor pocket shall be screwed into the compressor housing in accordance with the compressor manufacturer's instructions. Ensure correct sealing and tightening torque as specified by the compressor manufacturer.
2. The transmitter shall be mounted onto the installed sensor pocket.
 - Short stroke version (SLCD-M1/25/Ex):
The transmitter shall be secured to the pocket using the two supplied set screws.
 - Long stroke version (SA96DX-I/Ex):
The transmitter shall be mechanically secured by the installer. Mounting screws are not supplied.
3. Ensure that the transmitter is correctly positioned before tightening the set screws.
4. After mechanical installation, proceed with electrical connection in accordance with the Installation section of this manual.

Safety Considerations

- Avoid impact, grinding or other operations that may generate mechanical sparks.
- The aluminum enclosure shall be protected against mechanical impact.
- Installation shall not introduce mechanical stress to the enclosure.
- Installation shall be carried out by qualified personnel familiar with explosion protection requirements.

Tools

No special tools are required for installation of the device.

Installation shall be carried out using suitable industrial tools and in accordance with EN/IEC 60079-14 and applicable local safety regulations.

Care shall be taken to avoid impact or mechanical actions that may generate sparks.

Maintenance

The transmitter is maintenance-free.

Periodic inspection shall be performed in accordance with EN/IEC 60079-17.

Repairs and Service

Repair of the device is not permitted.

In case of malfunction, the device shall be returned to the manufacturer.

Dismantling

Before dismantling, ensure the area is non-hazardous or that the circuit is de-energised.

Disconnect the intrinsically safe circuit before removal.

Disposal shall be carried out in accordance with national regulations.

Special Conditions for Safe Use (X)

The device shall only be used with a standardised solenoid valve connector.

The ambient temperature range depends on the selected temperature class.

The temperature range is not marked on the type label and must be taken from this manual.

Foreseeable Misuse

The device must not be:

- Connected directly to non-intrinsically safe power supplies
- Used in Zone 0
- Opened in hazardous areas
- Operated outside the specified ambient temperature range

Required Qualifications

Installation and commissioning shall only be carried out by qualified personnel familiar with explosion protection and intrinsically safe systems.

ATEX Certificate

1st page only. Full certificate can be found here:

<https://www.hbproducts.dk/en/product-certificates#sort=position&sortdir=desc>



Translation

(1) **EU-Type Examination Certificate**

(2) Equipment and protective systems intended for use in potentially explosive atmospheres, **Directive 2014/34/EU**

(3) **Certificate Number** TÜV 16 ATEX 173252 X **Issue:** 03

(4) for the product: Long stroke transmitter SA96DX-I/Ex and Short stroke transmitter SLCD-M1/25/Ex

(5) of the manufacturer: **HB Products A/S**

(6) Address: Bøgekildevej 21
8361 Hasselager
Denmark

Order number: 8003098842
Date of issue: See date of signature

(7) The design of this product and any acceptable variation thereto are specified in the schedule to this EU-Type Examination Certificate and the documents therein referred to.

(8) The TÜV NORD CERT GmbH, Notified Body No. 0044, in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and the Council of 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.
The examination and test results are recorded in the confidential ATEX Assessment Report No. 26 203 424418.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN IEC 60079-0:2018/AC:2020-02 **EN 60079-11:2012**
except in respect of those requirements listed at item 18 of the schedule.

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions for Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design, and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the product shall include the following:

 **II 2 G Ex ib IIC T5 Gb or**
II 2 G Ex ib IIC T6 Gb
The temperature class depends on the maximum ambient temperature

TÜV NORD CERT GmbH, Am TÜV 1, 45307 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The deputy head of the notified body

 Digital unterschrieben von Meyer
Andreas
Datum: 2026.05.29 09:59:44 +02'00'

Hanover office, Am TÜV 1, 30519 Hannover, Tel. +49 511 998-61455, Fax +49 511 998-61590

This certificate may only be reproduced without any change, schedule included.
Excerpts or changes shall be allowed by the TÜV NORD CERT GmbH

IECEx Certificate

1st page only. Full certificate can be found here:

<https://www.iecex-certs.com/#/deliverables/CERT/2157366/view>

		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 TUN 16.0001X	Page 1 of 4	<u>Certificate history:</u> Issue 3 (2026-02-25) Issue 2 (2025-04-03) Issue 1 (2017-01-26) Issue 0 (2016-11-07)
Status:	Current	Issue No: 4	
Date of Issue:	2026-05-29		
Applicant:	HB Products A/S Bøgekildevej 21 8361 Hasselager Denmark		
Equipment:	Long stroke transmitter SA96DX-I/Ex and short stroke transmitter SLCD-M1/25/Ex		
Optional accessory:			
Type of Protection:	Intrinsic safety "ib"		
Marking:	Ex ib IIC T5 Gb or Ex ib IIC T6 Gb The temperature class depends on the maximum ambient temperature		
Approved for issue on behalf of the IECEx Certification Body:		Andreas Meyer	
Position:		Deputy Head of the IECEx Certification Body	
Signature: (for printed version)		 Digital unterschrieben von Meyer Andreas Datum: 2026.05.29 10:38:52 +02'00'	
Date: (for printed version)			
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:			
TÜV NORD CERT GmbH Hanover Office Am TÜV 1, 30519 Hannover Germany			

Declaration of Conformity

DECLARATION OF CONFORMITY

We, HB Products A/S

declare under our sole responsibility that the product:

Category: Instrumentation
Types: SA96DX-I/Ex, SLCD-M1/25/Ex
Description: Long stroke and short stroke transmitters based on inductive measuring principles
Manufacturer: Developed and produced by HB Products A/S, Bøgekildevej 21, DK-8361 Hasselager

to which this declaration relates is in conformity with the ATEX standards noted below:

EN IEC 60079-0:2018/AC:2020-02 Equipment-General requirements

EN 60079-11: 2012 Equipment protection by intrinsic safety "i"

Conformity Assessment: II 2 G Ex ib IIC T5 Gb, $-20^{\circ}\text{C} < T_a < +80^{\circ}\text{C}$
II 2 G Ex ib IIC T6 Gb, $-20^{\circ}\text{C} < T_a < +70^{\circ}\text{C}$

EU-Type Examination Certificate No.: TÜV 16 ATEX 173252 X

IECEx Certificate of Conformity No.: IECEx TUN 16.0001X

Production Quality Assurance Notification: ITS-I25ATEXQ43031, Intertek Italia S.p.A. (NB 2575)

Following the provision of European directives:

2014/34/EU (ATEX Directive)

2014/30/EU (EMC Directive)

Production Quality Assurance in accordance with Annex IV (Module D) of Directive 2014/34/EU, Notification No. ITS-I25ATEXQ43031, Notified Body 2575.

HB Products A/S declares that the above product may be used in hazardous areas in accordance with the stated standards.

Date: 2026-02-19

Signed: _____ 

Name: Jonas Elstrøm, Director of Business & Technology