

LoopSeries Detectors

LB 43x (ATEX / IECEx / NEC / CEC)

**Safety Manual /
Explosion Protection Manual**



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- (bg) Инструкции за безопасност за употреба в потенциално експлозивни райони. Това ръководство за безопасност е и на разположение на официалните езици на Европейския съюз.
- (cs) Bezpečnostní pokyny pro použití v oblastech, kde hrozí nebezpečí výbuchu. Tato příručka s bezpečnostními pokyny je k dispozici i v úředních jazycích Evropské unie.
- (da) Skkerhedsvejledning til brug i eksplosionsfarlige omgivelser. Denne sikkerhedsmanual findes på alle officielle sprog i det Europæiske fælleskab.
- (de) Sicherheitshinweise für den Einsatz in explosionsgefährdeten Bereichen. Dieses Sicherheitshandbuch ist auch in den Amtssprachen der europäischen Gemeinschaft erhältlich.
- (el) Υποδείξεις ασφάλειας για χρήση σε περιοχές με κίνδυνο έκρηξης. Αυτό το εγχειρίδιο ασφάλειας διατίθεται επίσης στις επίσημες γλώσσες της Ευρωπαϊκής Ένωσης.
- (en) Safety instructions for use in potentially explosive areas. This safety manual is available also in the official languages of the European Community.
- (et) Ohutusjuhised kasutamiseks plahvatusohtlikes piirkondades. Käesolev ohutuskäsiraamat on saadaval ka Euroopa Ühenduse ametlikes keeltes.
- (fi) Räjähdyksvaarallisilla alueilla käyttöä koskevat turvallisuusohjeet. Tämä turvaohjekirja on saatavilla myös Euroopan yhteisön virallisilla kielillä.
- (fr) Consignes de sécurité relatives à une utilisation en zones explosives. Le présent manuel de sécurité est également disponible dans les langues officielles de la communauté européenne.
- (ga) Treoracha sábháilteachta le haghaidh úsáide i limistéir inphléasccha Tá an lámhleabhar sábháilteachta seo ar fáil i dteangacha oifigiúla an Aontais Eorpaigh, chomh maith.
- (hu) Biztonsági utasítások robbanásveszélyes területeken történő alkalmazáshoz. Ez a biztonsági kézikönyv az Európai Közösség hivatalos nyelvein is rendelkezésre áll.
- (it) Istruzioni per l'impiego in ambienti a rischio di deflagrazione. Il presente manuale contiene le disposizioni di sicurezza ed è disponibile in tutte le lingue ufficiali della comunità europea.
- (lt) Saugumo nurodymai naudojimui potencialiai sprogiose zonose. Šį saugumo vadovą taip pat galima gauti Europos Bendrijos oficialiomis kalbomis.
- (lv) Drošības noteikumi piemērošanai jomās, kas saistītas ar sprādzienbīstamību. Šī drošības noteikumu rokasgrāmata ir pieejama arī citās Eiropas Kopienas oficiālajās valodās.
- (mt) Istruzzjonijiet dwar is-sigurtà li għandhom jintużaw f'żoni potenzjalment splussivi. Dan il-manwal tas-sigurtà huwa disponibbli wkoll fl-ilsna uffċjali kollha tal-Komunità Ewropea.
- (nl) Veiligheidsinstructies voor de inzet in gebieden met gevaar voor explosies. Dit veiligheidshandboek is ook in officiële talen in de Europese Gemeenschap verkrijgbaar.
- (pl) Przepisy bezpieczeństwa dotyczące użytkowania na obszarach zagrożonych wybuchem. Niniejsza instrukcja bezpieczeństwa dostępna jest również w językach urzędowych Unii Europejskiej.
- (pt) Indicações de Segurança para a utilização em áreas potencialmente explosivas. Este Guia de Segurança também está disponível nas línguas oficiais da Comunidade Europeia.
- (ro) Instrucțiuni de siguranță pentru utilizarea în zone periculoase. Acest manual de siguranță este de asemenea disponibil în limbile oficiale ale Comunității Europene.
- (sk) Bezpečnostné pokyny pri použití vo výbušnom prostredí. Táto bezpečnostná príručka je k dispozícii aj v úradných jazykoch Európskej únie.
- (sl) Varnostna navodila za uporabo v eksplozijsko ogroženih območjih. Ta varnostni priročnik je na voljo tudi v uradnih jezikih Evropske unije.
- (sp) Instrucciones de seguridad para el uso en áreas explosibles. El presente manual de seguridad está disponible también en las lenguas oficiales de la Comunidad Europea.
- (sv) Säkerhetshänvisningar till användning i områden som är utsatt för explosionsfara. Denna handbok finns även tillgänglig i alla officiella språk av den europeiska gemenskapen.

1

Declaration of Conformity



BERTHOLD TECHNOLOGIES GmbH & Co. KG
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EU-Konformitätserklärung

EU-Declaration of Conformity

Nr./No.: CE20043-01

Hiermit erklären wir in alleiniger Verantwortung, dass die Bauart des nachfolgend bezeichneten Geräts, in der von uns in den Verkehr gebrachten Ausführung den unten genannten einschlägigen Harmonisierungsvorschriften der EU entspricht.

Durch nicht mit uns abgestimmte Änderungen oder nicht bestimmungsgemäßen Gebrauch verliert diese Erklärung ihre Gültigkeit

We hereby declare, under our sole responsibility, that the design of the following device placed on the market by us complies with the relevant harmonized rules of the EU.

Unauthorized modifications or unintended use of the product makes this declaration invalid

Hersteller
Manufacturer

BERTHOLD TECHNOLOGIES GmbH & Co. KG
Calmbacher Str. 22, D-75323 Bad Wildbad, Germany

Produktbezeichnung
Product name

LoopSeries Detektoren (ATEX)
LoopSeries Detectors (ATEX)

Typenbezeichnung / Modell
Type / model

LB430-xx-Jx
LB430-xx-Kx

Richtlinie / Verordnung
directive / regulation

angewendete Normen
applied standards

ATEX	2014/34/EU	EN IEC 60079-0:2018 EN 60079-1:2014 IEC 60079-11:2023 EN 60079-31:2014
EMV EMC	2014/30/EU	EN IEC 61326-1:2021 Namur NE 021:2017
RoHS	2011/65/EU	

notifizierte Stelle / Nummer
Notified body / number

Maßnahme
measure

Bescheinigungsnummer
Certificate Number

Bureau Veritas, Germany / 2004	EU-Baumusterprüfbescheinigung EU Type Examination	EPS 23 ATEX 1 325 X
Dekra, Netherlands / 0344	Qualitätssicherung Quality Assurance	DEKRA 24 ATEX Q0048

Diese Erklärung wird in Verantwortung für den Hersteller ausgestellt durch
This declaration is issued by the manufacturer released by

Bad Wildbad, 20.09.2024

Ort und Datum
Place and date

Tobias Stephan

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Hersteller
Manufacturer

BERTHOLD TECHNOLOGIES GmbH & Co. KG
Calmbacher Str. 22, D-75323 Bad Wildbad, Germany

Produktbezeichnung
Product name

LoopSeries Detektoren (nicht ATEX)
LoopSeries Detectors (non ATEX)

Typenbezeichnung / Modell
Type / model

LB430-xx-00

Richtlinie/Verordnung directive/regulation		angewendete Normen applied standards
EMV / EMC	2014/30/EU	EN IEC 61326-1:2021 Namur NE 021:2017
RoHS	2011/65/EU	
Schutzziele der NSR safety objectives according LVD	2014/35/EU	EN 61010-1:2010+A1:2019

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This declaration is issued by the manufacturer released by


Tobias Stephan

Head of R&D
Bad Wildbad, 10.04.2024

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2

General Instructions

This safety manual contains operating instructions in accordance with Directive 2014/34/EU and the explosion protection standards specified in the declaration of conformity, the National Electrical Code (NEC: ANSI/NFPA 70) and the Canadian Electrical Code (CEC).

National responsible authorities can claim additional requests.

Observe the safety manual unconditionally to avoid personal injury and property damage and to ensure safe operation.

Device in context of the document refers to the LB 43x.

2.1 Proper Use

The device, together with an appropriate radiation source, is used to monitor and determine values within a process continuously and without contact in different applications. The device processes the measured data and converts the data in a proper 4-20 mA signal.

This safety manual is a supplement to the following documents:

Document	ID
Operating Manual	69691BA2
Technical Information	69691TI2

The following constitutes proper use

Strictly adhering to the instructions and procedural sequences and perform no unauthorised third-party actions that endanger your safety and the functional efficiency of the device.

Observing the provided safety instructions.

Carrying out the prescribed maintenance measures or having them carried out for you.

Using only accessories and spare parts from Berthold.

Improper Use

Failing to observe the specified safety instructions and instructions for the operation, maintenance, and disposal in the manual.

Any non-compliance with the present manual for the supplied products.

Applying conditions and requirements which do not conform to those stated in the technical documents, data sheets, operation and assembly instructions and other specific guidelines of the manufacturer.

Using the product in a damaged or corroded condition.

Using the product in other than specified temperature range. When cooling is applied the installer and operator must ensure proper function of the cooling system at any time to not operate the product outside of the specified temperature range.

Modification or changing the system components.

For operation with intrinsically safe interfaces (LB 43x-xx-Kx-.../LB 43x-xx-Mx-.../LB 43x-xx-Ox-...) verification of intrinsically safe system must be provided (see IEC 60079-14).

Repairs of device that are used in hazardous areas by persons who are not authorised by Berthold Technologies GmbH & Co. KG.

The operation with opened or insufficiently closed or fastened housings.

Insufficiently closed entries in the wall housing or insufficiently tightened or damaged screw connections, i.e., cable glands, adapters or sealing plugs.

Connect non-intrinsically safe circuits with intrinsically safe interfaces of the device.

Operation without the safety precautions provided by the manufacturer.

Manipulation or avoidance of existing safety equipment.

Berthold Technologies GmbH & Co. KG shall only accept liability for/guarantee the conformity of the device to its published specifications.

If the product is used in a way which is not described in the present manual, the device's protection is compromised, and the warranty claim becomes invalid.

2.2 Qualification of the Personnel

NOTICE



A minimum requirement for all work on or with the product would be employees with general knowledge who are instructed by an expert or authorised person.

At different parts in this manual, reference is made to personnel with certain qualifications who can be entrusted with different tasks during installation, usage, and maintenance.

These three groups of people are:

Employees with general knowledge

Experts

Authorised persons

Employees with general knowledge

NOTICE



Employees with general knowledge must always be guided by an expert at the very least. When dealing with radioactive substances, a radiation safety officer must also be consulted.

Employees with general knowledge are e.g., technicians who can undertake different tasks during the transportation, assembly, and installation of the product under the guidance of an authorised person. This can also refer to construction site personnel. The persons in question must have experience in handling the product.

Experts

Experts are persons who have sufficient knowledge in the required area due to their specialist training and who are familiar with the relevant national health and safety regulations, accident prevention regulations, guidelines and recognized technical rules.

Expert personnel must be capable of safely assessing the results of their work and they must be familiar with the content of this manual.

Authorized Persons

Authorized persons are those who are either designated for the corresponding task due to legal regulations or those who have been authorized by Berthold Technologies GmbH & Co. KG for specific tasks. When dealing with radioactive materials, a radiation safety officer must also be consulted.

2.3 Operator's Obligations

The operator of the product must regularly train his personnel in the following topics:

Observation and use of the manual and the legal provisions.

Intended operation of the product.

Observation of the plant security instructions and the operating instructions of the operator.

Ensure the product is not used outside the specified temperature range. If a cooling system is applied to maintain temperature, proper function of the cooling system is to be maintained and observed at any time by the operator.

In the event of major changes in the overall system (e.g., changes in the classification of the explosion protection zones), the intrinsically safe installation must be checked.

3

System Components

3.1 Device View

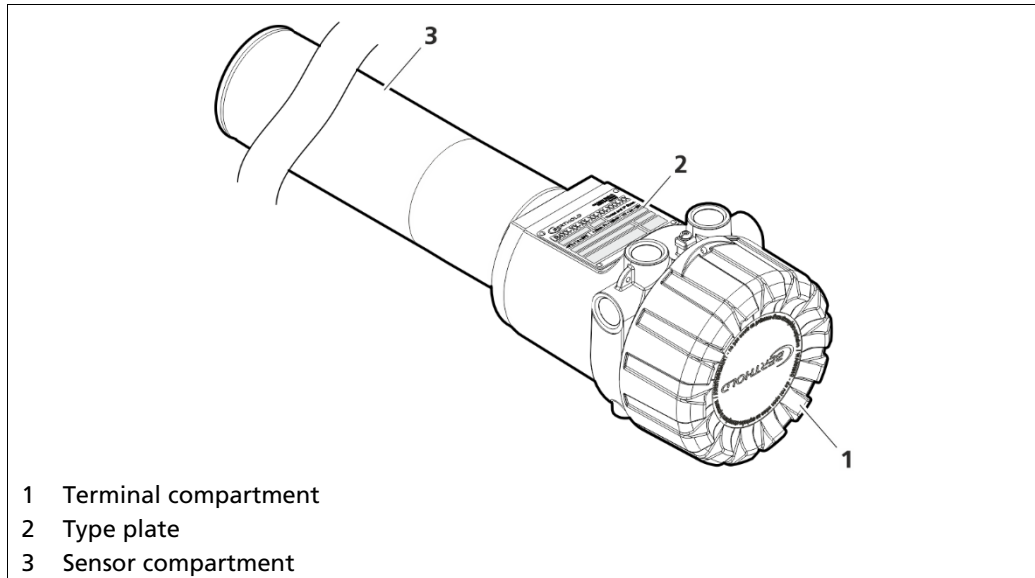


Fig. 1 System overview

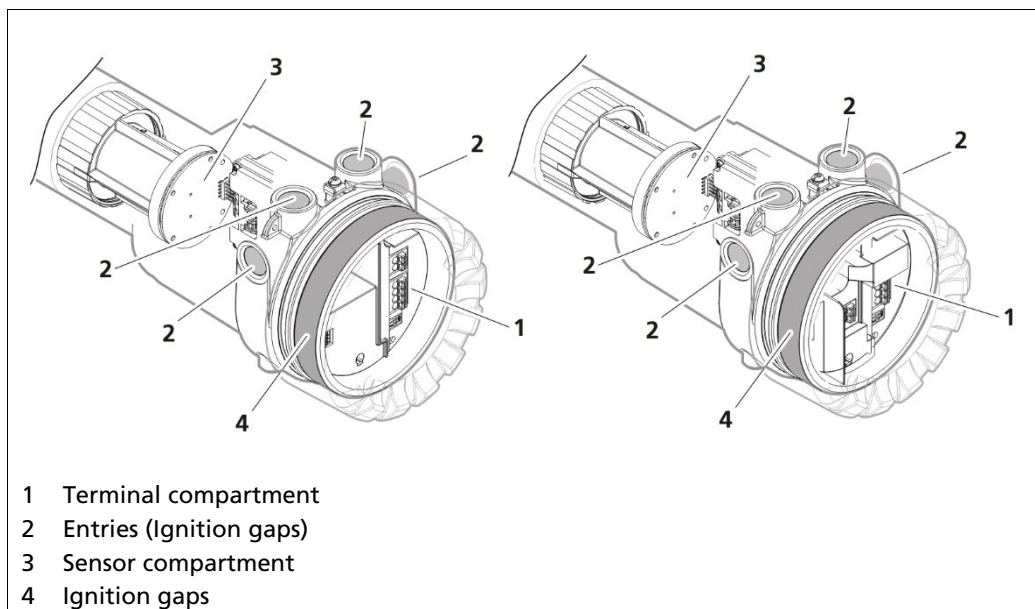


Fig. 2 System components (left: T6 variant; right: T4 variant)

3.2 Connection Drawing

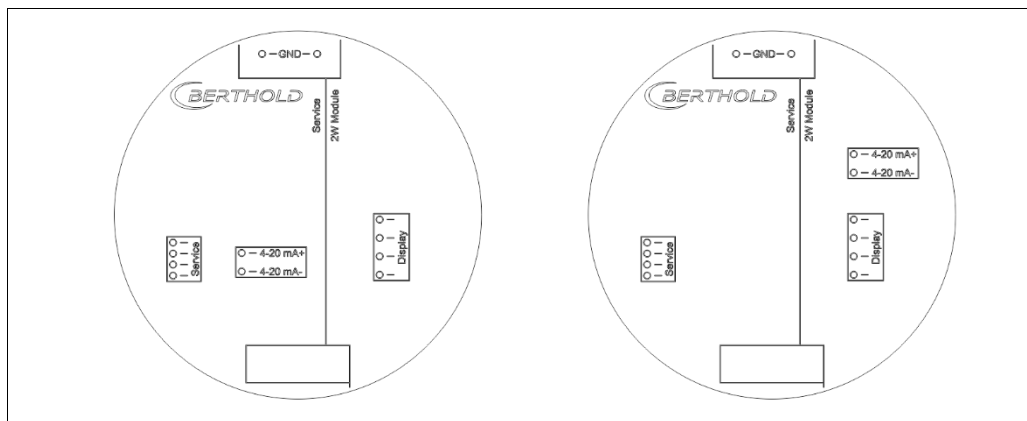


Fig. 3 Connection drawings
(left: version with water cooling; right: version without water cooling)

3.3 Type Plate

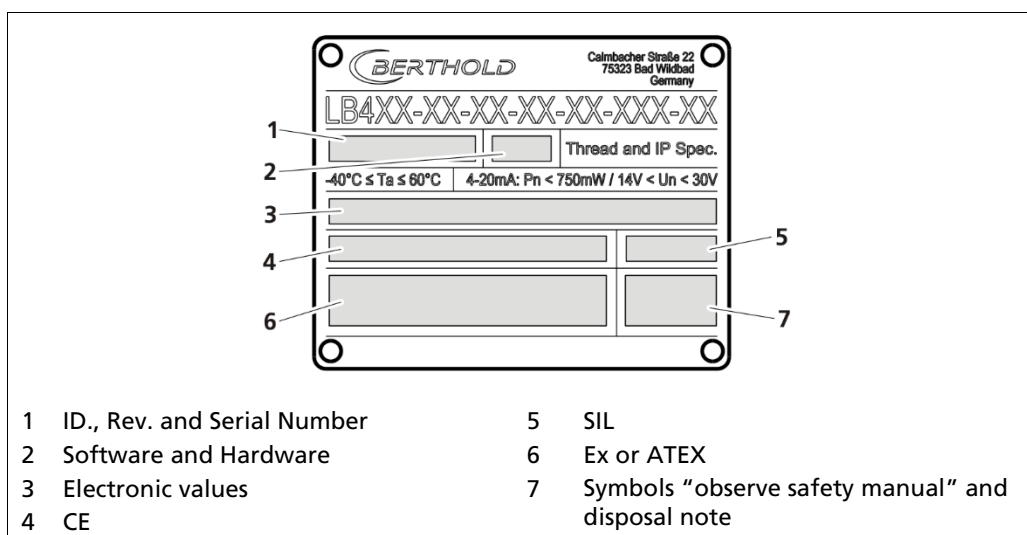


Fig. 4 Type plate

4

Safety Instructions

Safety Instructions for Installation and Operation Staff

NOTICE



Assembly, installation, commissioning, operation, and maintenance may only be carried out by authorized and properly trained personnel!

Before assembly/commissioning:

- ▶ Read safety manual
- ▶ Read operating instructions
- ▶ Train assembly and operating personnel sufficiently
- ▶ Make sure that the contents of the safety manual and the operating manual are fully understood by the personnel.

If in doubt, please contact the manufacturer.

NOTICE



Repair of explosion-proof components

Exclusively the service of the company Berthold Technologies GmbH & Co.KG or persons authorized by Berthold are permitted to carry out repairs or install spare parts.



WARNING



Danger to life by explosion!

Substitution of components may impair intrinsic safety.

Explosion protection and temperature limits

Explosion Protection and Environmental Conditions	
Certificates	EPS 23 ATEX 1 325 X IECEx EPS 23.0085X
Degree of protection	IP66/68, Type 4X/Type 6P
Air pressure	80 kPa (0.8 bar) to 110 kPa (1.1 bar) Oxygen content of the air, usually: 21% (Vi/V)



WARNING



Danger to life by explosion!

- ▶ Strictly maintain the permissible ambient temperature (T_a).
- ▶ Make sure that the maximum permissible surface temperature is not exceeded.

4.1 Overview of Explosion Protection Concepts

IMPORTANT



Explosion protection concept of all variants of LB 43x relies on flame proof enclosure/dust tight enclosure, but some variants offer intrinsically safe interfaces. Type code: LB 43x-xx-Jx-... specifies operation without intrinsically safe interfaces and type code: LB 43x-xx-Kx-... specifies operation with intrinsically safe interfaces.

Temperature class also depends on the variant. Type code: LB 43x-xx-xx-1 specifies T4 variant, Type code: LB 43x-xx-xx-0 specifies T6 variant.

WARNING



Danger to life by explosion!

- ▶ Do not connect intrinsically safe interfaces with non-intrinsically safe circuits!
- ▶ Do only connect a suitable display from Berthold Technologies at the intrinsically safe Display interface
- ▶ Do only connect a suitable protected galvanically isolated device at the intrinsically safe HART 4-20 mA, passive interface, see section 4.1.3
- ▶ Make sure that the maximum permissible ambient temperature is not exceeded in all operating conditions. This includes also heat from radiation (exposure to sun or hot surfaces)
- ▶ When device is used with water cooling the operator of the device must ensure the housing do not exceed the given temperature limits even when water cooling system fails! Otherwise, operator must ensure immediate de-energize the device when water cooling system fails!

4.1.1 Overview

Protection

Variants	LB 43x-xx-Kx-...
Type of Protection of Compartments	
Terminal Compartment	Ex "t" (dust protection)
	Ex "d" (flameproof enclosure)
Sensor Compartment	Ex "t" (dust protection)
	Ex "i" (intrinsic safety)
Ambient Temperature	
T6	$-40\text{ }^{\circ}\text{C} \leq T_a \leq 60\text{ }^{\circ}\text{C}$
T4	$-40\text{ }^{\circ}\text{C} \leq T_a \leq 100\text{ }^{\circ}\text{C}$
ATEX/IECEX	
II 2 G (Zone 1)	Ex db ia IIC T6/T4 Gb
II 2 D (Zone 21)	Ex tb [ia] IIIC T80°C/T130°C Db

Variants	LB 43x-xx-Jx-...
Type of Protection of Compartments	
Terminal Compartment	Ex "t" (dust protection)
	Ex "d" (flameproof enclosure)
Sensor Compartment	Ex "t" (dust protection)
	Ex "i" (intrinsic safety)
Ambient Temperature	
T6	$-40\text{ }^{\circ}\text{C} \leq T_a \leq 60\text{ }^{\circ}\text{C}$
T4	$-40\text{ }^{\circ}\text{C} \leq T_a \leq 100\text{ }^{\circ}\text{C}$
ATEX/IECEX	
II 2 G (Zone 1)	Ex db ia IIC T6/T4 Gb
II 2 D (Zone 21)	Ex tb IIIC T80°C/T130°C Db

4.1.2 Operation without intrinsically safe interfaces

Electrical Parameter of Interfaces

Design	LB 43x-xx-Jx-...
Input: HART 4-20 mA, passive	
not intrinsically safe	
Voltage U_N	$\leq 30 \text{ Vdc}$
Power P_N	$\leq 750 \text{ mW}$
Output: Display	
not intrinsically safe	
Only connect displays from Berthold Technologies GmbH. Contact Berthold for more information	
Input: Service	
not intrinsically safe	
Only connect devices from Berthold Technologies GmbH. Contact Berthold for more information	

4.1.3 Operation with intrinsically safe interfaces

Electrical Parameter of Interfaces

Variants	LB 43x-xx-Kx-...	
Input: HART 4-20 mA, passive		
intrinsically safe		
max. input voltage U_i	30 V	
max. input current I_i	430 mA	
max. input power P_i	1 W	
internal capacitance C_i	-	
internal inductance L_i	-	
Additional notes	Interface circuit is galvanically isolated from housing with a dielectric strength of at least 500 V _{rms} . Level of protection of the system degrades when associated device has lower level of protection ib or ic. Associated device to be connected must also be galvanically isolated from all other circuits and earth with at least 500 V _{rms}	
Output: Display		
intrinsically safe		
output characteristics	linear	
max. output voltage U_o	8 V	
max. output current I_o	820 mA	
max. output power P_o	95 mW	
internal capacitance C_i	6 nF	
internal inductance L_i	4 μH	
	IIC	IIIC/IIB
max. outer capacitance C_o	1,46 μF	8,99 μF
max. outer inductance L_o	113 μH	453 μH
Only connect displays from Berthold Technologies GmbH. Contact Berthold for more information		
Input: Service		
not intrinsically safe		
max. effective AC or DC voltage $U_m^{1)}$	250 V	
Only connect devices from Berthold Technologies GmbH. Contact Berthold for more information		

1) Please note that applying voltages up to U_m cannot put device in a dangerous state but may damage to functionality

4.2 Installation

Observe the installation and safety instructions of the operating manual.

Install in accordance with manufacturer's specifications and the relevant standards and rules.

Do not operate the device outside of its electrical, thermal, and mechanical parameters.

Make sure no explosive atmosphere is present while installing.

Install the housing cover and the cable glands, sealings or blanking elements (see section 4.4) correctly to maintain the degree of protection of the housing. Always use cable glands if cables are to be inserted into the housing. Only use cables suitable for the used cable glands.

Unused entries must always be properly sealed with listed blanking elements, see section 4.4.

The O-ring between the housing enclosure and cover must be inserted for sealing the terminal compartment.

The cover must be fully closed and secured with the grub screw inserted on the cover side.

Sufficient grounding of the device is necessary for safe operation.

Grease must be used on all threads. See operating manual or ask Berthold Technologies for proper grease.

Before operating intrinsically safe interfaces, verification of intrinsically safe system must be provided (see IEC 60079-14).

Sufficient insulation of >500 V between 4-20 mA Interface and all other circuits and PE must be ensured

Connecting cables (conductors and insulation) must be suitable for a continuous service temperature $\geq T_a + 20$ K.

Use suitable connecting cable for the prevailing environmental conditions.

Connected lines must be strain relieved.

Do **not** disassemble the terminal compartment (Fig. 6, Pos. 1) from the sensor compartment (Fig. 6, Pos. 3). Dust-tightness and thus safe operation can be compromised.

Do **not** remove or modify electronic modules within the device

The detectors are to be used exclusively for fixed location installation.

Make sure to properly protect interfaces of the device (for example with external separators or fuses) in corresponding to the applicable environment

Do not connect intrinsically safe interfaces of the device with non-intrinsically safe interfaces of other equipment. Safe operation can be compromised.

Devices with intrinsically safe circuits may no longer be connected to intrinsically safe circuits if they were not previously used in an intrinsically safe manner.

4.3 Electrical Connection of intrinsically safe interfaces

Requirements for conductors connected to intrinsically safe interfaces

Variants	LB 43x-xx-Kx-...
Interfaces	intrinsically safe
Diameter for conductors	
HART 4-20 mA, passive	0,25mm ² (AWG24) bis 2,5mm ² (AWG12)
Display	0,25mm ² (AWG24) bis 2,5mm ² (AWG12)

4.4 Entries

Entries can be used for installation of cable glands or conduit seals. Unused entries shall be closed with blanking elements. See section 3.1 for position of entries.

All used cable glands, conduit seals and blanking elements must be properly installed as specified from manufacturer.

The entries are provided with threads specified in the following table:

Variant	Threaded Entries into Enclosure
LB 43x-xx-xx-x-x1-xx	4x M20x1.5 6H
LB 43x-xx-xx-x-x2-xx	4x NPT ½"

IMPORTANT



- ▶ Only cable glands in compliance with requirements in section 4.4.1 are safe to use
- ▶ Only conduit seals in compliance with requirements in section 4.4.2 are safe to use
- ▶ All unused entries must be properly closed with blanking elements. Only blanking elements in compliance with requirements in section 4.4.3 are safe to use
- ▶ For the flameproof housing a reference pressure of 2013 kPa was determined. All used cable glands, conduit seals and blanking elements must withstand a test pressure of at least 1,5 time the reference pressure resulting in 2714 kPa.

4.4.1 Cable Glands

The cable glands may only be used for connection of permanently laid lines.

IMPORTANT



If cable glands or cables that were not tested by Berthold Technologies GmbH & Co. KG are used, the torques for fixing may need to be redefined.

The specified torques in the table of the attached manuals are guidelines for the cable glands listed in the table, but essentially depend on the cable used. The pressure screw and the fitting body must be tightened so that the IP protection is securely guaranteed.

Only metallic cable glands may be used with a temperature range of at least $-20\text{ °C} \leq T_a \leq +60\text{ °C}$.

Respect the torques, cross sections and protection types of cable glands in the table of the attached manuals.

4.4.2 Conduit Seals

When conduit seals are installed, they must be installed directly at the entry of the enclosure.

4.4.3 Blanking Elements

Unused entries must be closed with listed stopping plugs with an appropriate protection (IP66, IP68 or type 4X):

Material	Size	ID No.	Ex Code / Type of Protection	Mounting	Torque
Stainless Steel	NPT ½"	66050	ATEX/IECEX Ex-d IIC Gb ATEX/IECEX Ex-tb IIC Gb Class I; Groups A, B, C & D Class II; Groups E, F & G	10 mm (inner hexagon)	20 Nm
	M20 x 1.5	59032	Ex-d IIC Gb Ex-tb IIC Gb	24 mm (outer hexagon)	6 Nm neoprene
Brass nickel-plated	NPT ½"	73006	ATEX/IECEX Ex-d IIC Gb ATEX/IECEX Ex-tb IIC Gb Class I; Groups A, B, C & D Class II; Groups E, F & G Class III, Type 4X	10 mm (inner hexagon)	20 Nm
	M20 x 1.5	56093	Ex-d IIC Gb Ex-tb IIC Gb	24 mm (outer hexagon)	20 Nm

4.5 Operation

IMPORTANT



For operation of all variants of LB 43x:

- ▶ Do not operate device when threads, cable gland or sealing plugs are corroded or device is visible damaged or heavily corroded.
 - ▶ Do not operate device outside of the temperature limits, see section 4.1. Exposure to additional heat sources or radiation is to be properly considered when verification of intrinsically safe system corresponding to IEC 60079-14 is performed.
 - ▶ Do not operate device without properly closed cover. Only open cover in non-hazardous locations.
 - ▶ Depending on local legal regulations additional the protection of the used cables can be required. E. g. application of conduits or a specific type of cable
-

5 Control Drawing

5.1 LB 43x Ex-di (LB 43x-xx-Kx-...)

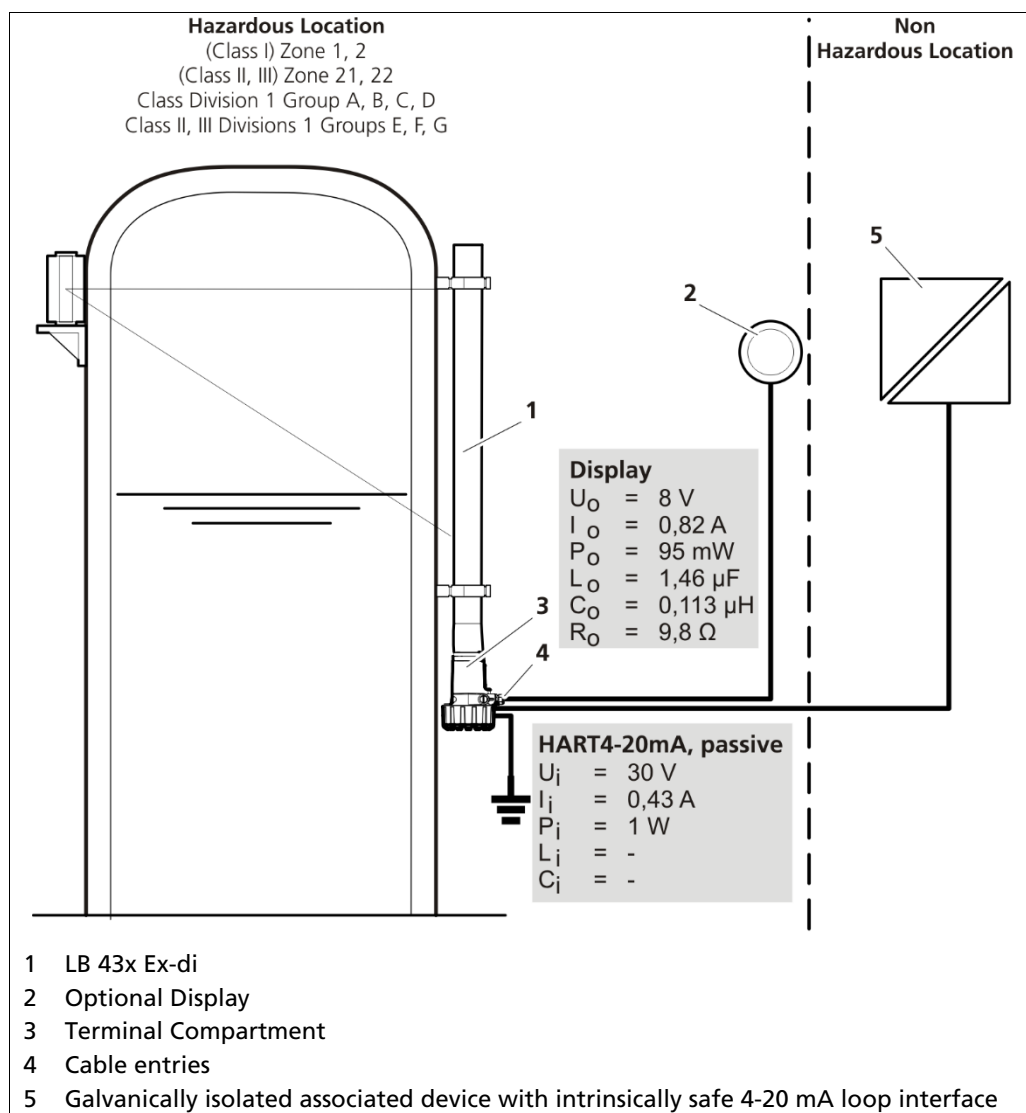


Fig. 5 Control Drawing of LB 43x Ex-di (LB 43x-xx-Kx-...)

5.2 LB 43x Ex-d (LB 43x-xx-Jx-...)

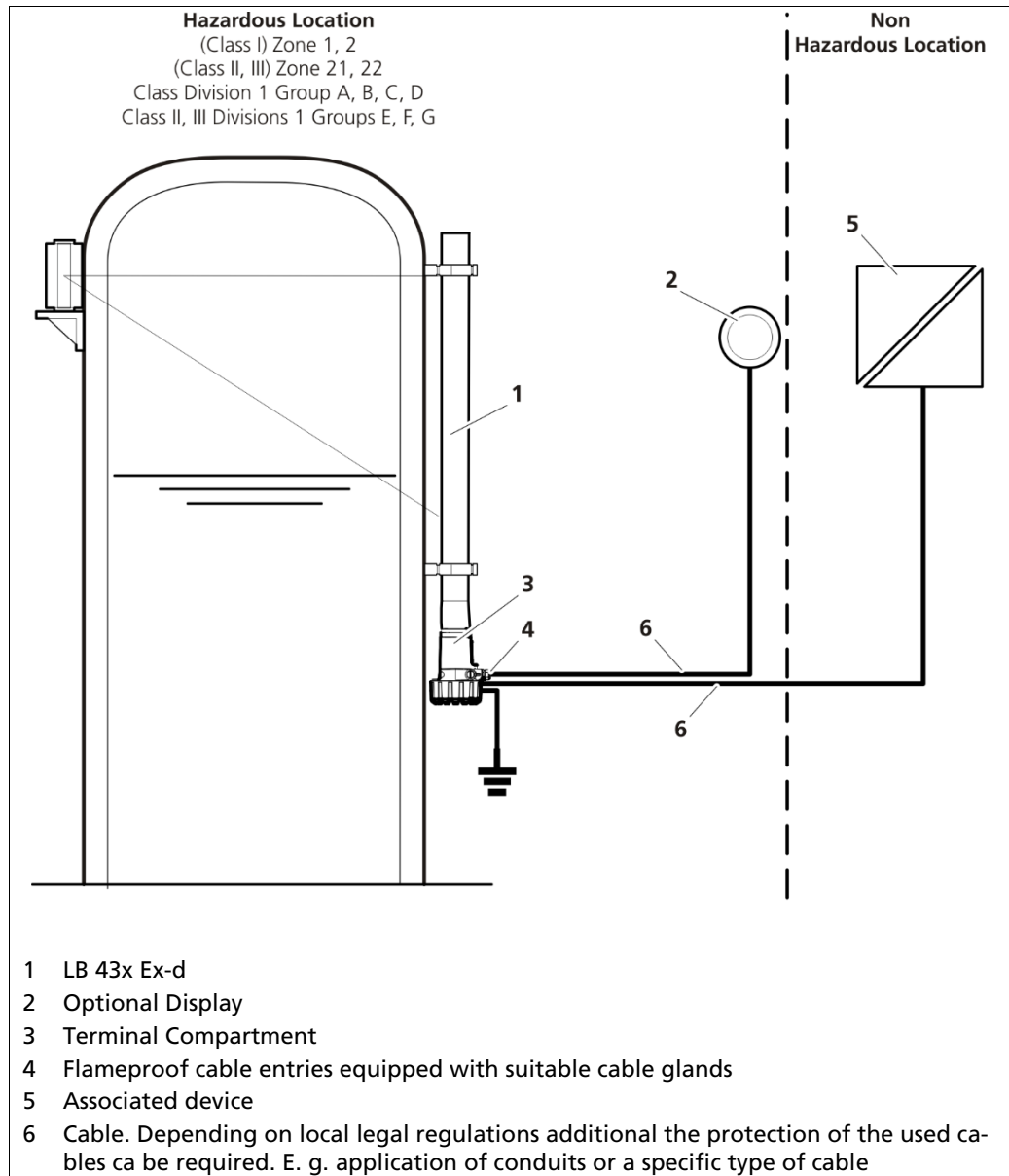


Fig. 6 Control Drawing of LB 43x Ex-d (LB 43x-xx-Jx-...)

6

Maintenance and Visual Inspection

IMPORTANT



During commissioning, maintenance, or repair, always use the check lists in chapter 7 to document the accuracy and completeness of your work.

For detectors that are used in hazardous areas, the detector housing and thus the pressure-proof enclosure of the electronics may be opened only by the BERTHOLD TECHNOLOGIES service or by persons authorized by BERTHOLD TECHNOLOGIES.

Visual Inspection

Carry out a visual inspection regularly. The interval depends on the local regulations and conditions. The plan described in Chapter 7 will support you in this. In the event of deviations from this plan, suitable measures must be taken to rule out any risk.

When determining the intervals for the visual inspection ambient and operating conditions are to be considered.

Seals

If the cover or the housing is opened, check the respective seals and replace them, if necessary.

Cleaning

Make sure that the cable glands and the name plates are not damaged during cleaning. Cleaning measures that may cause damage, such as grinding, filing, etc., are not permitted.

7

Plan for Visual Inspection

Plan for visual inspection

IMPORTANT



If you answer any of these questions with "No", you must make a note of the measures you have taken to remedy this deficiency in the last column. Before you take the detector into operation, make sure to verify the correctness of the measures with your explosion protection officer again.

Date:..... Name:.....	Yes	No	Measures
General examination			
Is the device free of corrosion, dents, cracks, holes, and warpage?			
Is the cover closed properly? See section 4.2.			
Is the O-ring of the cover properly seated and undamaged			
Is the device exposed to additional heat sources or radiation (e.g., sunlight) which may not be considered in verification of intrinsically safe system corresponding to IEC 60079-14			
Are the external connections of the potential equalizer in good working order?			
Is the surface of the detector free of contact with other non-alloy steel parts?			
Is the detector still installed and operated within the guidelines of section 4.2 and 4.5?			
Are the used cable glands, conduit seals or blanking elements still in accordance with 4.4			
Are the used cable glands, conduit seals or blanking elements free of corrosion, dents, cracks, holes, and warpage?			
Are the diameters of the used cables suitable for the used cable glands?			
Are the cables firmly clamped in the cable glands?			
Are the screwed fittings firmly tightened?			
Are all unused openings provided with dummy plugs?			
Is the interior (terminal compartment) in expected condition?			
Is the interior dry, clean, free of foreign material and free of visible corrosion?			
Are the cables connected firmly?			
Is there any visible damage or irregularity of the terminals or the used ferrules			

8

Certificates

8.1 ATEX Certificate

**EU - Baumusterprüfbescheinigung**

- (1)
- (2) Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen –
Richtlinie 2014/34/EU
- (3) EU - Baumusterprüfbescheinigungsnummer
- EPS 23 ATEX 1 325 X** **Revision 1**
- (4) Gerät: Detektor Typ LB 43x
- (5) Hersteller: Berthold Technologies GmbH & Co. KG
- (6) Anschrift: Calmbacher Str. 22
75323 Bad Wildbad
Germany
- (7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser EU - Baumusterprüfbescheinigung festgelegt.
- (8) Bureau Veritas Consumer Products Services Germany GmbH bescheinigt als benannte Stelle Nr. 2004 nach Artikel 21 der Richtlinie 2014/34/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 die Erfüllung der grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie. Die Ergebnisse der Prüfung sind in der vertraulichen Dokumentation unter der Referenznummer 21TH0241 festgelegt.
- (9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit:
- EN IEC 60079-0:2018** **EN 60079-1:2014**
IEC 60079-11:2023 **EN 60079-31:2014**
- (10) Falls das Zeichen „X“ hinter der Bescheinigungsnummer steht, wird auf besondere Bedingungen für die sichere Anwendung des Gerätes in der Anlage zu dieser Bescheinigung hingewiesen.
- (11) Diese EU - Baumusterprüfbescheinigung bezieht sich nur auf Konzeption und Prüfung des festgelegten Gerätes gemäß Richtlinie 2014/34/EU. Weitere Anforderungen dieser Richtlinie gelten für die Herstellung und das Inverkehrbringen dieses Gerätes. Diese Anforderungen werden nicht durch diese Bescheinigung abgedeckt.
- (12) Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

LB 43x Ex-d:II 2G Ex db ia IIC T6/T4 Gb
II 2D Ex tb [ia] IIC T80°C/T130°C DbLB 43x Ex-d:II 2G Ex db ia IIC T6/T4 Gb
II 2D Ex tb IIC T80°C/T130°C Db

Zertifizierungsstelle Explosionsschutz

Ulrich Fejke



Türkheim, 23.07.2024

Bescheinigungen ohne Unterschrift und Siegel haben keine Gültigkeit. Diese Bescheinigung darf nur unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung von Bureau Veritas Consumer Products Services Germany GmbH.

Bureau Veritas Consumer Products Services Germany GmbH
www.bureauveritas.de/cps

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86842 Türkheim

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Zertifikatsnummer EPS 23 ATEX 1 325 X, Revision 1

ZERT-0201-DEU-ZE-EX-V01/TEMP-0001-DEU-ZE-V02

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Anlage

(13)

(14) EU – Baumusterprüfbescheinigung EPS 23 ATEX 1 325 X

Revision 1

(15) Beschreibung des Gerätes:

Der Detektor vom Typ LB 43x ist ein Feldgerät zur Bestimmung von Dichte, Grenzwert oder Füllstand mit Hilfe eines strahlungsbasierten Messprinzips. Der LB 43x ist ein 2-Leiter-System. Er wird über die Signalleitung (4-20 mA Schleife) versorgt.

Das Gehäuse besteht entweder aus Edelstahl oder Aluminium. Es lassen sich zwei Gehäuseteile unterscheiden: Das Szintillator-Gehäuse enthält den entsprechenden Szintillator und das Frontend. Das Detektorgehäuse enthält die Prozessschnittstelle und - bei Temperaturklasse T4 - die Elektronikabdeckung.

Varianten:

LB 43x-xx-Jx-... / LB 43x-xx-Lx-... / LB 43x-xx-Nx-...	Typen ohne eigensichere Schnittstelle
LB 43x-xx-Kx-... / LB 43x-xx-Mx-... / LB 43x-xx-Ox-...	Typen mit eigensicherer Schnittstelle

Elektrische Daten:

Service-Schnittstelle: $U_m = 250 \text{ V}$

LB 43x ohne eigensichere Schnittstelle:

HART 4-20 mA: $U_N \leq 30 \text{ V DC}$ / $P_N \leq 750 \text{ mW}$

LB 43x mit eigensicherer Schnittstelle:

HART 4-20 mA: $U_i = 30 \text{ V}$ / $I_i = 0,43 \text{ A}$ / $P_i = 1 \text{ W}$ / $C_i = \text{vernachlässigbar}$ / $L_i = \text{vernachlässigbar}$

Display: $U_o = 8 \text{ V}$ / $I_o = 0,82 \text{ A}$ / $P_o = 95 \text{ mW}$ / $R_o = 9,8 \text{ Ohm}$

Display (IIC): $C_o = 1,46 \text{ }\mu\text{F}$ / $L_o = 113 \text{ }\mu\text{H}$

Display (IIB/IIC): $C_o = 8,99 \text{ }\mu\text{F}$ / $L_o = 453 \text{ }\mu\text{H}$



EU – Baumusterprüfbescheinigung EPS 23 ATEX 1 325 X

Revision 1

(16) Referenznummer: 21TH0241(17) Besondere Bedingungen:

Typenschlüssel für unterschiedliche Temperaturklassen und zugehöriger Umgebungstemperaturbereich:

LB 43x-xx-xx-0 für T6 und T_{amb}: -40 °C ... +60 °CLB 43x-xx-xx-1 für T4 und T_{amb}: -40 °C ... +100 °C

(T4: Interne Temperatur begrenzt durch eine Temperatursicherung auf +80 °C. Zur Sicherstellung der Funktion – aber nicht zu Sicherheit – ist zum Betrieb bei hohen Temperaturen eine externe Wasserkühlung zu betreiben)

Bei eigensicheren Typen muss das zugehörige Betriebsmittel eine galvanisch getrennte Versorgung bereitstellen. (siehe auch die im Sicherheitshandbuch beschriebenen Installationsbedingungen)

(18) Grundlegende Sicherheits- und Gesundheitsanforderungen:

Durch Übereinstimmung mit Normen abgedeckt.



Türkheim, 23.07.2024

Bureau Veritas Consumer Products Services Germany GmbH
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86842 Türkheim

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Zertifikatsnummer EPS 23 ATEX 1 325 X, Revision 1

ZERT-0201-DEU-ZE-EK-V01/TEMP-0051-DEU-ZE-V02

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8.2 IECEx Certificate

		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 EPS 23.0085X	Page 1 of 4	<u>Certificate history:</u>
Status:	Current	Issue No: 1	Issue 0 (2024-03-04)
Date of Issue:	2024-07-23		
Applicant:	Berthold Technologies GmbH & Co. KG Calmbacher Str. 22 75323 Bad Wildbad Germany		
Equipment:	detector LB 43x		
Optional accessory:			
Type of Protection:	Flameproof enclosures "d", Intrinsic safety "i", Protection by enclosures "t"		
Marking:	LB 43x Ex-d: Ex db ia IIC T6/T4 Gb Ex tb IIIC T80°C/T130°C Db LB 43x Ex-di: Ex db ia IIC T6/T4 Gb Ex tb [ia] IIIC T80°C/T130°C Db		
Approved for issue on behalf of the IECEx Certification Body:			
Position:	Head of Certification		
Signature: (for printed version)			
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: Bureau Veritas Consumer Products Services Germany GmbH Businesspark A96 86842 Türkheim Germany			
			



IECEx Certificate of Conformity

Certificate No.: **IECEx EPS 23.0085X**

Page 2 of 4

Date of issue: **2024-07-23**

Issue No: 1

Manufacturer: **Berthold Technologies GmbH & Co. KG**
Calmbacher Str. 22
75323 Bad Wildbad
Germany

Manufacturing
locations: **Berthold Technologies GmbH & Co.
KG**
Calmbacher Str. 22
75323 Bad Wildbad
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 60079-1:2014 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
Edition:7.0

IEC 60079-11:2023 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
Edition:7.0

IEC 60079-31:2013 Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"
Edition:2

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 Report:

DE/EPS/ExTR23.0089/01

Quality Assessment Report:

DE/PTB/QAR06.0011/07



IECEx Certificate of Conformity

Certificate No.: **IECEx EPS 23.0085X**

Page 3 of 4

Date of issue: **2024-07-23**

Issue No: 1

EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The detector of type LB 43x is a field-device for determining density, limit or level by using a radiation-based measuring principle. The LB 43x is a 2-wire system. It is connected only via the signal line (4-20 mA loop).

The housing consists of either stainless steel or aluminum. Two enclosure parts can be distinguished: the scintillator housing contains the according scintillator and the frontend. The detector housing contains the process interface and – for temperature class T4 – the electronic cover.

Variants:

LB 43x-xx-Jx-... / LB 43x-xx-Lx-... / LB 43x-xx-Nx-...: without intrinsically safe interfaces

LB 43x-xx-Kx-... / LB 43x-xx-Mx-... / LB 43x-xx-Ox-...: with intrinsically safe interfaces

Electrical data:

Service interface: $U_m = 250 \text{ V}$

LB 43x without intrinsically safe interfaces:

HART 4-20 mA: $U_N \leq 30 \text{ V DC}$ / $P_N \leq 750 \text{ mW}$

LB 43x with intrinsically safe interfaces:

HART 4-20 mA: $U_i = 30 \text{ V}$ / $I_i = 0.43 \text{ A}$ / $P_i = 1 \text{ W}$ / $C_i = \text{negligible}$ / $L_i = \text{negligible}$

Display: $U_o = 8 \text{ V}$ / $I_o = 0.82 \text{ A}$ / $P_o = 95 \text{ mW}$ / $R_o = 9.8 \text{ Ohm}$

Display (IIC): $C_o = 1.46 \text{ }\mu\text{F}$ / $L_o = 113 \text{ }\mu\text{H}$

Display (IIB/IIC): $C_o = 8.99 \text{ }\mu\text{F}$ / $L_o = 453 \text{ }\mu\text{H}$

SPECIFIC CONDITIONS OF USE: YES as shown below:

Consider Type key configuration for different temperature classes and ambient temperature range:

LB 43x-xx-xx-0 for T6 and Tamb: $-40 \text{ }^\circ\text{C}$... $+60 \text{ }^\circ\text{C}$

LB 43x-xx-xx-1 for T4 and Tamb: $-40 \text{ }^\circ\text{C}$... $+100 \text{ }^\circ\text{C}$

(T4: Internal temperature limited to $+80 \text{ }^\circ\text{C}$ by a temperature fuse. To ensure functionality - but not for safety - an external water cooling system must be used for operation at high temperatures)

For intrinsic safe types, the associated apparatus shall provide a galvanically separated supply. (refer also to the installation conditions described in the safety manual)

		IECEx Certificate of Conformity	
Certificate No.:	IECEx EPS 23.0085X	Page 4 of 4	
Date of issue:	2024-07-23	Issue No: 1	
DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)			
Revision 1: new variant Ex-di, removed variant Ex-i, according marking change, no electrical modification, no enclosure construction modification			

