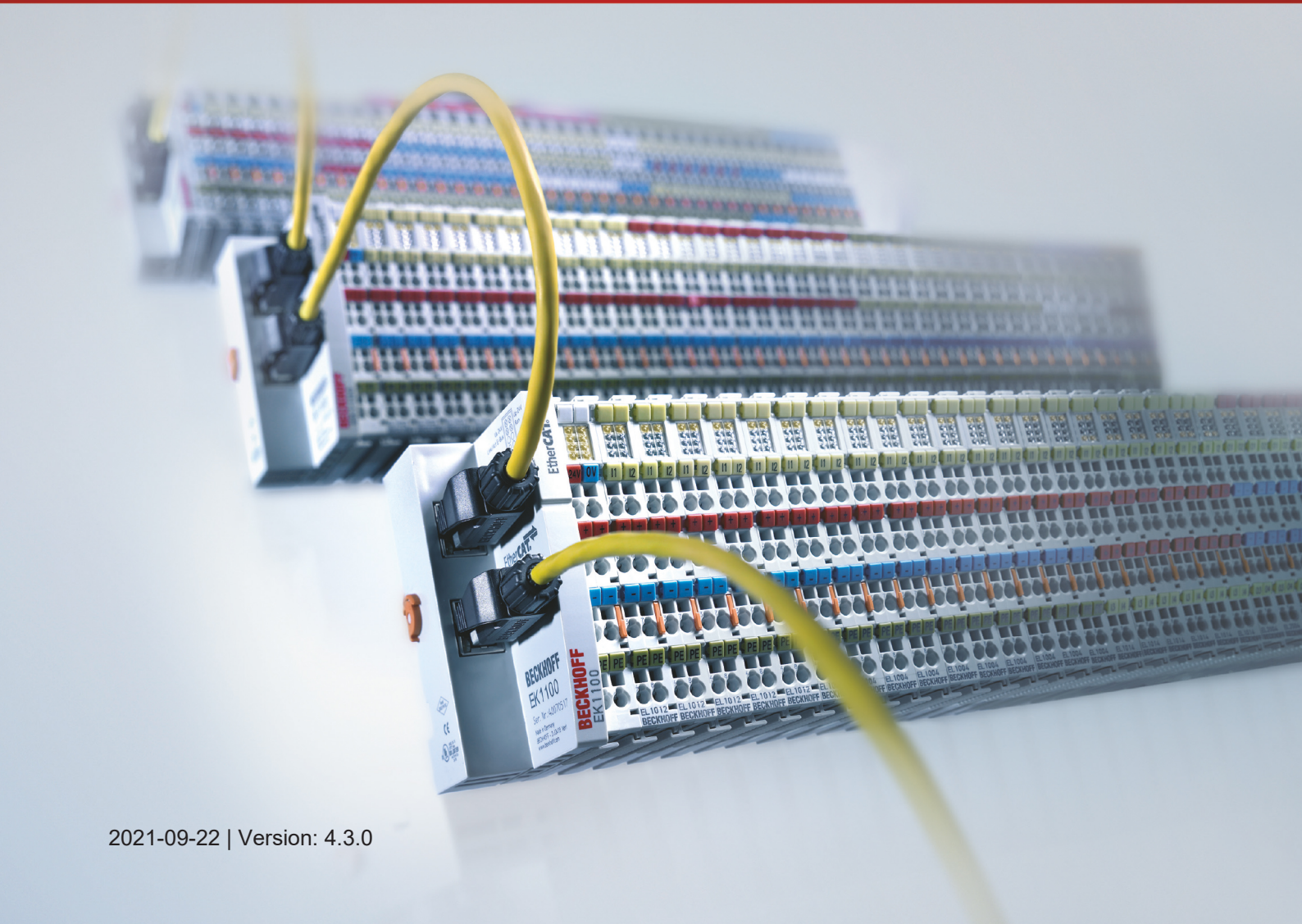
BECKHOFF New Automation Technology

Documentation | EN

# Explosion Protection for Terminal Systems

Notes on the use of the Beckhoff terminal systems in hazardous areas according to ATEX and IECEx

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# 1 Foreword

## 1.1 Notes on the documentation

### Intended audience

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.
It is essential that the documentation and the following notes and explanations are followed when installing and commissioning these components.
It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

### Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without prior announcement.

No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

### Trademarks

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### Patent Pending

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents: EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702 with corresponding applications or registrations in various other countries.


EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

### Copyright

## 1.2 Safety instructions

### Safety regulations

Please note the following safety instructions and explanations!
Product-specific safety instructions can be found on following pages or in the areas mounting, wiring, commissioning etc.

### Exclusion of liability

All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

### Personnel qualification

This description is only intended for trained specialists in control, automation and drive engineering who are familiar with the applicable national standards.

### Description of instructions

In this documentation the following instructions are used.
These instructions must be read carefully and followed without fail!

**⚠ DANGER**

**Serious risk of injury!**

Failure to follow this safety instruction directly endangers the life and health of persons.

**⚠ WARNING**

**Risk of injury!**

Failure to follow this safety instruction endangers the life and health of persons.

**⚠ CAUTION**

**Personal injuries!**

Failure to follow this safety instruction can lead to injuries to persons.

***NOTE***

**Damage to environment/equipment or data loss**

Failure to follow this instruction can lead to environmental damage, equipment damage or data loss.

**Tip or pointer**

This symbol indicates information that contributes to better understanding.

## 1.3 Validity

This document applies to all Beckhoff fieldbus components that bear ATEX and/or IECEx markings.

Their product designation is structured as follows:

**Bus Coupler**

BKxxxx-xxxx, LCxxxx-xxxx

**Bus Terminal Controller**

BCxxxx-xxxx, BXxxxx-xxxx

**Bus Terminals**

KLxxxx-xxxx, KSxxxx-xxxx

**Terminal modules**

KMxxxx-xxxx

**EtherCAT Coupler**

EK1xxx-xxxx, BK1xxx-xxxx, EKM1xxx-xxxx

**EtherCAT Terminals**

ELxxxx-xxxx, ESxxxx-xxxx, EMxxxx-xxxx

The small letter x stands in each case for a number from 0 to 9.

Up-to-date lists of the certified components can be found on the Beckhoff homepage at

https://www.beckhoff.de/english/certifications/busterm.htm
and
http://www.beckhoff.de/german/zertifikate/ethercat.htm

# 2 Notes on operation in areas subject to an explosion hazard

## 2.1 ATEX - Special conditions (standard temperature range)

**⚠ WARNING**

**Observe the special conditions for the intended use of Beckhoff fieldbus components with standard temperature range in potentially explosive areas (directive 2014/34/EU)!**

- The certified components are to be installed in a suitable housing that guarantees a protection class of at least IP54 in accordance with EN 60079-15! The environmental conditions during use are thereby to be taken into account!
- For dust (only the fieldbus components of certificate no. KEMA 10ATEX0075 X Issue 9): The equipment shall be installed in a suitable enclosure providing a degree of protection of IP54 according to EN 60079-31 for group IIIA or IIIB and IP6X for group IIIC, taking into account the environmental conditions under which the equipment is used!
- If the temperatures during rated operation are higher than 70°C at the feed-in points of cables, lines or pipes, or higher than 80°C at the wire branching points, then cables must be selected whose temperature data correspond to the actual measured temperature values!
- Observe the permissible ambient temperature range of 0 to 55°C for the use of Beckhoff fieldbus components standard temperature range in potentially explosive areas!
- Measures must be taken to protect against the rated operating voltage being exceeded by more than 40% due to short-term interference voltages!
- The individual terminals may only be unplugged or removed from the Bus Terminal system if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- The connections of the certified components may only be connected or disconnected if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- The fuses of the KL92xx/EL92xx power feed terminals may only be exchanged if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- Address selectors and ID switches may only be adjusted if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!

### Standards

The fundamental health and safety requirements are fulfilled by compliance with the following standards:

- EN 60079-0:2012+A11:2013
- EN 60079-15:2010
- EN 60079-31:2013 (only for certificate no. KEMA 10ATEX0075 X Issue 9)

### Marking

The Beckhoff fieldbus components with standard temperature range certified according to the ATEX directive for potentially explosive areas bear one of the following markings:

**II 3G KEMA 10ATEX0075 X Ex nA IIC T4 Gc Ta: 0 … +55°C**

II 3D KEMA 10ATEX0075 X Ex tc IIIC T135°C Dc Ta: 0 ... +55°C
(only for fieldbus components of certificate no. KEMA 10ATEX0075 X Issue 9)

or

**II 3G KEMA 10ATEX0075 X Ex nA nC IIC T4 Gc Ta: 0 … +55°C**

II 3D KEMA 10ATEX0075 X Ex tc IIIC T135°C Dc Ta: 0 ... +55°C
(only for fieldbus components of certificate no. KEMA 10ATEX0075 X Issue 9)

## 2.2 ATEX - Special conditions (extended temperature range)

**⚠ WARNING**

**Observe the special conditions for the intended use of Beckhoff fieldbus components with extended temperature range (ET) in potentially explosive areas (directive 2014/34/EU)!**

- The certified components are to be installed in a suitable housing that guarantees a protection class of at least IP54 in accordance with EN 60079-15! The environmental conditions during use are thereby to be taken into account!
- For dust (only the fieldbus components of certificate no. KEMA 10ATEX0075 X Issue 9): The equipment shall be installed in a suitable enclosure providing a degree of protection of IP54 according to EN 60079-31 for group IIIA or IIIB and IP6X for group IIIC, taking into account the environmental conditions under which the equipment is used!
- If the temperatures during rated operation are higher than 70°C at the feed-in points of cables, lines or pipes, or higher than 80°C at the wire branching points, then cables must be selected whose temperature data correspond to the actual measured temperature values!
- Observe the permissible ambient temperature range of -25 to 60°C for the use of Beckhoff fieldbus components with extended temperature range (ET) in potentially explosive areas!
- Measures must be taken to protect against the rated operating voltage being exceeded by more than 40% due to short-term interference voltages!
- The individual terminals may only be unplugged or removed from the Bus Terminal system if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- The connections of the certified components may only be connected or disconnected if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- The fuses of the KL92xx/EL92xx power feed terminals may only be exchanged if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- Address selectors and ID switches may only be adjusted if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!

### Standards

The fundamental health and safety requirements are fulfilled by compliance with the following standards:

- EN 60079-0:2012+A11:2013
- EN 60079-15:2010
- EN 60079-31:2013 (only for certificate no. KEMA 10ATEX0075 X Issue 9)

### Marking

The Beckhoff fieldbus components with extended temperature range (ET) certified according to the ATEX directive for potentially explosive areas bear the following marking:

**II 3G KEMA 10ATEX0075 X Ex nA IIC T4 Gc Ta: -25 … +60°C**

II 3D KEMA 10ATEX0075 X Ex tc IIIC T135°C Dc Ta: -25 ... +60°C
(only for fieldbus components of certificate no. KEMA 10ATEX0075 X Issue 9)

or

**II 3G KEMA 10ATEX0075 X Ex nA nC IIC T4 Gc Ta: -25 … +60°C**

II 3D KEMA 10ATEX0075 X Ex tc IIIC T135°C Dc Ta: -25 ... +60°C
(only for fieldbus components of certificate no. KEMA 10ATEX0075 X Issue 9)

## 2.3 IECEx - Special conditions

**⚠ WARNING**

**Observe the special conditions for the intended use of Beckhoff fieldbus components in potentially explosive areas!**

- For gas: The equipment shall be installed in a suitable enclosure providing a degree of protection of IP54 according to IEC 60079-15, taking into account the environmental conditions under which the equipment is used!
- For dust (only the fieldbus components of certificate no. IECEx DEK 16.0078X Issue 3):
  The equipment shall be installed in a suitable enclosure providing a degree of protection of IP54 according to EN 60079-31 for group IIIA or IIIB and IP6X for group IIIC, taking into account the environmental conditions under which the equipment is used!
- The equipment shall only be used in an area of at least pollution degree 2, as defined in IEC 60664-1!
- Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 119 V!
- If the temperatures during rated operation are higher than 70°C at the feed-in points of cables, lines or pipes, or higher than 80°C at the wire branching points, then cables must be selected whose temperature data correspond to the actual measured temperature values!
- Observe the permissible ambient temperature range for the use of Beckhoff fieldbus components in potentially explosive areas!
- The individual terminals may only be unplugged or removed from the Bus Terminal system if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- The connections of the certified components may only be connected or disconnected if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- Address selectors and ID switches may only be adjusted if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- The front hatch of certified units may only be opened if the supply voltage has been switched off or a non-explosive atmosphere is ensured!

### Standards

The fundamental health and safety requirements are fulfilled by compliance with the following standards:

- EN 60079-0:2011
- EN 60079-15:2010
- EN 60079-31:2013 (only for certificate no. IECEx DEK 16.0078X Issue 3)

### Marking

Beckhoff fieldbus components that are certified in accordance with IECEx for use in areas subject to an explosion hazard bear the following markings:

| | |
|---|---|
| Marking for fieldbus components of certificate no. IECEx DEK 16.0078X Issue 3: | **IECEx DEK 16.0078 X**<br>**Ex nA IIC T4 Gc**<br>**Ex tc IIIC T135°C Dc** |
| Marking for fieldbus components of certficates with later issues: | **IECEx DEK 16.0078 X**<br>**Ex nA IIC T4 Gc** |

## 2.4 Serial number

The Beckhoff fieldbus components bear a serial number that is structured as follows:

CW YY SW HW

| | |
|---|---|
| Key: | Example: Serial number 29 10 02 01 |
| CW: Calendar week of manufacture | Calendar week: 29 |
| YY: Year of manufacture | Year: 2010 |
| SW: Software version | Software version: 02 |
| HW: Hardware version | Hardware version: 01 |

## 2.5 Product-specific documents

In addition, please refer to the product-specific documents for installation, parameterization and programming, which are available to you on the Beckhoff homepage at https://www.beckhoff.com in the Download section.

# 3 Basic principles of explosion protection

## 3.1 Why explosion protection?

In many industries, such as chemicals and process engineering, combustible substances are processed whose ignition can cause an explosion. These may be flammable liquids and gases or finely distributed dusts and fibers. In addition to a combustible substance, the prerequisites for the occurrence of an explosion are the presence of oxygen and a source of ignition. No explosion can occur if one of these factors is lacking.

Different protective measures are taken to avoid explosions and the resulting damage, and these measures are divided into three categories. Primary and secondary explosion protection is taken to mean measures to prevent the occurrence of an explosion. While primary explosion protection counteracts the formation of an explosive atmosphere, secondary explosion protection eliminates potential sources of ignition. Tertiary (or structural) explosion protection concerns measures to prevent or reduce personal injuries and damage to materials and the environment due to explosions if the risk of explosion cannot be ruled out by primary and secondary explosion protection.

**Differentiation of the protective measures**

| Primary explosion protection | Secondary explosion protection | Tertiary explosion protection |
|---|---|---|
| Measures that prevent or limit the formation of explosive atmospheres. | Measures that prevent the ignition of the explosive atmosphere. | Measures that limit the effects of an explosion or reduce them to a safe level. |
| • Avoidance of flammable materials in an explosive form<br>• Inertization (displacement of the oxygen) | • Avoidance of the source of ignition<br>• Enclosure of the ignition source | • Explosion-proof design<br>• Explosion pressure relief |

For the approval of electrical equipment for use in areas subject to an explosion hazard, there are various standards that define the requirements for the equipment. Conformity to the respective standard is verified by an independent certificate authority as part of a certification process. Conformity to the standard is certified by the issuing of a certificate. The applicable standard usually depends on the place of use of the electrical equipment. The most important standards are briefly described below.

The International Electrotechnical Commission is responsible for global standardization in the field of electrical engineering. The IEC 60079 (IECEx scheme) series of standards deals with explosion protection for areas subject to a gas and dust explosion hazard. National regulations must be observed depending on the place of use of the electrical equipment.

In the ATEX directive 2014/34/EU, the European Union has created the basis for binding uniform property requirements with regard to the protection of systems, equipment and components against explosion, which apply to use in Europe. The application of the directive 2014/34/EC for explosion-protected applications has been compulsory throughout the EU since April 2016.

The basic principles of explosion protection are the same all over the world. Nevertheless, the explosion protection regulations of the US National Electrical Code (NEC) and the Canadian Electrical Code (CEC) in North America differ in part from those of the IEC, e.g. in the definition of areas subject to an explosion hazard. This document applies exclusively to the provisions of the ATEX Directive and the IECEx scheme.

Furthermore, this chapter serves as reference for the decoding of device markings.

## 3.2 Marking of equipment

The areas where the equipment may be used, the constructive safety level to which the equipment is certified and the material group in which the equipment may be used must be recognizable on the basis of adequate marking of the equipment. The following illustration shows the marking of equipment for zone 2. The individual elements of the marking are explained in the remainder of this document.

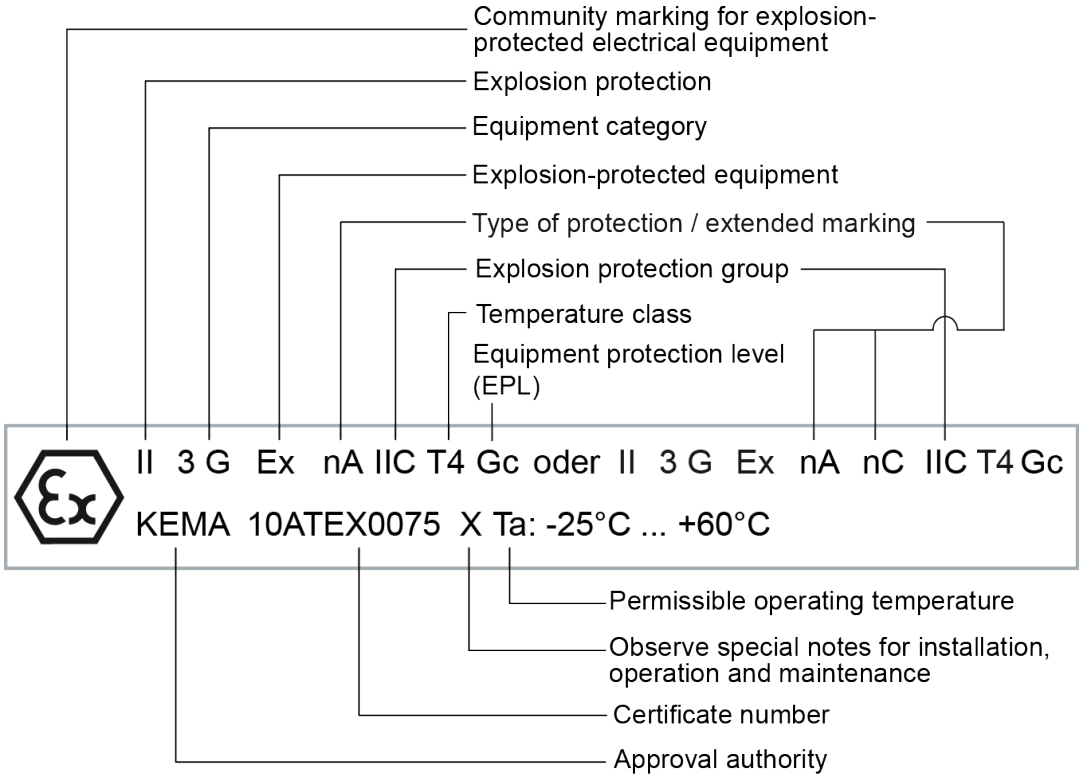


Fig. 1: Marking of equipment

## 3.3 Classification of electrical equipment into protection groups

The usability of electrical equipment in potentially explosive atmospheres is classified into three groups:

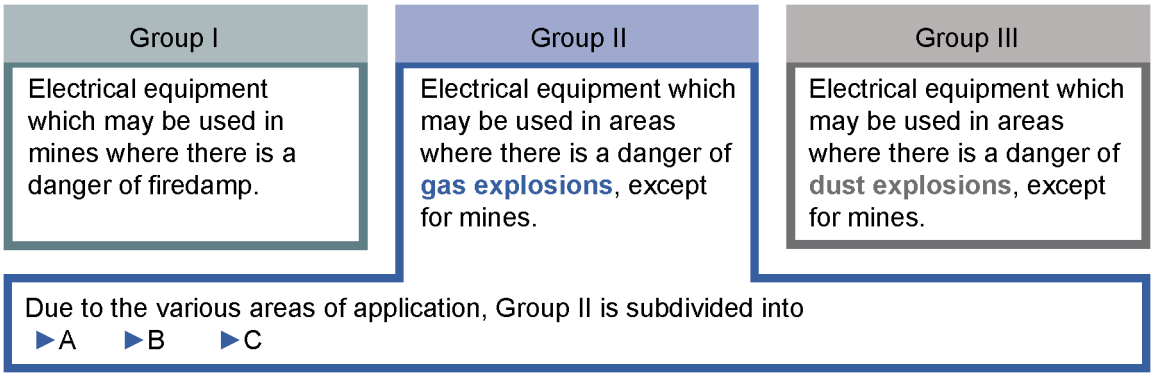


Fig. 2: Explosion protection groups

The gases are divided into the subgroups A, B and C according to their flammability. The classification is based on the minimum ignition current ratio (MIC), a characteristic value for determining the flammability of the gas in comparison with methane. Substances from the IIC group have the highest flammability and can therefore be ignited by a lower energy input than substances from the other subgroups.

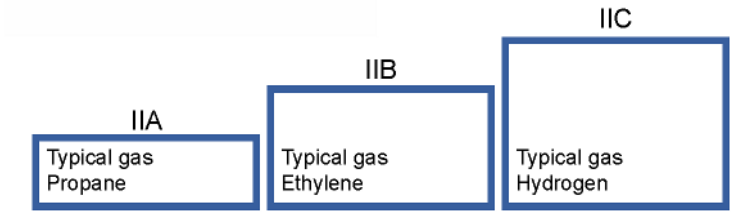


Fig. 3: Subdivision of Group II

Equipment from higher groups is suitable for use in lower groups.

Group IIC contains the most highly flammable gases.

## 3.4 Classification of surrounding atmosphere into zones

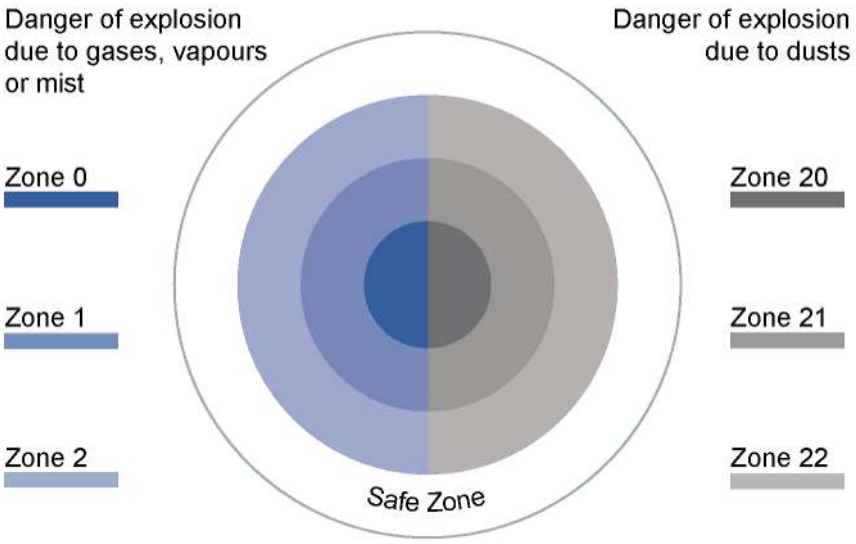


Fig. 4: Classification of surrounding atmosphere into zones

Areas where explosive mixtures can form are called areas subject to an explosion hazard. In principle, a distinction is made between areas subject to a gas explosion hazard and those subject to a dust explosion hazard. The classification into the individual zones is based on the frequency and duration of the occurrence of an explosive atmosphere; this is greatest, for example, for gas explosions in zone 0. Accordingly, higher requirements apply to equipment used within zone 0 than to equipment for zone 1 or 2.

This classification takes into account the various dangers due to explosive atmospheres according to the probabilities and enables the implementation of explosion protection with regard to the boundary conditions for safety and economy.

**Potentially explosive areas**

| | |
|---|---|
| **Zone 0** | An atmosphere where a mixture of air and flammable substances in the form of gas, vapor or mist is present frequently, continuously or for long periods. |
| **Zone 1** | An atmosphere where a mixture of air and flammable substances in the form of gas, vapor or mist is likely to occur in normal operation occasionally. |
| **Zone 2** | An atmosphere where a mixture of air and flammable substances in the form of gas, vapor or mist is not likely to occur in normal operation but, if it does occur, will persist for only a short period. |
| **Zone 20** | An atmosphere where a cloud of combustible dust in the air is present frequently, continuously or for long periods. |
| **Zone 21** | An atmosphere where a cloud of combustible dust in the air is likely to occur in normal operation occasionally. |
| **Zone 22** | An atmosphere where a cloud of combustible dust in the air is not likely to occur in normal operation but, if it does occur, will persist for only a short period. |

## 3.5 Usability of electrical equipment

Based on the level of probability of ignition and the type of potentially explosive atmosphere, there are different safety requirements for equipment.

To this end, devices are classified into device categories according to the EC Directive 94/9/EC and the ATEX Directive 2014/34/EU. At international level, IEC 60079-0 assigns Equipment Protection Levels (EPL).

On the basis of the device category or Equipment Protection Level (EPL), the usability of a device in a specific atmosphere can be derived unambiguously and in a simple way.

### 3.5.1 Equipment category

Electrical equipment intended for use in potentially explosive atmospheres is classified into different categories depending on the type of ignition protection used and the degree of protection derived from it.

Equipment for use in mines at risk of firedamp is classified into two different categories (M1 and M2). Conversely, equipment for use in areas subject to a gas explosion hazard, or where combustible dusts occur, can be classified into three different categories.

| Protection group | Area | Equipment category | |
|---|---|---|---|
| I | – | **I M1** | Operation in case of explosion risk |
| | – | **I M2** or **I M1** | Shutdown in case of explosion risk |
| II | Zone 0 | **II 1G** | |
| | Zone 1 | **II 2G** or **II 1G** | |
| | Zone 2 | **II 3G** or **II 2G** or **II 1G** | |
| III | Zone 20 | **III 1D** | |
| | Zone 21 | **III 2D** or **III 1D** | |
| | Zone 22 | **III 3D** or **III 2D** or **III 1D** | |

Fig. 5: Equipment category

**Mines at risk of firedamp**

**Category M1**

The devices must be designed and manufactured in such a way that sources of ignition do not take effect even in the event of rare device malfunctions. They must be equipped with explosion protection measures so that

at least one second independent technical protection measure ensures the necessary safety in the event of the failure of a technical protection measure, or

the required level of safety is guaranteed when two independent errors occur.

**Category M2**

The devices must be equipped with protective measures to ensure that ignition sources do not take effect during normal operation, even under difficult conditions and in particular in the case of harsh treatment and changing environmental influences. It must be possible to switch the devices off if an explosive atmosphere occurs.

**Areas subject to a gas explosion or dust explosion hazard**

**Category 1**

The devices must be designed and manufactured in such a way that sources of ignition are avoided even in the event of rare device malfunctions. They must be equipped with explosion protection measures so that

- at least one second independent technical protection measure ensures the necessary safety in the event of the failure of a technical protection measure, or
- the required level of safety is guaranteed when two independent errors occur.

**Category 2**

The devices must be designed and manufactured in such a way that the necessary level of safety can be guaranteed, even in the event of frequently occurring device malfunctions or faulty operating conditions that are usually to be expected.

**Category 3**

Devices of this category ensure the required level of safety during normal operation.

## 3.5.2 Equipment Protection Level (EPL)

Based on the level of probability of ignition and the type of potentially explosive atmosphere, there are different safety requirements for equipment. The Equipment Protection Level (EPL) describes the device-specific level of protection and allows easy determination of the usability in an explosive atmosphere.

**EPL Ma**

Device with a "very high" level of protection for installation in mines at risk of firedamp, which ensures the necessary level of safety so that there is no risk of ignition during normal operation or in the case of foreseeable or rare errors/ malfunctions, even if the device is still in operation during an escape of gas.

**EPL Mb**

Device with a "high" level of protection for installation in mines at risk of firedamp, which ensures the necessary level of safety so that, during normal operation or in the case of foreseeable errors/ malfunctions, there is no risk of ignition in the time between the escape of gas and the device being switched off.

**EPL Ga**

Device with a "very high" level of protection for use in areas subject to an explosion hazard where there is no risk of ignition during normal operation or in the case of foreseeable or rare errors/malfunctions.

**EPL Gb**

Device with a "high" level of protection for use in areas subject to an explosion hazard where there is no risk of ignition during normal operation or in the case of foreseeable errors/malfunctions.

**EPL Gc**

Device with an "extended" level of protection for use in areas subject to an explosion hazard where there is no risk of ignition during normal operation and which features some additional protective measures to ensure that there is no risk of ignition in the event of normally foreseeable device faults (e.g. a defective lamp).

**EPL Da**

Device with a "very high" level of protection for use in combustible dust atmospheres where there is no risk of ignition during normal operation or in the case of foreseeable or rare errors/malfunctions.

**EPL Db**

Device with a "high" level of protection for use in combustible dust atmospheres where there is no risk of ignition during normal operation or in the case of foreseeable errors/malfunctions.

**EPL Dc**

Device with an "extended" level of protection for use in combustible dust atmospheres where there is no risk of ignition during normal operation and which features some additional protective measures to ensure that there is no risk of ignition in the event of normally foreseeable device faults.

**Assignment of the EPL to device categories and zones (source: EN 60079-0:2012)**

| EN 60079-0 | | Directive 2014/34/EU (ATEX) | | EN 60079-10-X |
|---|---|---|---|---|
| EPL | Group | Device group | Equipment category | Zone |
| Ma | I | I | M1 | NA |
| Mb | | | M2 | |
| Ga | II | II | 1G | 0 |
| Gb | | | 2G | 1 |
| Gc | | | 3G | 2 |
| Da | III | | 1D | 20 |
| Db | | | 2D | 21 |
| Dc | | | 3D | 22 |

## 3.5.3 Types of protection for electrical equipment

As part of the secondary explosion protection, there are various types of ignition protection that prevent the development of a source of ignition or prevent a potential source of ignition from coming into contact with the explosive atmosphere. Sources of ignition can occur in various ways, e.g. in the form of electrical/mechanical sparks or the input of heat by hot surfaces. A suitable type of ignition protection is selected depending on the type of equipment and the potential source of ignition.

The types of ignition protection relevant for Beckhoff fieldbus components are briefly explained below.

**Ex nA - non-sparking electrical equipment**

The Ex nA ignition protection type is taken to mean equipment that does not release sparks as sources of ignition during normal operation. This type of protection is permissible only for zone 2.

**Ex nC – sparking equipment with protected contacts**

Sparking equipment in which the contacts are protected in a suitable manner belong to the Ex nC ignition protection type. This type of protection is permissible only for zone 2.

**Ex e – increased safety**

In the case of the Ex e ignition protection type, measures are taken to prevent - with an increased degree of safety - the occurrence of impermissibly high temperatures or sparks on internal and external parts of electrical equipment in which they do not occur during normal operation.

**Ex t – protection by housing**

The Ex t ignition protection type, which is approved only for areas subject to dust explosion hazards, prevents the source of ignition inside the equipment from coming into contact with the surrounding atmosphere by means of a housing construction.

**Ex i - intrinsic safety**

By limiting the electrical current and voltage, the Ex i ignition protection type prevents a spark or thermal effect that can cause the ignition of the surrounding atmosphere. The intrinsic safety must be maintained even when defined errors occur.

At Beckhoff, the intrinsic safety ignition protection type is used only for the ELX terminals. All functional and safety information on the ELX terminals can be found in the product-specific documents.

Some ignition protection types allow certification for the use of equipment in different zones. To be more precise, the designation of the ignition protection type is specified in this case by the letters a, b or c for zones 0/20, 1/21 and 2/22 respectively. Example: Ex ia - intrinsically safe ignition protection type for zone 0/20.

## 3.5.4 Temperature class

The temperature class is also relevant to the determination of usability. The temperature of a heated surface is decisive for classification into the appropriate temperature class. The rule is that the next higher temperature class includes all lower classes.

Surface temperatures | gas explosion protection

| Temperature class | Ignition temperature [°C] | Max. surface temperature [°C] |
|---|---|---|
| T1 | > 450 | 450 |
| T2 | > 300 to ≤ 450 | 300 |
| T3 | > 200 to ≤ 300 | 200 |
| T4 | > 135 to ≤ 200 | 135 |
| T5 | > 100 to ≤ 135 | 100 |
| T6 | > 85 to ≤ 100 | 85 |

Fig. 6: Temperature classes

## 3.6 Intrinsically safe electrical circuits in zones 0/20 and 1/21

Various types of ignition protection are available for the acquisition of measured data in areas subject to an explosion hazard (see chapter Types of protection for electrical equipment [▶ 19]). Intrinsic safety (Ex i) is a widely used type of ignition protection for data acquisition up to zone 0/20, as it has various advantages. For example, complex housing constructions are eliminated and maintenance work is possible during operation.

In principle, there are two different options for connecting intrinsically safe sensors and actuators to control or measuring systems. If the higher-level system does not have any intrinsically safe interfaces, the intrinsically safe field device must be connected via a safety barrier that isolates the intrinsically safe and non-intrinsically safe circuits from each other.

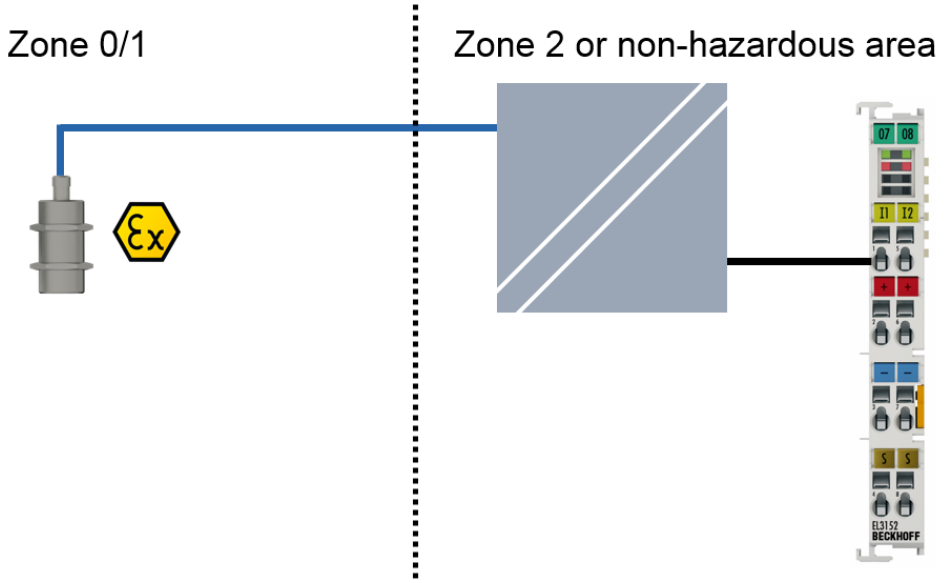


Fig. 7: With barrier

If the control system has intrinsically safe interfaces, no intermediate safety barrier is necessary and can therefore be omitted. Instead, the intrinsically safe field devices can be connected directly to the higher-level system. Compared to the use of safety barriers, applications implemented in this way offer advantages in terms of space requirements, wiring work and diagnostics.

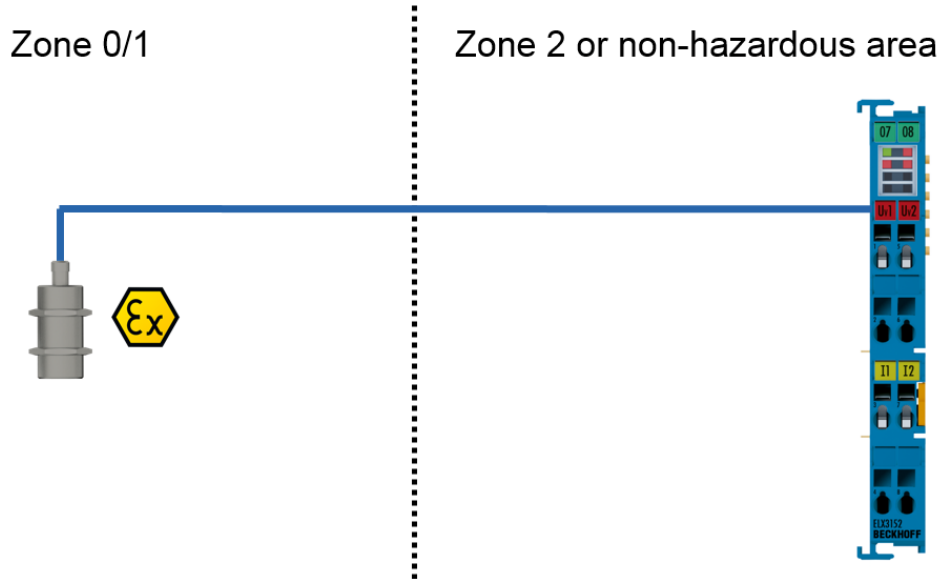


Fig. 8: Without barrier

# 4 Appendix

## 4.1 Support and Service

Beckhoff and their partners around the world offer comprehensive support and service, making available fast and competent assistance with all questions related to Beckhoff products and system solutions.

### Beckhoff's branch offices and representatives

Please contact your Beckhoff branch office or representative for local support and service on Beckhoff products!

The addresses of Beckhoff's branch offices and representatives round the world can be found on her internet pages: https://www.beckhoff.com

You will also find further documentation for Beckhoff components there.

### Beckhoff Support

Support offers you comprehensive technical assistance, helping you not only with the application of individual Beckhoff products, but also with other, wide-ranging services:

- support
- design, programming and commissioning of complex automation systems
- and extensive training program for Beckhoff system components

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|---|---|
| Hotline: | +49 5246 963 157 |
| Fax: | +49 5246 963 9157 |
| e-mail: | support@beckhoff.com |

### Beckhoff Service

The Beckhoff Service Center supports you in all matters of after-sales service:

- on-site service
- repair service
- spare parts service
- hotline service

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| Hotline: | +49 5246 963 460 |
| Fax: | +49 5246 963 479 |
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### Beckhoff Headquarters

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