



ATEX

# Safety Switches



More than safety.



**EUCHNER**



## ATEX products from EUCHNER

### The ATEX directive

Since 1 July 2003 all equipment in the EU that is used in a potentially explosive atmosphere must comply with directive 94/9/EC.

This directive is also known as ATEX100a Equipment for use in potentially explosive atmospheres – ATEX for short.

As a result of harmonization, this directive replaces all former national regulations. Accordingly, the same, consistent rules for explosion protection apply in all EU states.

### Prerequisites for an explosion

The following prerequisites are needed for an explosion to occur:

- ▶ A potentially explosive mixture of
  - Flammable material (gas, vapor, mist or dust)
  - Oxidizing agent (oxygen)
- ▶ A source of ignition (sparks, hot surfaces, etc.)

### Prevention of explosions

The most effective way of preventing an explosion is to prevent the formation of a potentially explosive atmosphere. This type of explosion protection is called **primary explosion protection**. However, primary explosion protection is not always possible, for this reason the ignition of the potentially explosive atmosphere must be prevented. This measure is termed **secondary explosion protection**. In practice this form of protection is achieved by using explosion protected equipment. This equipment ensures that no hazard can be produced because of its operation in a potentially explosive atmosphere.

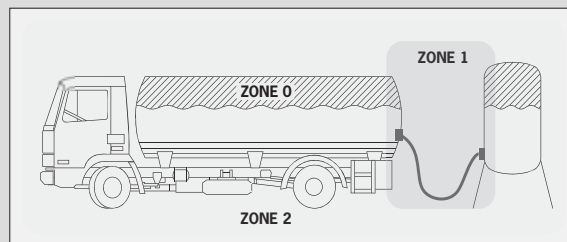
### Material groups

The ATEX directive divides flammable materials into so-called material groups. A differentiation is made between the following material groups:

- ▶ G (gases, vapors and mists)
- ▶ D (dusts)

### Hazardous zones

In accordance with EN 60079-10 the application areas for electrical equipment are divided into hazardous zones. The hazardous zone defines the probability of the occurrence of a potentially explosive atmosphere. A differentiation is made between zones for flammable gases (zone 0, 1 and 2) and flammable dusts (zone 20, 21 and 22). The related zone must be defined by the machine or plant manufacturer. Most ATEX equipment manufactured by EUCHNER is suitable for use in zone 2 and zone 22.



Example zone breakdown for a tank system

### Information on zone 2/22

Applications:

- ▶ Areas in the immediate vicinity around zone 0/20 or 1/21
- ▶ Areas, e.g., around pipes in closed spaces

If cable glands are used on equipment for zone 2/22, the glands must have special ATEX suitability. An appropriate cable gland is included with EUCHNER ATEX products.

Equipment for zone 2/22 does not require a test certificate from a notified body. ATEX equipment is tested by the manufacturer under the manufacturer's responsibility. However, most EUCHNER devices have been tested by TÜV on a voluntary basis.

### Equipment groups

A further division into groups is made depending on the place a piece of equipment is used. The following groups are used:

- Group I:** Equipment for use in underground systems in mining
- Group II:** Equipment for all other areas with potentially explosive atmospheres

ATEX equipment manufactured by EUCHNER belongs to group II.

### Explosion groups

The likelihood of ignition depends on the material. For this reason gases and vapors are divided into explosion groups. The hazard produced by the gases increases from explosion group IIA to IIC. The requirements on the equipment increase correspondingly. Electrical equipment approved for IIC is also allowed to be used for the lower explosion groups (see table in this document).


















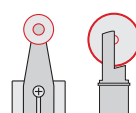
### Categories

The category describes the level of safety achieved by a piece of equipment.

Zone	Category	Potentially explosive atmosphere is present	General figures (not standardized)
Gases Dusts			
0 20	1	continuous, long period or frequent	> 1,000 hours per year
1 21	2	occasional	10 – 1,000 hours per year
2 22	3	rare	< 10 hours per year

# ATEX Overview of safety systems

## Electromechanical safety switches

						
Marking according to						
ATEX	- Application (gases/dusts)	Ex II 3 G D	Ex II 3 G D	Ex II 3 G D	Ex II 3 G D	
	- Equipment characteristics (gases)	Ex nC IIC T5 X	Ex nC IIC T5 X	Ex nC IIC T5 X	Ex nC IIC T4 X	
	- Equipment characteristics (dusts)	Ex tD A22 T90 °C X	Ex tD A22 T90 °C X	Ex tD A22 T90 °C X	Ex tD A22 T110 °C X	
Approvals						
Features/specific advantages	According to EN 50041, with impact resistant cover	Basic housing according to EN 50041, with impact resistant cover	Identical fixing dimensions to safety switches TP, with impact resistant cover	Auxiliary, key auxiliary, emergency or escape release, ideal for profile assembly, with impact resistant cover	Actuating head made of metal, high locking force, with impact resistant cover	
Contact elements	<b>Slow-action switching elements</b>					
	Positively driven contacts 	1 2 2 3 4	1 2 2 3 4	1 2 2 3 4	1 1 2 2 2 4	1 1 2 2 2 4
	NO contacts	1 - 2 1 -	1 - 2 1 -	1 - 2 1 -	1 - - 2 1 -	1 - - 2 1 -
	NC contacts	- - - -	- - - -	- - - -	- 1 - - 1 -	- 1 - - 1 -
	<b>Snap-action switching elements</b>					
	Positively driven contacts 	1	1	-	-	-
	NO contacts	1	1	-	-	-
	Conventional thermal current	4 A	4 A	4 A	4 A	4 A
Switching current min. (at 24 V)	1 mA	1 mA	1 mA	1 mA	1 mA	
Mechanical life, min.	30 x 10 <sup>6</sup>	2 x 10 <sup>6</sup>	2 x 10 <sup>6</sup>	1 x 10 <sup>6</sup>	1 x 10 <sup>6</sup>	
Environment	Housing material	Anodized die-cast alloy	Anodized die-cast alloy	Reinforced thermoplastic	Reinforced thermoplastic	Reinforced thermoplastic
	Housing dimensions min. (HxWxD)	97 x 44 x 43.5 mm	115 x 44 x 43.5 mm	125 x 43 x 46 mm	192 x 43 x 46 mm	190 x 43 x 46 mm
	Ambient temperature	-20 to +80 °C	-20 to +80 °C	-20 to +80 °C	-20 to +55 °C	-20 to +55 °C
	Degree of protection, max. acc. to IEC 60529	IP 67	IP 67	IP 67	IP 67	IP 67
	Approach/actuating directions	Depending on actuator 				
	Approach speed, max.	50 m/min.	20 m/min.	20 m/min.	20 m/min.	20 m/min.
Guard locking	Solenoid operating voltage	-	-	-	24 V	24 V
	Power consumption	-	-	-	8 W	8 W
	Locking force, locked	-	-	-	1300 N	2500 N
Connection	Cable entry (1 cable gland ATEX included)	M 20 x 1.5	M 20 x 1.5	3 x M 20 x 1.5	3 x M 20 x 1.5	3 x M 20 x 1.5
	Accessories		● / -	● / ●	● / ●	- / ●
	Hinged actuator	●	●	●	-	
	Door radius, min.	165 mm	90 mm	90 mm	300 mm	
	Bolt for safety guards	●	●	●	●	

Detailed information in catalog

Safety Switches  
with Metal Housing

Safety Switches  
with Plastic Housing

● Available as an option   ○ Available on request   - Not applicable  
All data given refer to the respective minimum and/or maximum values for the entire series.

1) Approval pending

# Marking of equipment

All equipment used in potentially explosive atmospheres must carry appropriate markings:

## Marking according to application

Marking according to ATEX



**Directive**  
Corresponds to 94/9/EC



**Equipment group**  
I: Mining  
II: All applications except mining



**Related electrical equipment**  
Equipment to which components for the stated application are connected.



**Material group**

	Category 1 Very high level of protection		Category 2 High level of protection		Category 3 Normal level of protection	
Atmosphere G: Gases, D: Dusts	G	D	G	D	G	D
Use in	Zone 0	Zone 20	Zone 1	Zone 21	Zone 2	Zone 22

Overview of the

## Explosion groups and temperature classes

	T1	T2	T3	T4
<b>I</b>	Methane			
<b>II A</b>	Acetone	Ethyl alcohol	Petrol	Acetaldehyde
	Ethane	i-Amyl acetate	Diesel	Ethyl ether
	Ethyl acetate	n-butan	Aircraft fuel	
	Ammonia	n-butyl alcohol	Heating oils	
	Benzol (pure)		n-hexane	
	Acetic acid			
	Carbon monoxide			
	Methane			
	Methanol			
	Propane			
Toluol				
<b>II B</b>	Town gas	Ethylene		
	Coal gas			
<b>II C</b>	Hydrogen	Acetylene		

More than safety.





## Marking according to equipment characteristics

Marking according to standard

### Gases

Marking for use in atmosphere with flammable gases (zone 0,1,2) according to EN 60079

[ **Ex**   **nC**   **IIA** ]   **T4**   **X**

**Explosion protected equipment**

**Related electrical equipment**  
Equipment to which components for the stated application are connected.

**Type of protection:**

i: Intrinsic safety  
q: Powder filling  
m: Encapsulation  
o: Oil immersion  
e: Increased safety  
d: Flameproof enclosure  
p: Pressurization  
n: Type n  
nA: Non-sparking equipment  
nC: Sparking equipment  
nR: Restricted breathing enclosure  
nL: Energy limited circuit

**Equipment groups**

I: Mining  
II: All applications except mining  
(Sub-groups: IIA, IIB, IIC)

**Temperature class:**

Permissible surface temperature  
**Maximum surface temperature**

$T = T_a + T_i$   
T: Maximum surface temperature  
 $T_a$ : Max. ambient temperature  
 $T_i$ : Self-heating of the equipment

**X:** Compliance with special conditions required (e.g. correct tightening of the cover screws)

### Dusts

Marking for use in atmospheres with flammable dusts (zone 20, 21, 22) according to EN 61241-0

[ **Ex**   **tD**   **A22** ]   **T90°C**   **X**

**Explosion-protected equipment**

**Related electrical equipment**  
Equipment to which components for the stated application are connected.

**Type of protection:**

pD: Pressurization  
tD: Protection by enclosure  
iD: Intrinsic safety  
mD: Encapsulation

**Test method**

A or B

**Use in zone:**

20  
21  
22

**Maximum surface temperature**

$T = T_a + T_i$   
T: Maximum surface temperature  
 $T_a$ : Max. ambient temperature  
 $T_i$ : Self-heating of the equipment

**X:** Compliance with special conditions required (e.g. correct tightening of the cover screws)



**EUCHNER**

# ATEX Overview of safety systems

## Non-contact safety switches



Safety Switch  
CES-A-C5...EX



Evaluation unit  
CES-AA...EX



Read head/actuator  
for evaluation unit  
CES-A-A...EX



Read head  
CEM-A-LE05K-S2-EX  
Actuator  
CEM-A-BE05-EX

Marking according to

- Application (gases/dusts)
- Equipment characteristics (gases)
- Equipment characteristics (dusts)

Ex II 3 G D

Ex nA IIC T5

Ex tD A22 T90 °C



Ex II (3) G

[Ex nL] IIC



Ex II 3 G

Ex nL IIC T70 °C



Ex II 3 G

Ex nA IIC T6



Approvals

Features/specific advantages

Actuator with unique code,  
integrated evaluation unit

Actuator with unique code,  
separate evaluation unit

Actuator with unique code,  
separate evaluation unit

Actuator with unique code,  
separate evaluation unit

Read heads

1

1

-

-

Relay safety outputs

-

2

-

-

Semiconductor safety outputs

2

-

-

-

Monitoring outputs (semiconductor)

1

2

-

-

Monitoring/feedback loop connection

-

-

-

-

Monitoring/start button connection

-

-

-

-

Switching current per safety output

400 mA

6 A (evaluation unit)

-

-

Mechanical life, min.

-

10 x 10<sup>6</sup> (evaluation unit)

-

-

### Evaluation unit

Integrated evaluation unit/read head

Mounting

Decentralized

DIN rail

-

-

Dimensions min. (HxWxD)

117 x 40 x 40 mm

114 x 99 x 22,5 mm

-

-

Ambient temperature

-20 to +55 °C

-20 to +55 °C

-

-

Degree of protection, max. acc. to IEC 60529

IP 67

IP 20

-

-

LED indicator

2

3

-

-

### Read head/actuator

Actuator

Ambient temperature

-25 to +70 °C

-

-25 to +50 °C

-25 to +70 °C

Degree of protection, max. acc. to IEC 60529

IP 67/IP69K

-

IP 67/IP 69 K

IP 67

Operating distance, max.

20 mm

-

16 mm

2 mm

Approach directions



-



Solenoid operating voltage

-

-

-

24 V

Power consumption, max.

-

-

-

2.5 W

Locking force, max.

-

-

-

500 N

Evaluation unit

Plug connector M12

Plug-in terminals

-

-

Read head cable/plug connector

-

-

M8

M8

Actuator rectangular/cylindrical

● / -

-

● / ●

-

Bolt for safety guards

●

-

●

●

Detailed information in catalog

Non-Contact Safety Switches  
CES/CEM

● Available as an option ○ Available on request – Not applicable

1) Approval pending

All data given refer to the respective minimum and/or maximum values for the entire series.

Subject to technical modifications; no responsibility is accepted for the accuracy of this information.



### Category 1

Equipment in this category is intended for use in areas in which a potentially explosive atmosphere comprising gases or dusts is present continuously, for long periods or frequently.

Requirements on the equipment

- ▶ Very high level of safety, the equipment remains protected against providing a source of ignition even in case of malfunctions to be expected only rarely
- ▶ The equipment also remains safe if two independent failures occur
- ▶ Safety is achieved using two independent means of protection against providing a source of ignition

### Category 2

Equipment in this category is intended for use in areas in which it is to be expected that a potentially explosive atmosphere comprising gases or dusts may occur occasionally.

Requirements on the equipment

- ▶ A high level of safety, the equipment remains protected against providing a source of ignition even in the case of malfunctions or fault conditions to be expected frequently
- ▶ Safety is achieved using one means of protection against providing a source of ignition

### Category 3

Equipment in this category is intended for use in areas in which it is not to be expected that a potentially explosive atmosphere may occur due to gases or dusts. If a potentially explosive atmosphere nevertheless occurs, then in all probability it will only occur rarely and for a short period.

Requirements on the equipment

- ▶ Equipment with a normal level of safety
- ▶ The equipments remains protected against providing a source of ignition in normal operation

ATEX equipment manufactured by EUCHNER is category 3 equipment.

### Type of protection

Electrical explosion-protected equipment can be designed using various types of protection according to the standard EN60079-0 and EN61241-0. The type of protection used on a piece of equipment by the manufacturer essentially depends on the nature and function of the piece of equipment. There exist the following types of protection:

	Type of protection	Marking	Corresponding standard	
EN60079 Gases	Flameproof enclosure	Ex d	EN 60079-1	
	Increased safety	Ex e	EN 60079-7	
	Intrinsic safety	Ex i	EN 60079-11	
	Encapsulation	Ex m	EN 60079-18	
	Type n protection	Ex n	EN 60079-15	
	Oil immersion	Ex o	EN 60079-6	
	Pressurization	Ex p	EN 60079-2	
	Powder filling	Ex q	EN 60079-5	
	EN61241 Dusts	Protection by enclosure	Ex tD	EN 61241-1
		Pressurization	Ex pD	EN 61241-4
Intrinsic safety		Ex iD	EN 61241-11	
Encapsulation		Ex mD	EN 61241-18	

ATEX equipment manufactured by EUCHNER has type of protection **n** or **tD**. This means that the equipment is protected against providing a source of ignition for a surrounding potentially explosive atmosphere. This protection can be achieved using various technical principles. The principle used on a piece of equipment can be determined from the marking. The following overview lists these principles:

#### A Non-sparking equipment

Ex nA

- ▶ Because of the design it is ensured the production of sparks and arcs is reliably prevented

#### C Sparking equipment with appropriate protection

Ex nC

(Hermetically sealed device / enclosed switching device)

- ▶ The equipment contains contacts that open and close a circuit that could provide a source of ignition

#### R Restricted breathing enclosure

Ex nR

#### L Energy limited equipment

Ex nL

### Temperature classes

The temperature class is directly related to the ignition temperature (temperature from which a potentially explosive mixture will ignite) and defines the maximum surface temperature allowed on a piece of equipment. The maximum surface temperature must always be less than the ignition temperature of the atmosphere in which it is used.

On equipment intended for use in zone 0, 1, 2 (gases), the related temperature class must be given in the equipment marking.

On equipment intended for use in zone 20, 21, 22 (dusts), the maximum surface temperature must be given in the equipment marking.

Temperature classes	Ignition temperature range of the mixtures	Maximum surface temperature on the electrical equipment
T1	> 450 °C	450 °C
T2	> 300 °C	300 °C
T3	> 200 °C	200 °C
T4	> 135 °C	135 °C
T5	> 100 °C	100 °C
T6	> 85 °C	85 °C



# ATEX products

Item	Order no.	Locking method	Monitoring solenoid position <sup>1)</sup>	Monitoring door position <sup>1)</sup>	Suitable for zone G=gases/D=dusts	Temperature class/ max. surface temperature
<b>Mechanical safety switches</b>						
NZ1HS-3131-M-EX	094167	---	---	2PD + 2NO	2G and 22D	T5/90 °C
NZ1RS-3131-M-EX	094169	---	---	2PD + 2NO	2G and 22D	T5/90 °C
NZ1VZ-2131E-M-EX	093660	---	---	3PD + 1NO	2G and 22D	T5/90 °C
GP1-2131A-M-EX	095702	---	---	3PD + 1NO	2G and 22D	T5/90 °C
TP3-2131A024M-EX	093791	Mechanical	2PD + 1NO	1NC	2G and 22D	T4/110 °C
TP4-2131A024M-EX	093793	Electrical	2PD + 1NO	1NC	2G and 22D	T4/110 °C
TP3-4121K024M-EX	094152	Mechanical	2PD + 1NC	1NO	2G and 22D	T4/110 °C
STP3A-2131A024M-EX	093794	Mechanical	2PD + 1NO	1NC	2G and 22D	T4/110 °C
STP3A-4121A024M-EX	097626	Mechanical	2PD + 1NC	1NO	2G and 22D	T4/110 °C
STP4A-2131A024M-EX	093795	Electrical	2PD + 1NO	1NC	2G and 22D	T4/110 °C
<b>Non-contact safety switches</b>						
Evaluation units						
CES-A-C5H-01-EX	097945	---	---	2S	2G and 22D	T5/90 °C
CES-A-ABA-01B-EX	098682	---	---	2S	2G	
Read heads						
CES-A-LNA-SC-EX	098156				2G	70 °C
CES-A-LMN-SC-EX	098157				2G	70 °C
CEM-A-LE05K-S2-EX	097174	Electrical	---		2G	T6
Actuators						
CES-A-BBA-EX	098158				2G and 22D	70 °C
CES-A-BMB-EX	098159				2G	70 °C
CES-A-BPA-EX	102125				2G and 22D	70 °C
CEM-A-BE05-EX	097178	---	---		2G	T6

1) PD: positively driven contact, NC: normally closed contact, NO: normally open contact

Further information is available from [www.euchner.com](http://www.euchner.com)

AUDIN - 8, avenue de la malle - 51370 Saint Brice Courcelles  
 Tel : 03.26.04.20.21 - Fax : 03.26.04.28.20 - Web : <http://www.audin.fr> - Email : [info@audin.fr](mailto:info@audin.fr)

More than safety.



EUCHNER GmbH + Co. KG  
 Kohlhammerstraße 16  
 70771 Leinfelden-Echterdingen  
 Germany

Tel. +49-(0)711-7597-0  
 Fax +49-(0)711-753316  
[info@euchner.de](mailto:info@euchner.de)  
[www.euchner.com](http://www.euchner.com)

**EUCHNER**