

Extreme

中文/english



// 应用在极端条件下的控制开关 /
SWITCH CONTROL UNDER EXTREME CONDITIONS

产品概述 / Product overview



// 要求极其严格且至关重要应用的安全开关 / SAFE SWITCHGEAR FOR DEMANDING AND CRITICAL APPLICATIONS



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»要求极其严格且至关重要应用的安全开关«。如言所示，50多年来，世德源源不断为客户提供新型的、实用且持久耐用的开关应用方案。

客户的成功就是我们的成功。在过去的几十年，我们公司持续稳定地增长，只因我们专注致力于客户。世德不断的成长一与客户的密切合作分不开。

世德坐落于威斯特伐利亚以东，是一个机械制造和生产电气产品的主要地区。该地区被资深专家一致推崇为研发、生产创新型产品的故乡。同时该地区也是各知名大学、研究院以及教育机构的所在地，且我们与这些相关机构保持着良好的关系。

市场无国界。这就是为什么我们开发和测试的极端环境产品可以在世界范围内应用的原因。我们确保我们的产品始终依据最新的国际标准认证。在世界上任何一个工业国家或新兴国家，世德是位确保为其提供强有力的技术支持和快速服务的资深专家。

作为一个中型企业，我们对客户的需求和市场趋势作出快速反应。我们不断研发创新产品和使用新型技术，坚持不懈地开拓产品应用的新领域。

目前世德致力于四个不同的业务领域，生产应用于工业领域和医疗设备的开关、传感器和控制器：

无线

无线开关和传感器，应用于机器制造厂和加工厂。这些工业强度装配的无线开关通过可靠的无线电传输与更高层次的控制系统对接通信。

»能量采集« 在这些产品中起主要作用。

自动化

标准的和客户定制的开关，用于机器制造厂和加工厂。久经考验的机电式和非接触式技术是工业自动化和加工控制的传统应用——直着眼于全球最新需求。

极端

开关和传感器，应用于极端环境或极其恶劣的条件下。认证产品适用于全球范围的危险区域（例如：ATEX 认证、IECEx 认证 和 EAC 认证）。

医疗

标准的和客户定制的脚踏开关和手控开关，广泛应用于医疗设备，符合最高人体工程学和高可靠性的需求。医疗产品的生产均依据 EN ISO 13485 质量管理体系认证的标准。

以下信息阐述标准系列的开关在复杂和极端条件下的应用。我们很乐意为您提供任何您需要的详尽信息。如果您找不到适合您的应用方案，请联系我们。我们帮助了无数的客户研发、定制他们各自所需求的产品。

Marc Stanesby

总经理

steute Schaltgeräte GmbH & Co. KG

Wireless



Automation



Extreme



Meditec



»Safe switchgear for demanding and critical applications«. True to this motto, steute has been providing its customers with innovative, practical and durable switchgear solutions – for over 50 years.

When our customers are successful, so are we. Because we always focus on our customers, our company has grown steadily and sustainably over the last decades. Steute is committed to continuing this growth – in close cooperation with our customers.

We are situated in East Westphalia, a key region for machine building and electrical goods manufacturing. It is home to qualified specialists committed to developing and manufacturing innovative products. It is also the location of renowned universities, research and educational institutions to which we maintain healthy contacts.

Markets are no longer restricted by national borders. This is why our products are developed and tested for extreme conditions all over the world. We take care to ensure that our products are always certified according to the latest international standards. In every industrial or emerging nation in the world, steute has access to qualified specialists who can guarantee competent support and a quick service.

As a medium-sized company we are able to react with speed to customer wishes and market trends. We are continually developing innovative products and using new technologies as we consistently open up new fields of application for our switchgear.

steute is currently active in four different business fields, producing switchgear, sensors and control units for use in industry and in medical equipment:

Wireless

Cable free switchgear and sensors for use in machinery and process plants. These industrial-strength wireless switches communicate with higher level control systems via reliable radio transmission. »Energy harvesting« can play a major role in these products.

Automation

Standard and customised switchgear for machinery and process plants. Tried and tested electromechanical and non-contact technologies for classical applications in industrial automation and process control – always with a view to the latest global requirements.

Extreme

Switchgear and sensors for use in extreme environments or under extreme conditions. Certified products for use in hazardous areas worldwide (e. g. ATEX, IECEx, EAC).

Meditec

A comprehensive range of standard and customised foot and hand controls for medical devices, meeting the highest ergonomic and availability requirements. Produced in accordance with the certified EN ISO 13485 quality management system for medical products.

The following information provides an overview of our standard range of switchgear for complex and demanding applications. We will be happy to provide you with any additional information you require. If you cannot find the solution for your application: just get in touch. We have already helped numerous customers by developing »tailor-made« switchgear for their individual needs.

Marc Stanesby
Managing Director
steute Schaltgeräte GmbH & Co. KG

// STEUTE EXTREME – 应用在极端条件下的安全开关 / STEUTE EXTREME –
SAFE SWITCHGEAR FOR EXTREME AMBIENT CONDITIONS





由世德公司制造的开关设备可以达到最高标准, 质量优越, 耐用性强。因为我们一直与客户保持紧密合作, 灵活地满足客户要求。我们常常处理特殊的要求。

许多这样的请求可以总结为短语 »极端«。我们的客户正在寻找这样的开关设备:

- 用在极端高温环境中
- 承受高压清洁
- 满足国际气体和粉尘爆炸危险环境的使用需求
- 在冷库的低温环境中工作稳定
- 可以安装在海上平台和潜艇上
- 应用在有严重振动的机器上没有任何问题。

开发人员的专业性和模拟极端环境中的综合测试使世德开关已经可以满足以上及更多要求。

新的业务领域

因为应用在极端环境中开关的研发和生产世德一直在全世界享有盛誉。这一开关系列现在已经纳入了新的业务领域»极端«。本产品概述描述了这个系列的开关, 以及其如何满足在极端条件下的应用要求。

测试环境 – 热, 冷, 湿, 盐

如果世德开关设备在极端环境中表现出色, 以顾客为导向的开发和精心制造是两个重要的先决条件。第三个条件是原型测试和可再生情况下的串行设备。大多数测试是在世德自己的实验室进行的。如果需要非常特殊的测试条件, 世德与认证测试实验室合作, 如菲尼克斯测试实验室。

Switching devices made by steute are manufactured to the highest standards and are outstanding for their top quality and durability. Since we collaborate closely with our customers and are very flexible in meeting their requirements, we are often approached with extraordinary requests.

Many of these requests can be summed up by the phrase »extreme«. Our customers are looking for switchgear, for example:

- to be applied at extremely high temperatures
- to withstand high-pressure cleaner
- to meet the international gas and dust explosion hazard requirements
- to work reliably at low temperatures in cold storage
- to be installed on offshore platforms and in submarines
- to be applied in heavily vibrating machines without any problems.

All of these requirements and more have already been met by steute, made possible not only by the expertise of our developers, but also by comprehensive testing simulating extreme conditions.

A New Business Field is Introduced

Following a good reputation worldwide for the development and manufacture of switchgear for extreme environmental conditions, the relevant steute range has now been incorporated into the new business field »Extreme«. This product overview shows the switchgear in the new portfolio, as well as the requirements they meet under extreme application conditions.

Hot, Cold, Wet, Salty – Testing Equipment at steute

Competent, customer-oriented development and careful manufacturing are two important preconditions, if the switching devices made by steute are to do a good job in extreme environments. A third precondition is the testing of prototypes and serial devices under reproducible circumstances. Most of these tests are carried out at steute in our own laboratory. In cases requiring very special test conditions, steute cooperates with accredited testing laboratories, such as Phoenix TestLab.

// 世德这样测试 - 热, 冷, 湿, 盐 / HOT, COLD, WET, SALTY - THIS IS HOW STEUTE TESTS



防护等级 IP 68

防护等级 IP 68 要求开关可以抵抗水长期的浸泡。为证明这点, 需要将开关放在水盆中进行一个长期的渗透测试。满足这些条件的世德开关都配置了特制的橡胶垫圈以及电缆密封接口-例如GFSI系列的脚踏开关。

低温

世德的人工气候实验室可以进行最低低至-60摄氏度的低温测试。世德的开关可以工作在低至-40 °C的环境中, 例如磁传感器RC M20系列, 可以使用在低温的仓库中, 在暴露于寒冷区域的室外空气中使用也表现良好(如, 用于输送系统)。

高温

世德开关设备需要接受最高达200摄氏度的高温测试。这个温度不仅是过程工程部门的要求, 而且在钢铁工业和玻璃制造行业都要达标才能满足要求。高温常常伴随着潮湿, 所以适用于热带气候标准是开关必不可少的。

世德也提供了大量的达到IP69K标准的开关产品, 包括脚踏开关、拉线开关和安全传感器等, 例如BZ16, RC Si M30和RC Si 56都满足此标准要求。以上产品均可以应用于EN ISO 13849-1 标准的e系列或者 EN 62061 标准的 SILCL 3细则。

急停开关的锁定、复位和碰撞测试

依据EN60947-5-5第7.7章规定的标准, 锁定、复位和碰撞测试是急停开关必须进行的。在锁定测试中, 急停开关被一个预先定义好力量的摆锤冲击。此测试进行三次, 每次冲击后驱动系统必须能够进行锁定。世德急停开关系列都按此标准进行检测; 这些测试设备其中的任何一个都是我们实验室装备的组成部分。



Degree of protection IP 68

The IP 68 degree of protection requires protection against water penetration during permanent immersion. To prove this, a leakage test is performed involving immersion in a basin. The devices from steute which meet these requirements are equipped with special gaskets and cable outlets – for example the foot-operated controls in series GFSI.

Cold

The climatic chamber in the steute lab enables tests to be performed at temperatures as low as -60 °C. Switching devices suited to low temperatures down to -40 °C, like the magnetic sensor RC M20, are applied in low-temperature warehouses, as well as in the open air in colder climatic zones (e.g. on conveying systems).

Heat

At steute, switching devices are tested at temperatures of up to +200 °C. This is a requirement found not only in parts of the process engineering sector, but also in the steel industry and glass processing. Heat is often connected with humidity. For this reason, the criterion »fit for the tropics« is often requested in connection with switchgear.

steute offers a comprehensive range of switchgear in IP 69K, including foot switches, pull-wire switches and safety sensors, like the BZ 16, RC Si M30 and RC Si 56. They are well suited to applications till PL »e« per EN ISO 13849-1 or SILCL 3 per EN 62061.

Latch-in, Reset and Impact Tests for Emergency-Stop Switches

According to EN 60947-5-5, Chapter 7.7, latch-in, reset and impact tests are essential for emergency-stop switches. During the latch-in test, the emergency stop device is actuated by a swing hammer with a defined power. The test is carried out three times, and after each punch the actuator system must be latched in. The emergency-stop switches in the steute range are checked accordingly; one of these test devices is part of our lab equipment.





// 冲击试验和自锁试验 /
IMPACT AND LATCH-IN TEST





防爆开关的冲击试验

EN 60079-0要求开关设备的机械强度满足在爆炸环境中的使用要求。在26.4.2章将讲述抗冲击性的标准测试。在这个测试中,一个硬化钢样品从一个指定高度落到设备上。

世德所有用于防爆1区和2区(爆炸性气体)以及21区和22区(爆炸性粉尘)的开关都已经通过了这个试验。

盐雾试验

开关的抗盐水腐蚀试验按照IEC / EN 60068-2-52 / GL / (循环盐雾试验)标准进行了验证。根据“德国劳氏船级社”的要求,样品在两个小时四次循环的喷洒后放在温度高达+40° C的环境中七天。针对海上应用开发的开关设备必须通过这些测试,例如ES 95系列限位开关。

抗震

IEC / EN 60068-2-27标准要求开关要在冲击试验中达到要求。每个方向三个轴上有6个推动力(总计36个推动力)。脉冲持续时间、脉冲形式和加速度也是预先确定好的。这些循环通过特别抗震的安全传感器HS Si 4成功完成。

根据IEC/EN 60529 标准达到防护等级IP 66

世德多数标准开关按照IEC / EN 60529标准设计为防护等级为IP 65和IP 67。此外,也有更高的防护等级设计用于抗潮湿和水分。其中一个防护等级是IP 66。从2.5到3.0米的距离,从不同方向对这些开关喷水1分钟100 l。射流直径为12.5毫米并且测试持续时间至少3分钟。

Impact Test for Ex Switchgear

EN 60079-0 indicates the requirements for testing the mechanical strength of switchgear developed for application in potentially explosive atmospheres. In Chapter 26.4.2, a standard test for checking impact resistance is described. In this test, a sample mass of hardened steel falls from a defined height onto the device.

All steute switching devices for application in Ex zones 1 and 2 (gas Ex), as well as 21 and 22 (dust Ex), have passed this test.

Salt Mist Test

The saltwater resistance of switchgear is verified by means of a salt test in accordance with IEC/EN 60068-2-52/GL/(cyclic salt mist test). According to the requirements of »Germanischer Lloyd«, specimens are sprayed in four cycles of two hours each and then stored at a temperature of +40 °C for seven days. Switching devices developed for offshore applications – e. g. position switches in series ES 95 have to pass these tests.

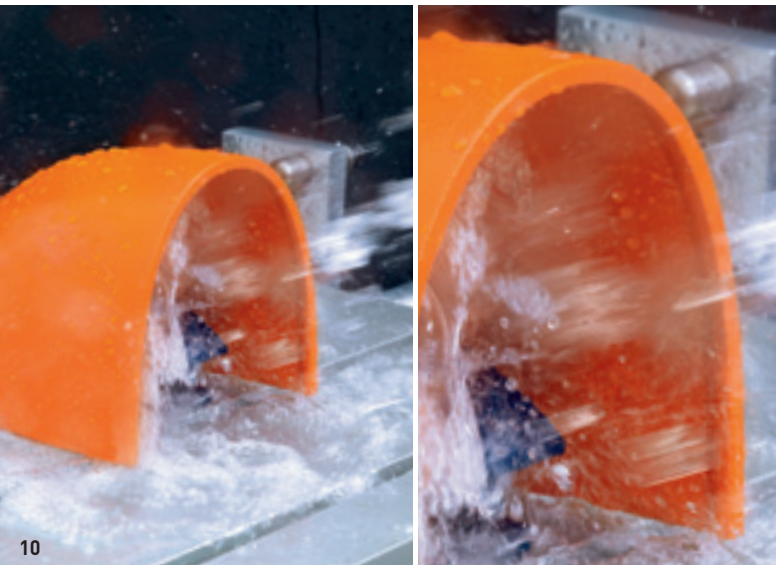
Shock Resistance

The IEC/EN 60068-2-27 stipulate the requirements to be met in a shock test. Six pushes on three axes in each direction (i. e. 36 pushes in total) are performed. Pulse duration, pulse form and top acceleration are also predetermined. These cycles have been successfully completed by the particularly shock-resistant safety sensor HS Si 4.

Degree of protection IP 66 as per IEC/EN 60529

Many of the switching devices in the standard range made by steute are designed according to degree of protection IP 65 and IP 67 as per IEC/EN 60529. In addition, there are designs meeting even higher requirements regarding resistance to dampness and moisture. One of them is in IP 66 degree of protection. From a distance of 2.5 to 3.0 m, the devices are treated with splashing water which hits the switchgear from different directions at 100 l per minute. The jet diameter is 12.5 mm and the test duration is at least 3 minutes.

// 用于全世界的极端环境 / FOR EXTREME CONDITIONS WORLDWIDE



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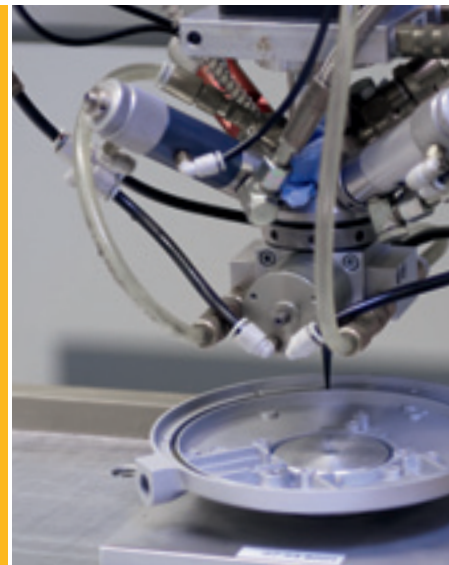
防护等级IP 69K

防护等级 IP 69K 的测试标如下：在100mm的距离，从不同方向以100bar 的水压向开关喷射80℃的热水流。

这个需求源于车辆制造—制造机器通常以这种方式清洗，例如，防护等级 IP 69 k 的开关设备也可以应用在食品行业的卫生区域，如高压水喷射和蒸汽清洁。

经过反复考验的

用于极端环境开关的研发和生产所使用的测试设备已经在测试概述阐述：世德»极端«领域的整套系列开关都是经过全面考验的。而且在全球极端环境的使用案例证明是成功的—在石油钻井平台，食品工业，技术工厂，热，冷，盐水等极端环境中的使用。无论极端环境怎样要求，世德都将会找到合适的测试方法以便在这个新领域开发出高标准，耐用的开关装置—按照客户的要求。



Degree of protection IP 69K

The test criteria for IP 69K degree of protection are as follows: devices are treated with a hot water jet at 80 °C with a hydraulic pressure of 100 bar from a distance of 100 mm and from different directions. It is thus guaranteed that devices can withstand high-pressure washer jets without their function being affected.

This requirement originated from vehicle construction – building machines are often cleaned in this way, for example. Switchgear protected according to IP 69K can also be applied in hygienic areas of the food industry, however, cleaned with high-pressure water jets and steam.

Tried and Tested

This overview of the tests and test equipment used in the development and manufacture of switchgear for extreme applications shows: all series in the steute business field »Extreme« have been thoroughly tried and tested. And they have already proven successful in extreme conditions worldwide – on oil rigs, in the food industry, in technological plants, in heat, cold, saltwater And wherever new extreme requirements arise, steute will find suitable testing methods in order to develop high-standard, durable switchgear in this new area – just as the customer requested.



// TRIED AND TESTED BY STEUTE EXTREME



所选产品极端特性表格 / Selection chart extreme characteristics

// 系列 / Series

// 特性 / Characteristics

	防护等级 Degree of protection			低温 Low temperature		
带有独立操动头的安全开关 / Safety switches with sep. act. - ES 95 AZ	IP 66	IP 67		-20 °C		
安全传感器 / safety sensors - BZ 16 - HS Si 4 - RC Si 56 - RC Si M30	IP 66 IP 66 IP 66 IP 66	IP 67 IP 67 IP 67 IP 67	IP 69K IP 69K IP 69K IP 69K	0 °C -20 °C -20 °C -20 °C	-40 °C -40 °C -40 °C -40 °C	
带/不带安全功能的限位开关 / Position switches with/without Sfct. - E 12 - ES 13 - ES/EM14 - ES/EM 41 - ES 95 - ES/EM 98	IP 66 IP 66 IP 66 IP 66 IP 66 IP 66	IP 67 IP 67 IP 67 IP 67 IP 67 IP 67	IP 69K	-20 °C -20 °C -20 °C -20 °C -20 °C -20 °C	-40 °C -40 °C -40 °C -40 °C -40 °C -40 °C	
脚踏开关 / Foot switches - GF / GFS - GF 2 / GFS 2 - GF 3 / GFS 3 - GFI / GFSI	IP 66 IP 66 IP 66 IP 66	IP 68 IP 68 IP 68 IP 68	IP 69K	-25 °C -25 °C -25 °C -25 °C	-40 °C -40 °C -40 °C -40 °C	
紧急拉线开关 / Emergency pull-wire switches - ZS 71 - ZS 73 - ZS 75 - ZS 80 - ZS 91	IP 65 IP 65 IP 65 IP 66 IP 66	IP 66 IP 66 IP 66 IP 67 IP 67	IP 69K	-25 °C -25 °C -25 °C -20 °C	-40 °C -40 °C -40 °C -40 °C	
跑偏开关 / Belt-alignment switches - ZS 73 SR - ZS 75 SR - ZS 91 SR	IP 66	IP 67 IP 67			-40 °C -40 °C -40 °C	
拉线开关 / Pull-wire switches - ES 41 Z - ES 95 WH/90° - ES 61 WZ	IP 65 IP 66	IP 67 IP 67		-20 °C -20 °C	-40 °C -40 °C -40 °C	
磁传感器 / Magnetic sensors - RC 15 - RC 23 - RC M20 - RC 2580 - RC 60	IP 66 IP 66 IP 66	IP 68 IP 68 IP 68 IP 68 IP 67	IP 69K IP 69K IP 69K IP 69K IP 69K	-20 °C -20 °C -20 °C	-40 °C -60 °C -40 °C -40 °C -40 °C	
电感式传感器 / Inductive sensors - IS M 8 - IS M 12 - IS M 18 - IS M 30		IP 68 IP 68 IP 68 IP 68			-40 °C -40 °C -40 °C -40 °C	

高温 High temperature		耐腐蚀性 Corrosion resistance		耐冲击性 Shock resistance	抗振性 / Vibration resistance
	+80 °C		玻璃钢 /glassfibre plastic		
	+55 °C +70 °C +70 °C +70 °C	+85 °C +85 °C +85 °C	玻璃钢 /glassfibre plastic 玻璃钢 /glassfibre plastic 玻璃钢 /glassfibre plastic 不锈钢 / stainless steel	> 100 g 50 g 50 g	> 100 g 20 g 20 g
	+75 °C +75 °C +75 °C +80 °C +80 °C +60 °C	+90 °C +90 °C +90 °C +180 °C +90 °C +90 °C	铝铸件，硬镀膜/Al diecast, hard-coated 玻璃钢 /glassfibre plastic 玻璃钢 /glassfibre plastic 铝铸件 /Al diecast 玻璃钢 /glassfibre plastic 锌压铸品/Zinc diecast		
	+80 °C +80 °C +80 °C +80 °C	+90 °C +90 °C +90 °C +90 °C	铝铸件，硬镀膜/Al diecast, hard-coated 或热塑性塑料保护罩/or thermoplastic shield 铝铸件 /Al diecast 铝铸件 /Al diecast 铝铸件 /Al diecast		
	+70 °C +70 °C +70 °C +70 °C +85 °C	+90 °C +90 °C +90 °C +90 °C	铝铸件，硬镀膜/Al diecast, hard-coated 铝铸件，硬镀膜/Al diecast, hard-coated 铝铸件，硬镀膜/Al diecast, hard-coated 铝铸件，硬镀膜 /Al diecast 玻璃钢 /glassfibre plastic		
	+70 °C	+100 °C +85 °C	铝铸件，硬镀膜/Al diecast, hard-coated 铝铸件，硬镀膜/Al diecast, hard-coated 玻璃钢 /glassfibre plastic		
	+80 °C +80 °C +80 °C	+180 °C +90 °C	铝铸件 /Al diecast 玻璃钢 /glassfibre plastic 铝铸件 /Al diecast		
	+80 °C +80 °C +80 °C +70 °C	+130 °C +200 °C +130 °C +130 °C	镀镍黄铜 / brass nickeled 不锈钢 / stainless steel 不锈钢 / stainless steel 不锈钢 / stainless steel 玻璃钢 /glassfibre plastic	1S: 100g 1Ö, 1W: 10g 1S: 20g 1Ö, 1W: 10g 1S: 100g 1Ö, 1W: 10g 1W: 10g 1W: 10g	1S: 30g, 1Ö, 1W: 15g 1S: 30g, 1Ö, 1W: 15g 1S: 30g, 1Ö, 1W: 15g
		+120 °C +120 °C +120 °C +120 °C	不锈钢 / stainless steel 不锈钢 / stainless steel 不锈钢 / stainless steel 不锈钢 / stainless steel		

特殊防护等级的开关设备

SWITCHGEAR WITH SPECIAL DEGREE OF PROTECTION

在许多自动化应用领域环境中，潮湿是非常常见的一种情况，一些食品生产机械经常会用高压清洗机来清洗。在船舶技术和海上应用中开关设备也暴露在水中，甚至，应用在露天的选煤厂或传送系统上。对于所有应用，世德提供保护等级为IP 66、IP68 和 IP69K 的高质量开关设备。其中包括在极端环境中经过反复考验的限位开关、脚踏开关、拉线开关和安全传感器。

Moisture and dampness are often part of the environmental conditions in many application fields of automation. A lot of machines for food production are regularly cleaned by means of a high-pressure washer. In the ships technology and offshore applications the switchgear are also exposed to moisture – just to mention further examples – in cleaning plants or in conveyor systems erected in the open air. For all these applications steute offers high-quality switchgear in IP 66, IP 68 and IP 69K degrees of protection. The range comprises position switches, foot switches, pull-wire switches and safety sensors. »Tried and tested« under extreme conditions.

// ES 95 IP66



// ZS 91 S IP66



// RC SI M30 IP69K



// BZ 16 IP69K



// RC SI 56 IP69K



// ZS 71 KST IP69K



应用在低温中的开关 SWITCHGEAR FOR LOW TEMPERATURES

不言而喻，如果一个开关在 -20、-40 甚至 -60° C 的低温环境中仍然可以可靠地工作，那么必须采取全面的建设性措施保证这个特性的实现。世德已经成功地生产出用在低温环境中的几个开关系列-磁开关、限位开关、跑偏开关和拉线开关。这些开关应用在低温仓库、缆索铁道和输送设备上用于原料提取。

It doesn't go without saying that a switch still works reliably at temperatures of -20, -40 or even -60 °C. On the contrary - comprehensive constructive measures have to be taken to guarantee this feature. steute has qualified several ranges of switchgear for low temperature – magnetic switches, position switches, belt-alignment switches and pull-wire switches. These switchgear are applied in low-temperature warehouses as well as at cable railways and conveying plants for raw material extraction.

// RC 23 -60 °C



// ES 14 W -40 °C



// ES 41 Z -40 °C



// ZS 73 SR -40 °C



室内外低温环境中的
应用

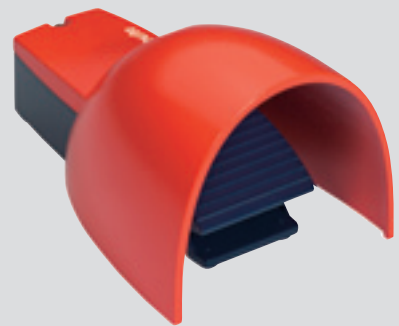
Low temperature in-
and outdoor applica-
tions

应用在高温中的开关 SWITCHGEAR FOR HIGH TEMPERATURES

钢铁厂、玻璃加工、铸造厂：很多应用领域中，开关设备都需要暴露在高温环境中。世德已经开发了几个系列适合在高达 + 180° C 的高温中连续工作的开关系列。这些系列包括脚踏开关、限位开关、磁开关和磁安全开关。在高温高湿度的热带地区的应用对于开关来说是一个特殊的挑战。这对传统的开关来说是一个很残酷的淘汰标准，但这对世德生产的设备来说却不是：由于特殊的密封技术世德开关能持久的免受水分的侵蚀。

Steelworks, glass processing, foundries: there are a lot of application fields in which switchgear are exposed to high temperatures. steute has developed several series for hot temperature applications suitable for continuous operation at temperatures up to +180 °C. This range comprises foot switches, position switches, magnetic switches and magnetic safety switches. A special challenge are switchgear »fit for the tropics« to withstand high temperatures in connection with high humidity. Very quickly this is a knock-out criterion for conventional switchgear, but not for devices made by steute: owing to a special sealing technology they are carefully and durably protected from letting in moisture.

// GFSI +90 °C



// IS M 18 B +120 °C



// ES 41 +180 °C



// RC SI M30 +85 °C



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室内外高温环境中的
应用

High temperature in-
and outdoor applica-
tions

开关的耐腐蚀设计 SWITCHGEAR IN CORROSION-PROOF DESIGN

一个防海水的开关需要满足：必须能够在腐蚀性环境中经久耐用。例如，安全传感器 HS Si 4 可以毫无疑问地满足这些要求，同时，磁安全传感器 RC Si M30, 限位开关 ES 13 W 和应用于海上的限位开关 ES 95 也满足这些要求。这些开关在近海平台以及在风力发电厂，船舶和潜艇上都运行良好。

The criterion of a seawater-proof switch shows which requirements have to be met: the switchgear must be able to work without failures even under corrosive conditions during a long life – in all weathers and waves. The safety sensor HS Si 4 for example meets these requirements without problems as well as the magnetic safety sensor RC Si M30, the position switch ES 13 W and the position switch ES 95 offshore. These switching devices feel fine on offshore platforms as well as in wind power plants, on ships and in submarines.

// RC 2580 NIRO



// GFS KST



// ZS 71 KST



// RC SI 56



腐蚀性环境中的应用

Applications under
corrosive environ-
mental conditions.

开关的高抗振性

SWITCHGEAR WITH HIGH SHOCK- AND VIBRATION RESISTANCE

这个产品系列的理念源于一个客户的要求。他们正在寻找一个能安装在船的轮机舱附近，用于副翼位置检测的安全传感器。存在的问题是：传统的磁安全传感器由于船舶柴油发动机不停的振动很快就坏掉了。解决方案是：基于霍尔传感器的抗振性安全传感器。

The idea for this production range arose from an enquiry of a customer. They were looking for a safety sensor for the position interrogation of a flap fixed near the engine room of a ship. The problem: conventional magnetic safety sensors fail very quickly due to the constant vibrations of the ship's diesel motor. The solution: a vibration-resistant safety sensor on Hall sensor basis.

Meanwhile the product portfolio of vibration-resistant switchgear has been expanded by explosion-proof safety sensors and micro switches. The application field was also expanded: in packing machines and processing plants switchgear are also exposed to vibrations which, however, must not affect the operating life.

// HS SI 4



// RC M20



// ST 14



// RC SI M30



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开关在强振动环境中的应用

Applications where switchgear are exposed to strong vibrations and shocks.





用在潜在爆炸领域的开关是用在可燃产品, 氧气和燃料同时发生的地方。例如, 化学工业, 近海技术, 矿业, 也用在基础材料和食品工业的几个分支中。世德的防爆开关系列包含在其他的可以用在潜在爆炸领域的带和不带安全功能的安全开关, 位置开关, 电磁锁, 指令设备, 紧急 拉线开关, 脚踏开关和磁式传感器。所有世德生产的防爆开关都能用在 潜在的爆炸环境1区, 2区和21或者22区。几乎所有的开关都达到了II 2G Ex deb IIC T6 Gb 和 II 2D Ex tb IIIC T80° C Db 防爆标准的要求。可提供EC Directive 94/9/ EC (ATEX)的测试认证证书以及 IECEx , Gost, Inmetro 和 Nepsi 认证证书。

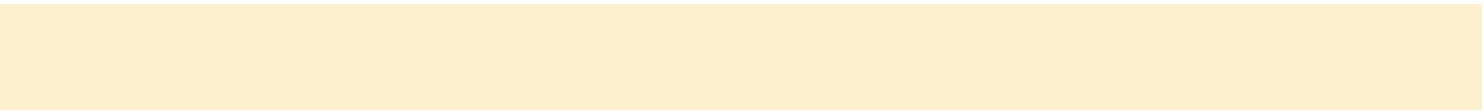
Switchgear used in potentially explosive atmospheres is required where ignitable substances, oxygen and a source of ignition occur at the same time, e. g. in the chemical industry, in offshore technology, in mining, but also in several branches of the basic materials and food industry. The steute range of Ex switchgear contains amongst others safety switches, position switches with and without safety function, solenoid interlocks, command devices, emergency pull-wire switches, foot switches and magnetic sensors which can be used in potentially explosive atmospheres. All Ex switchgear produced by steute can be used in potentially explosive atmospheres of zone 1 or 2 and 21 or 22. Nearly all switches meet the requirements of explosion protection according to II 2G Ex deb IIC T6 Gb and II 2D Ex tb IIIC T80°C Db. Corresponding type examination certificates per EC Directive 94/9/EC (ATEX) and certificates to IECEx, Gost, Inmetro and Nepsi are available.



所选产品极端特性表格 / Selection chart extreme characteristics

// 系列 / Series		// 特性 / Characteristics				
		防护等级 Degree of protection			低温 Low temperature	
防爆无线开关 / Ex wireless switchgear						
- Ex RF 95		IP 66	IP 67		-20°C	
- Ex RF 335			IP 67		-20°C	
- Ex RF BF 80		IP 66			-20°C	
- Ex RF GF(S)		IP 66	IP 67	IP 69K	-20°C	
防爆电磁锁开关 / Ex solenoid interlocks						
- Ex AZM 415			IP 67	IP 69K	-20°C	
防爆安全传感器 / Ex safety sensors						
- Ex HS Si 4		IP 66	IP 67	IP 69K	-20°C	-40°C
- Ex RC Si 56		IP 66	IP 67	IP 69K	-20°C	-40°C
- Ex RC Si M30		IP 66	IP 67	IP 69K	-20°C	-40°C
带有安全功能的防爆限位开关 / Ex Position switches with/without safety						
- Ex 12		IP 66	IP 67		-20°C	-40°C
- Ex 13		IP 66	IP 67		-20°C	-40°C
- Ex 14		IP 66	IP 67		-20°C	-40°C
- Ex 95		IP 66	IP 67		-20°C	-40°C
- Ex 98		IP 65	IP 67		-20°C	-40°C
防爆脚踏开关 / Ex Foot switches						
- Ex GF / Ex GFS		IP 66	IP 68	IP 69K	-20°C	-40°C
- Ex GF 2 / Ex GFS 2		IP 66	IP 68		-20°C	-40°C
- Ex GF 3 / Ex GFS 3		IP 66	IP 68		-20°C	-40°C
- Ex GFI / Ex GFSI		IP 66	IP 68		-20°C	-40°C
防爆紧急拉线开关 / Ex Emergency pull-wire switches						
- Ex ZS 71		IP 65	IP 66	IP 69K	-20°C	-40°C
- Ex ZS 73		IP 65	IP 66		-20°C	-40°C
- Ex ZS 75		IP 65	IP 66		-20°C	-40°C
- Ex ZS 80		IP 66	IP 67		-20°C	-40°C
- Ex ZS 90		IP 66	IP 67		-20°C	-40°C
防爆跑偏开关 / Ex belt-alignment switches						
- Ex ES/EM 98 SR		IP 65	IP 67		-20°C	-40°C
- Ex ZS 73 SR		IP 65	IP 66		-20°C	-40°C
- Ex ZS 75 SR		IP 65	IP 66		-20°C	-40°C
- Ex ZS 90 SR		IP 66	IP 67		-20°C	-40°C
防爆拉线开关 / Ex Pull-wire switches						
- Ex 61 Z		IP 65	IP 66		-20°C	-40°C
- Ex 95 WH/90°		IP 66	IP 67		-20°C	-40°C
防爆磁式传感器 / Ex Magnetic sensors						
- Ex RC 12		IP 66	IP 67	IP 69K	-20°C	-40°C
- Ex RC M14		IP 66	IP 67	IP 69K	-20°C	-40°C
- Ex RC 15		IP 66	IP 67	IP 69K	-20°C	-40°C
- Ex RC M20		IP 66	IP 67	IP 69K	-20°C	-40°C
- Ex RC 2580		IP 66	IP 67	IP 69K	-20°C	-40°C
防爆电感式传感器 / Ex inductive sensors						
- Ex IS			IP 67		-25°C	

* 根据相应的环境温度
* Depending on the corresponding ambient temperature



高温 High temperature				耐腐蚀性 Corrosion resistance	防爆区域* Ex zones*
	+65 °C +60 °C +60 °C +65 °C			玻璃钢/glassfibre plastic 铝铸件/Al diecast 热固性塑料/thermoset 铝铸件/Al diecast	1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22
	+90 °C			铝铸件/Al diecast	21
	+60 °C +70 °C +70 °C	+85 °C +85 °C +85 °C		玻璃钢/glassfibre plastic 玻璃钢/glassfibre plastic 不锈钢 / stainless steel	1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22
	+60 °C +65 °C +65 °C +65 °C +60 °C	+90 °C +90 °C +90 °C +90 °C +90 °C		铝铸件，硬镀膜 /Al diecast, hard-coated 玻璃钢/glassfibre plastic 玻璃钢/glassfibre plastic 玻璃钢/glassfibre plastic 玻璃钢/glassfibre plastic 锌压铸件/Zinc diecast	1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22
	+65 °C +65 °C +65 °C +65 °C	+90 °C +90 °C +90 °C +90 °C		铝铸件，硬镀膜 /Al diecast, hard-coated 铝铸件，硬镀膜 /Al diecast, hard-coated 铝铸件，硬镀膜 /Al diecast, hard-coated 铝铸件，硬镀膜 /Al diecast, hard-coated	1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22
	+65 °C +65 °C +65 °C +65 °C +65 °C	+90 °C +90 °C +90 °C +90 °C +90 °C		铝铸件，硬镀膜 /Al diecast, hard-coated 铝铸件，硬镀膜 /Al diecast, hard-coated 铝铸件，硬镀膜 /Al diecast, hard-coated 铝铸件，硬镀膜 /Al diecast, hard-coated 铝铸件，硬镀膜 /Al diecast, hard-coated 热固性塑料/thermoset	1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22
	+60 °C +65 °C +65 °C +65 °C	+90 °C +90 °C +90 °C +90 °C		锌压铸件/Zinc diecast 铝铸件，硬镀膜 /Al diecast, hard-coated 铝铸件，硬镀膜 /Al diecast, hard-coated 热固性塑料/thermoset	1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22
	+65 °C +65 °C	+90 °C +90 °C		铝铸件，硬镀膜 /Al diecast, hard-coated 玻璃钢/glassfibre plastic	1, 2, 21, 22 1, 2, 21, 22
	+70 °C +70 °C +70 °C +70 °C +70 °C	+100 °C +100 °C +100 °C +100 °C +100 °C		黄铜镀镍 / brass nickeled 黄铜镀镍 / brass nickeled 黄铜镀镍 / brass nickeled 不锈钢 / stainless steel 不锈钢 / stainless steel	1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22 1, 2, 21, 22
	+70 °C			不锈钢 / stainless steel	0, 1, 2, 20, 21, 22



防爆无线开关 Ex wireless switchgear

// EX RF BF 80



无线防爆开关通过低能 sWave® or EnOcean® 无线电技术传输信号。开关传输所需的必要低能量是开关自我生成的,例如通过一个大功率蓄电池,一个微型太阳能模块或一个电动发电机。这种新型发电机通过活塞运动产生电能。活塞的动能转化成电能。因此开关自己产生他们所需的能量,可以完全自给自足的工作:没有电缆、蓄电池和/或光线。无线电信号通过不用授权的 868 MHz or 915 MHz SRD (短距离设备) 频段进行传输。

限位开关,拉线开关和门把手开关都可以使用无线电技术。限位开关可配备多种操动头。

限位开关,拉线开关和脚踏开关都可以使用无线电技术。限位开关可配备多种操动头。

Ex switchgear with radio technology transmit the signals by means of low-energy sWave® or EnOcean® radio technology. The low quantity of energy necessary for the transmission is self-sufficiently generated by the switchgear, e.g. by means of a high-power battery or an electrodynamic energy generator. This new type of energy generator generates electrical energy from the movement of the plunger. This kinetic energy of the plunger is converted into electrical energy. So the switches produce the energy they require by themselves and work totally self-sufficiently: without cables, batteries and/or light. The radio signals are transmitted within the licence-free SRD band with 868 MHz or 915 MHz.

Position, pull-wire and foot switches, as well as command devices are available with radio technology. The position switches can be equipped with a large variety of actuators.

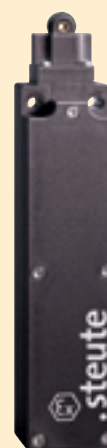
// EX RF GFI



// EX RF 95 WH/90°



// EX RF 96 R



// EX RF 335



防爆电磁锁开关 Ex solenoid interlocks



// EX STM 295



// EX AZM 415



STM 和AZM/AZP 系列的防爆安全锁确保危险的条件（如保证运行部件停止后）解除之后，滑动，铰链和滑动安全防护门（如防护门，机罩）才可以打开。同样的方式这些安全锁也被用于限制接近生产过程。

带有防松螺栓和安全锁操动头的开关元件在开关的时候将被分离和重新插入。这个安全锁可以用在气体防爆1 区, 2 区和粉尘防爆21 区和22 区。

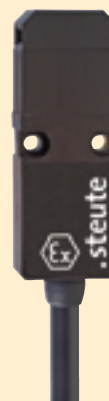
Ex safety interlocks of the series STM and AZM/AZP ensure that sliding, hinged and removable safety guards (such as fences, hoods or doors) cannot be opened until dangerous conditions (e. g. after-run movements) no longer exist. In the same manner these safety interlocks are employed to restrict access to the production process.

The switching element with locking bolt and the actuator of safety interlocks are separated and reinserted when switching. The safety interlocks can be used in gas-ex zones 1 and 2 as well as dust-ex zones 21 and 22.



带有独立操动头的防爆安全开关 Ex safety switches with separate actuator

// EX ST 14



// EX 95 AZ



// EX AZ 16



带有独立操动头的防爆安全开关适用于滑动、铰链和特别的滑动安全门等需要关闭以确保必要的操作安全的设备上。这些也适用于安置在现有设备的外壳系统和制动发动机装置上。

在带有操动头的防爆安全开关上, 开关部分不是真正的和操动头物理连接, 而是在功能上由开关联合或者分开。当保护装置打开的时候, 操动头就会与本体分离。在这一过程中NC触点肯定断开, NO触点闭合。我们也有很多不同种类的防爆安全开关附属设备, 包括不同的编码操动头, 适用于小半径的产品等。

所有防爆安全开关的防护等级是 IP 65/67。

The Ex safety switches with separate actuator are suitable for sliding, hinged and particularly removable safety guards, which need to be closed to ensure the necessary operational security. They are also suitable for mounting on profile chapters and retro fitting on existing equipment.

On the Ex safety switches with separate actuator, the switching element is not physically connected to the actuator but functionally brought together or separated by switching. When the guard device is opened, the actuator is separated from the base unit. In the process, NC contacts are positively opened and NO contacts closed. A wide range of accessories is available for the Ex safety switches, including various, coded actuators, also suitable for small radii.

Degree of protection of all Ex safety switches is IP 65/67.

// EX ES 98 ST



令人信服的既经济又专业的防爆解决方案 / TECHNICALLY AND ECONOMICALLY CONVINCING SOLUTIONS IN EXPLOSION PROTECTION



防爆安全传感器 Ex safety sensors



// EX RC SI M30



防爆安全传感器是为监控滑动、铰链和移动安全防护门的位置服务的。防爆安全传感器只能结合SRM系列安全继电器使用，且用于DIN VDE 0660-209规定的安全规程，其安全等级可达EN 13849-1标准的控制等级4。防爆安全传感器一个特别的优势在于可以在极其脏的环境或者对卫生有很高要求的地方，并且清洗非常简单。一个更加突出的优势是可以隐蔽安装在非磁性材料下。防爆安全传感器可以用在那些不能精确操作以及可以有比较大偏差的地方。

这些设备包括一个多通道的防爆安全传感器和一个编码操作磁铁。

The Ex safety sensors serve to monitor the position of sliding, hinged and removable safety guard. The Ex safety sensors can only be used for safety duties to DIN VDE 0660-209 in combination with a safety guard monitor of the SRM range for protection up to Control Category 4 to EN ISO 13849-1. The use of Ex safety sensors is of particular advantage in cases where extremely dirty conditions can occur or high hygienic standards need to be maintained. This is provided by the simplicity of cleaning the units. A further advantage is the facility for concealed mounting under non-magnetic materials. Ex safety sensors can also be used in cases where a precise approach is not possible and greater tolerances are required.

These devices comprise a multi-channel Ex safety sensor and an coded actuating magnet.

// EX HS SI 4



// EX RC SI 56



// SRM 21 MULTI



带有安全功能的防爆限位开关 Ex position switches with safety function

// EX 95 T5C



// EX 13 SB



// EX 95 SB



带有安全功能的防爆限位开关适用于滑动、铰链和特别的滑动安全门等需要关闭以确保必要的操作安全的设备上。与一个合适安全门监控装置配合，所有的带独立操动头的安全开关都可以达到EN ISO 13849-1标准规定的控制等级3或等级4。

在带有安全功能的防爆限位开关上,防护装置和绝对断开常闭触点是肯定连接的。大部分防爆限位开关都达到了 EN 60947-5-1 标准的要求。

在工业实践中,不同的应用要求有不同的解决方案。从精密仪器到重型工程,和外形尺寸,材料,电力负荷容量,额定值和质量特征有很大关联的设计细节很大程度上取决于应用的类别。我们也有很多不同种类的操动头解决方案来配合这些项目。

有很多不同的速动和缓动种类。

The Ex position switches with safety function are suitable for sliding, hinged and particularly removable safety guards, which need to be closed to ensure the necessary operational safety. All Ex safety switches with separate actuator meet in combination a suitable guard door monitor Control Category 3 or 4 to EN ISO 13849-1.

On the Ex position switches with safety function, the guard device and the positive break NC contact are positively linked. Many of the Ex position switches fulfil the requirements of the standard EN 60947-5-1.

The particular requirements in industrial practice need individual solutions. The design details in relation to body dimensions, materials, electrical loading capacity, rated values and quality characteristics are to a great extent determined by the variety of application, from precision mechanics to heavy engineering. A large variety of actuators complements the program.

Different versions with snap action or slow action are available.



铰链式门的防爆安全开关 Ex safety switches for hinged doors

// EX 14 VKU



为确保必要的操作安全，防爆安全铰链开关是在铰链安全门处于关闭状态的情况下使用的。

这里展示的防爆安全开关的总体优势是整体凸轮轴在安全开关里面。这样EN1088的要求就实现了，这些要求包括在凸轮和操动头之间的肯定连接和防干涉。

在防爆开关里面的这个结合体为用户避免必须安装特别设计的凸轮创造了成本优势。这些安全开关都具有缓动功能。

The Ex safety hinge switches are suitable for hinged safety guards which need to be closed to ensure the necessary operational safety.

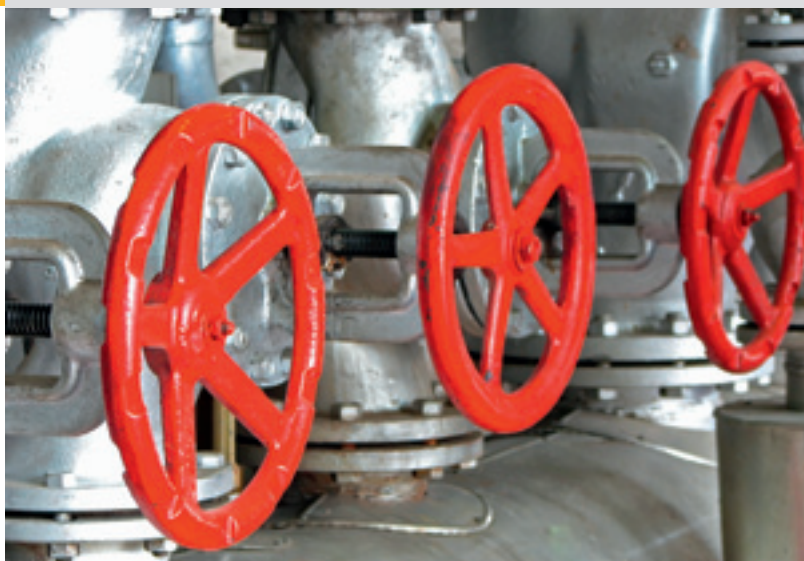
A general advantage of the Ex safety switches shown here is the integral cam within the safety switch. The requirements of EN 1088, such as positive linkage between cam and actuator, as well as protection against tampering, are thus fulfilled.

This combination within the Ex switches provides cost advantage for the user in avoiding the necessity of mounting a specially designed cam. These safety switches are equipped with slow action contacts.

// EX 98



35



// EX 95 WHM



防爆指令装置 Ex command devices

// EX BF 80 1



// EX 14 RUV



// EX BF 80 3



// EX 14 RST-V2A



防爆指令装置是安装在防爆配电板、控制面板、双手控制面板和提升机行业。在人工操动器上，这些装置是开动或者终止一个有序的操作和功能过程的。

我们有很多如按钮、选择器、钥匙开关和急停开关种类。急停装置是连接在安全线路上的。他们达到了 EN 60204-1 的要求。

这些防爆指令装置适合 $\varnothing 22.5$ mm 的安装孔和中心的距离为 30 mm 的间距。所有的操动头提供 IP 67 并且装置是达到防护二级的双层绝缘的。操动头是通过卡扣固定件和 Ex 14 开关连接的。

开关元件都带有缓动功能。

强大的防爆指令装置 Ex BF 80 适合在墙壁上安装。针对于 1 个、2 个和 3 个指令设备本系列提供了三种不同尺寸的外壳。并且支持不同的指令设备如按钮、信号灯、钥匙开关等。他们均满足 IP66 的防护等级。

Ex command devices are mounted in Ex switchboards, control panels, two-hand control panels and in lift construction. On manual actuation, the devices starts operating sequences and functional processes or terminate these.

There are versions as push buttons, selector, key-operated and emergency-stop switches. The emergency-stop devices are connected in the safety circuit of a machine or plant. They meet the requirements of EN 60204-1.

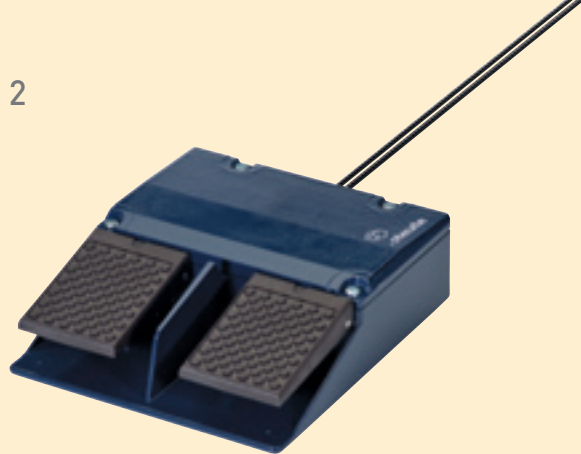
These Ex command devices fit in $\varnothing 22.5$ mm mounting holes and are suitable for spacings of 30 mm between centres. All actuators provide IP 67 and the devices are double-insulated to degree of protection II. The actuator is connected by a bayonet fastener to the Ex 14 switch.

Switching elements are available with slow action.

The robust Ex command devices Ex BF 80 are suitable for on-wall mounting. These series are available in three enclosure sizes for one, two or three command devices. There are different command devices, signalling devices and key switches available. They meet the degree of protection IP 66.

防爆脚踏开关 Ex foot switches

// EX GF 2



// EX GFI



// EX GFSI



防爆脚踏开关是用在用手不能操作的机器和设备上。他们是用来启动和停止操作和生产过程的。根据环境条件和机械原理的不同可以用不同种类的脚踏。

所有的防爆脚踏开关都有多踏板类型。脚踏开关有防护罩以防止突然的制动。防爆脚踏开关系列Ex GF, GFI, GFS 和GFSI都带有缓动和速动型号。

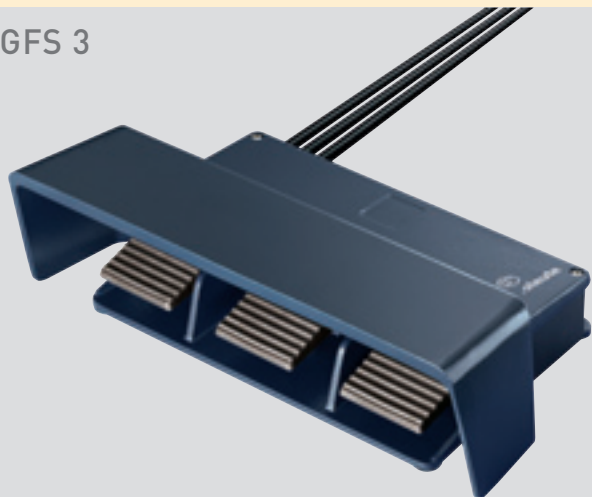
Ex foot switches are mounted on machines and plants in cases where operation using the hands is not possible. They are used to start and stop operations and production processes. Depending on the environmental conditions and mechanical duty, differing versions of foot switches are used.

All Ex foot switches are available as multi-pedal type. The foot switches are provided with a protective shield to prevent accidental actuation. The Ex foot switch series Ex GF, GFI, GFS and GFSI are available with slow or snap action.

// EX GFS



// EX GFS 3



防爆紧急拉线开关 Ex emergency pull-wire switches



// EX ZS 71



// EX ZS 75



// EX ZS 90 S



// EX ZS 80



防爆紧急拉线开关是用在安全盖不足以防护的机器和设备中。和急停按钮相比, 紧急拉线开关可以在线的任何一个点被操动。所有的紧急拉线开关都符合欧洲标准 EN ISO 13850 和 EN 60947-5-5。

我们有单向和双向防爆紧急拉线开关。所有的开关有一个整合的断线检测功能。如果防爆紧急拉线开关被操动或者这个线断了, 所有的常闭触点都被打开而所有的常开触点都会关闭。所有的防爆紧急拉线开关都有坚固的金属外壳。所有产品品种都有广泛而齐全的配件。

Ex emergency pull-wire switches are used on machines and plants which cannot be safeguarded by safety covers. In contrast to an Ex emergency-stop push button the emergency pull-wire switch can be actuated from any point along the wire. All Ex emergency pull-wire switches conform with the European standard EN ISO 13850 and EN 60947-5-5.

There are Ex emergency pull-wire switches with one-side and two-side actuation of the pull-wire. All switches have an integrated wire break monitoring function. If the Ex emergency pull-wire switches are actuated or if the wire breaks, all NC contacts are opened and all NO contacts are closed. All Ex emergency pull-wire switches have a robust metal housing. A wide range of accessories is available for all product types.

防爆跑偏开关 Ex belt-alignment switches



// EX 335 4VSR



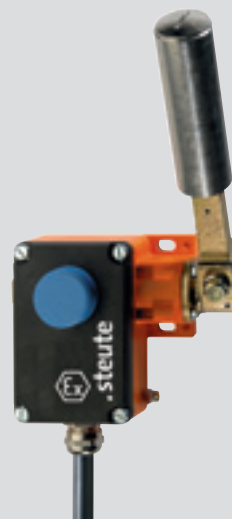
防爆安全跑偏开关适合装卸设备的应用。

当传送带移位了, 防爆安全跑偏开关将被起动作。根据设备的安排, 这个信号既可以用于关闭器械, 也可以用于安全跑偏的自动纠正功能。

Ex belt-alignment switches are suitable for applications with handling equipment.

The Ex belt-alignment switches are actuated when the conveyor belt becomes misaligned. Depending on the plant arrangements, this signal can either be used to switch the equipment off or to provide automatic correction of the belt alignment.

// EX ZS 73 SR



// EX ZS 90 SR



// EX ZS 75 SR



有效控制爆炸危险，创造安全工作环境 / EFFICIENT MEASUREMENTS AGAINST EXPLOSION
RISKS FOR A SAFE WORK ENVIRONMENT



防爆拉线开关 Ex pull-wire switches

// EX 95 WH/90°



防爆拉线开关是适合作为转换器启动机器或者开、关电动门, 电动闸的。防爆拉线开关是由人工的拉力操动的。

Ex pull-wire switches are suitable as transducers for starting machines or to open and close electrically powered doors, gates and barriers. Ex pull-wire switches are actuated manually by pulling.

// EX 61 WZ



41



// EX 61 Z



防爆磁式传感器 Ex magnetic sensors

// EX RC M14



// EX RC 2580



// EX RC 12



防爆磁式传感器在极其脏或者对卫生有很高要求的地方有很明显的优势。他们的适用性体现在它们易清洗的设计上。他们的高防护等级使这个单元只能用在外部。

磁式传感器是靠永久磁铁的接近操动的。

The use of Ex magnetic sensors is particularly advantageous where extreme soiling is encountered or high hygiene regulation standards must be met. Their suitability is achieved by their easy clean design. Their high degree of protection make the units predestined for use outside.

The magnetic sensors are proximity actuated by permanent magnets.



防爆电感式传感器 Ex inductive sensors

// EX IS M18 B



// EX IS M8 B



// EX IS M30 B



防爆电感式传感器是应用在机械工程, 热塑料工业, 纺织机, 木材加工行业和一些自动化行业的系统中, 这些自动化行业如应用于机器人系统中的参数传感器, 食品加工和化学工业。

防爆电感式传感器是电子装置。甚至在接触发电感应区域活跃类别的电感材料时它们也不需要物理接触就能开、关, 并且利用电学原理工作。因此他们的寿命在它们的额定值内是无限的。它们对于震动不敏感, 并且有很强且安全的联结。

Ex inductive sensors are applied in machinery construction, in the thermoplastic industry, in textile machines, in the wood processing industry and in many systems of the automotive industry, e. g. as reference sensor on robotic systems, as well as in the food processing and chemical industry.

Ex inductive sensors are electronic devices. Even on approach of an electrically conductive material that enter the active range of their generated sensing fields they switch without physical contact and work electronically. Therefore their life time, within their specified ratings, is virtually unlimited. They are insensitive to vibration and have a strong and safe contacting.

// EX IS M12 NB



电气设备的标识
危险区域的粉尘防爆



防爆标识

公告组织		
公告组织	国家	代码
TÜV Nord	德国 汉诺威 埃森	0032 0042
PTB	德国	0102
EXAM	德国	0158
DQS	德国	0297
FSA	德国	0588
BAM	德国	0589
IBExU	德国	0637
INERIS	法国	0080
LCIE	法国	0081
KEMA	荷兰	0344
SP	瑞典	0402
LOM	西班牙	0163
EECS (BASEEFA)	英国	0600
SCS	英国	0518

在爆炸危险区域的条件						
易燃材料	在防爆区域易燃材料的描述	爆炸危险区域的分类			按 EC 标准 94/9/EC	
		IEC // CENELEC	US NEC 506	US NEC 500	设备组	设备类别
粉尘	连续出现或经常出现	20 区	20 区	类 II/III 1 区	II	1D
	可能发生的	21 区	21 区		II	2D 或 1D
	不可能由旋转尘产生，如果出现了也是非常偶然并且是短时间存在的	22 区	22 区	类 II/III 1 区	II	3D 或 2D 或 1D
设备组别达到 IEC/CENELEC/NEC 506 NEC 500 标准						
组别 III*			类 II/III			
粉尘爆炸环境			粉尘爆炸环境			
子群			子群			
IIIA	易燃绒毛		类 III		纤维/绒毛	
IIIB	非导电粉尘		类 II 组别 G		非导电粉尘	
IIIC	导电粉尘		类 II 组别 F		煤灰粉尘	
			类 II 组别 E		金属粉尘	
* IEC (2007) 和 CENELEC (2009)						

设备组别和设备防护等级 (EPL)				
To Atex 94/9/EG		To IEC (2007) and CENELEC (2009)		
组别	设备类别	EPL	足够安全	
矿井甲烷环境				
I	M1	Ma		极少失灵
I	M2	Mb		直到设备断电
粉尘爆炸环境				
II	1D	Da	20 区	极少失灵
II	2D	Db	21 区	预期失灵
II	3D	Dc	22 区	常规操作

Ex tb IIIC T80°C Db IP67

设备子群粉尘

最高允许表面温度

设备保护等级 (EPL)

保护等级

保护方法						
保护方法	符号	标识	保护内容	区域	IEC CENELEC FM/UL/ISA/CSA	应用
通用要求		Ex Ex/AEx	–	20, 21, 22 20, 21, 22 类 II/III, 1/2 区	EN 60079-0 IEC 60079-0/ <u>US</u> ISA 61241-0 <u>US</u> ISA 12.12.01/FM 3600 <u>CA</u> CSA C22.2 No. 0	所有的应用
壳体保护		Ex t _a /t _b /t _c Ex t _a /t _b /t _c AEx tD DIP A21/A22	易爆环境和点燃源应该是分开的并且温度是有限制的	20, 21 或 22 20, 21 或 22 类 II, 1 区 21 区 类 II, 1/2 区	EN 60079-31 IEC 60079-31 <u>US</u> UL 1203 <u>US</u> ISA 61241-1 <u>CA</u> CSA E 61241-1-1	开关, 指令-和信号装置, 灯光, 安 装盒, 外壳
正压型		Ex p Ex p (PX) (PY) (PZ) AEx pD	易爆环境是和点燃源分开的	21 或 22 21 或 22 类 II, 1/2 区 21 区	EN 60079-4 IEC 60079-4 <u>US</u> NFPA 496/FM 3620 <u>US</u> ISA 61241-2	开关 和 控制柜, 电机, 测, 量和分析设备, 计算器
本质安全型		Ex i _a /i _b /i _c Ex i _a /i _b /i _c (iS) AEx i _a D/i _b D	火花和温度的能量限制	20, 21 或 22 20, 21 或 22 类 II, 1 区 20/21 区	EN 60079-11 IEC 60079-11 <u>US</u> FM 3610/UL 913 <u>CA</u> CSA C22.2 No. 157 <u>US</u> ISA 61241-11	测量, 控制技术和 工程, 传感器, 操动头, 仪表
浇封型		Ex m _a /m _b /m _c Ex m _a /m _b /m _c AEx m _a /m _b	易爆环境是和易燃源分开的	20, 21 或 22 20, 21 或 22 20/21 区	EN 60079-18 IEC 60079-18 <u>US</u> ISA 61241-18	继电器线圈, 和 各类电机, 电子 电器, 磁阀门, 连接系统
非易燃型		(NI)	避免火花和高温	类 II, 2 区 类 III, Div. 1/2	<u>US</u> FM 3611/ <u>US</u> ISA 12.12.01 <u>CA</u> CSA C22.2 No. 25 <u>US</u> FM 3611/ <u>US</u> ISA 12.12.01 <u>CA</u> CSA C22.1	
防尘型		(DIP)	排除了通向外界的爆炸传输过程	类 II, 1 区	<u>US</u> FM 3616/ <u>US</u> UL 1203 <u>CA</u> CSA C22.2 No. 25	

Marking of electrical equipment

Dust-explosive endangered areas



Ex-mark

Notified body		
Notified body	Country	Code No.
TÜV NORD	Germany Hannover Essen	0032 0044
PTB	Germany	0102
DEKRA EXAM	Germany	0158
FSA	Germany	0588
BAM	Germany	0589
IBExU	Germany	0637
INERIS	France	0080
LCIE	France	0081
KEMA	Netherlands	0344
SP	Sweden	0402
LOM	Spain	0163
BASEEFA	Great-Britain	0600
SCS	Great-Britain	0518

Conditions in the explosive endangered areas						
Flammable material	Temporary behaviour of the flammable material in Ex zones	Classification of the explosive endangered areas			per EC directive 94/9/EG	
		IEC/ CENELEC	US NEC 506	US NEC 500	Equipment group	Equipment category
Dusts	Are continuously present, for long periods or frequently	Zone 20	Zone 20	Class II/III Division 1	II	1D
	Are likely to occur	Zone 21	Zone 21		II	2D or 1D
	Are unlikely to occur by whirled dust, if they do, though only rarely or only for a short time	Zone 22	Zone 22	Class II/III Division 2	II	3D or 2D or 1D

Equipment groups to IEC/CENELEC/NEC 506		to NEC 500	
Group III*		Class II/III	
Dust explosive atmosphere		Dust explosive atmosphere	
Sub groups		Sub groups	
IIIA	flamable fluffs	Class III	fibers/fluffs
IIIB	non-conductive dust	Class II Group G	non-conductive dust
IIIC	conductive dust	Class II Group F	carbonaceous dust
		Class II Group E	metal dust
* IEC (2007) and CENELEC (2009)			

Equipment group and equipment protection level (EPL)			
To Atex 94/9/EG		To IEC (2007) and CENELEC (2009)	
Group	Equipment category	EPL	
Mines susceptible to firedamp		Sufficient security	
I	M1	Ma	during rare malfunctions
I	M2	Mb	until de-energizing of the equipment
Dust explosive atmosphere			
II	1D	Da	Zone 20 during rare malfunctions
II	2D	Db	Zone 21 during expected malfunctions
II	3D	Dc	Zone 22 in normal operation

Ex tb IIIC T80°C Db IP67

Equipment sub group dust

Maximum allowed surface temperature

Protection class

Equipment protection level (EPL)

Protection methods						
Protection method	Symbol	Marking	Protection concept	Zone	IEC CENELEC FM/UL/ISA/CSA	Application
General Requirements		Ex Ex/AEx	–	20, 21, 22 20, 21, 22 Class II/III, Div. 1/2	EN 60079-0 IEC 60079-0/ <u>US</u> ISA 61241-0 <u>US</u> ISA 12.12.01/FM 3600 <u>CA</u> CSA C22.2 No. 0	All applications
Protection by enclosure		Ex t _a /t _b /t _c Ex t _a /t _b /t _c AEx tD DIP A21/A22	Ex atmosphere is kept apart from ignition source and temperature limitation	20, 21 or 22 20, 21 or 22 Class II, Div. 1 Zone 21 Class II, Div. 1/2	EN 60079-31 IEC 60079-31 <u>US</u> UL 1203 <u>US</u> ISA 61241-1 <u>CA</u> CSA E 61241-1-1	Switching, command and signalling devices, lights, junction and terminal boxes, enclosures
Purged		Ex p Ex p (PX) (PY) (PZ) AEx pD	Ex atmosphere is kept apart from ignition source	21 or 22 21 or 22 Class II, Div. 1/2 Zone 21	EN 60079-4 IEC 60079-4 <u>US</u> NFPA 496/FM 3620 <u>US</u> ISA 61241-2	Switchgear and control cabinets, motors, measuring and analysis devices, calculators
Intrinsic Safety		Ex i _a /i _b /i _c Ex i _a /i _b /i _c (iS) AEx i _a D/i _b D	Energy limitation of sparks and temperatures	20, 21 or 22 20, 21 or 22 Class II, Div. 1 Zone 20/21	EN 60079-11 IEC 60079-11 <u>US</u> FM 3610/UL 913 <u>CA</u> CSA C22.2 No. 157 <u>US</u> ISA 61241-11	measuring, control technology and engineering, sensors, actuators, instrumentation
Encapsulation		Ex m _a /m _b /m _c Ex m _a /m _b /m _c AEx m _a /m _b	Ex atmosphere is kept apart from ignition source	20, 21 or 22 20, 21 or 22 Zone 20/21	EN 60079-18 IEC 60079-18 <u>US</u> ISA 61241-18	Coils of relays and motors, electronics, magnetic valves, connecting systems
Non-incendive		(NI)	Avoidance of sparks and high temperatures	Class II, Div. 2 Class III, Div. 1/2	<u>US</u> FM 3611/ <u>US</u> ISA 12.12.01 <u>CA</u> CSA C22.2 No. 25 <u>US</u> FM 3611/ <u>US</u> ISA 12.12.01 <u>CA</u> CSA C22.1	
Dust ignition-proof		(DIP)	Transmission of an explosion to the outside is excluded	Class II, Div. 1	<u>US</u> FM 3616/ <u>US</u> UL 1203 <u>CA</u> CSA C22.2 No. 25	

电气设备的标识
危险区域的气体防爆



防爆标识

公告组织		
公告组织	国家	代码
TÜV Nord	德国 汉诺威 埃森	0032 0042
PTB	德国	0102
EXAM	德国	0158
DQS	德国	0297
FSA	德国	0588
BAM	德国	0589
IBExU	德国	0637
INERIS	法国	0080
LCIE	法国	0081
KEMA	荷兰	0344
SP	瑞典	0402
LOM	西班牙	0163
EECS (BASEEFA)	英国	0600
SCS	英国	0518

在爆炸危险区域的条件						
易燃材料	在防爆区域易燃材料的描述	爆炸危险区域的分类 endangered areas			按 EC 标准 94/9/EC	
		IEC/ CENELEC	US NEC 505	US NEC 500	设备组	设备类别
气体， 蒸汽	持久的或经常的	0 区	I 类 0 区	I 类 1 区	II	1G
	可能发生的	1 区	I 类 1 区		II	2G 或 1G
	不可能产生，如果出现了也是非常偶然并且是短时间存在的	2 区	I 类 2 区	I 类 2 区	II	3G 或 2G 或 1G
甲烷	- -	煤矿 煤矿	- -	煤矿 -	I I	M1 M2 或 M1

设备组别达到 IEC/CENELEC/NEC 505			NEC 500 标准	
组别 I	组别 II		类 I	
矿井甲烷环境	燃气爆炸环境		燃气爆炸环境	
	子群		子群	
甲烷	IIA IIB IIC	丙烷 乙烯 氢气 乙炔	组别 D 组别 C 组别 B 组别 A	丙烷 乙烯 氢气 乙炔

设备组别和设备防护等级 (EPL)			
达到 Atex 94/9/EG		达到 IEC (2007) 和 CENELEC (2009) 标准	
组别	设备类别	EPL	足够安全
矿井甲烷环境 I I 燃气爆炸环境 II II II	M1 M2 1G 2G 3G	Ma Mb Ga 0 区 Gb 1 区 Gc 2 区	极少失灵 直到设备断电 极少失灵 预期失灵 常规操作

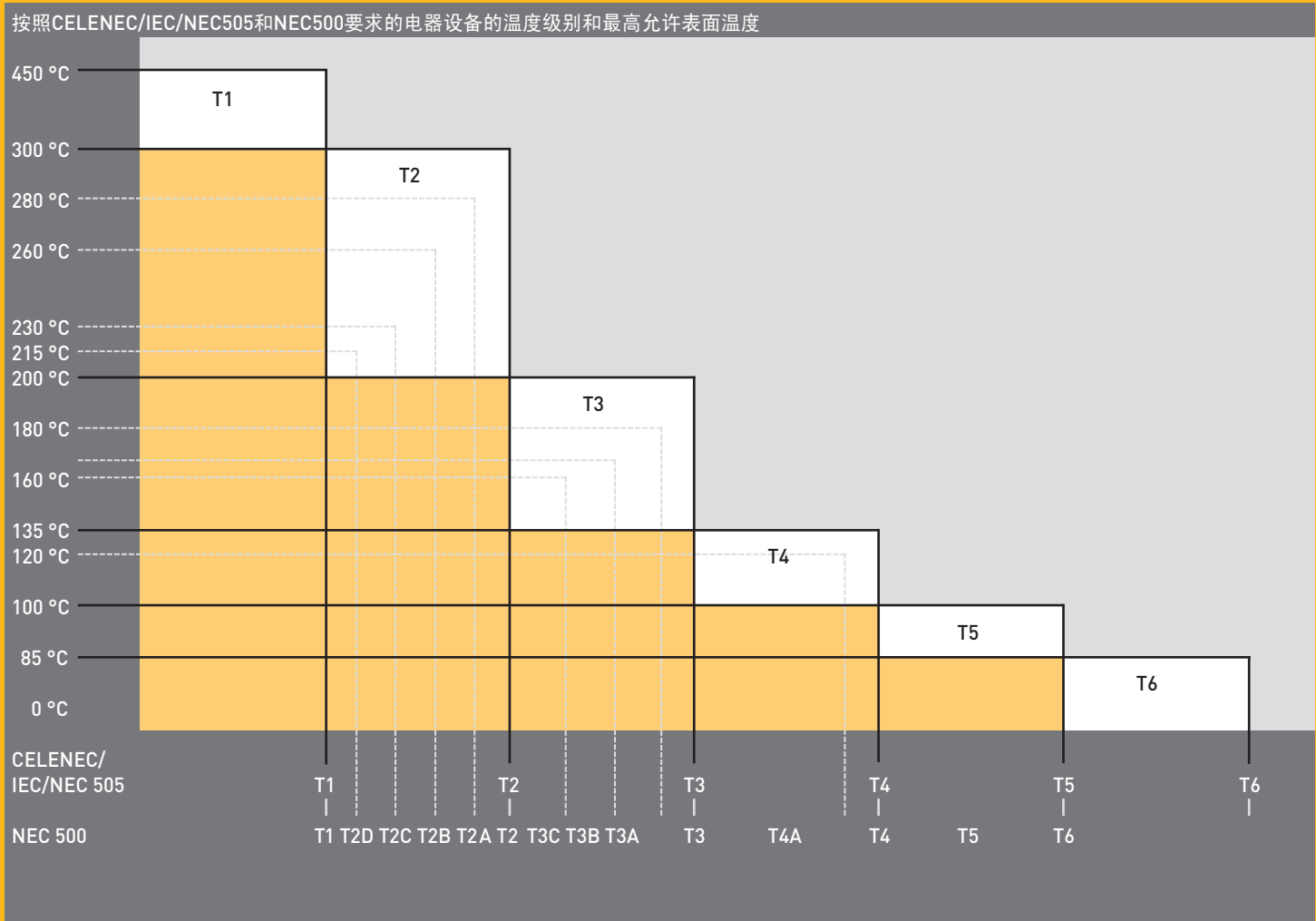


保护方法						
保护方法 method	符号	标识	保护内容	区域	CENELEC IEC FM/UL/ISA/CSA	应用
通用要求		Ex Ex/AEx Ex	-	20, 21, 22 20, 21, 22 类 I, 1/2 区	EN 60079-0 IEC 60079-0/UL 60079-0/ <u>US</u> ISA 60079-0 <u>US</u> FM 3600/ <u>CA</u> CSA C22.2 No. 0 <u>CA</u> CSA E 60079-0	所有的应用
增安型		Ex e Ex e AEx e Ex e	避免火花和高温	1 或 2 1 或 2 类 I, 1 区 类 I, 1 区	EN 60079-7 IEC 60079-7 <u>US</u> UL 60079-7/ <u>US</u> ISA 60079-7 <u>CA</u> CSA 60079-7	安装盒, 外壳, 电机, 灯光, 端子
隔爆型		Ex d _a /d _b /d _c Ex d _a /d _b /d _c AEx d _a /d _b /d _c Ex d _a /d _b /d _c	排除了通向外界 的爆炸传输过程	1 或 2 1 或 2 类 I 1 区 类 I 1 区	EN 60079-1 IEC 60079-1 <u>US</u> ISA 60079-1 <u>CA</u> CSA 60079-1	开关, 控制模块, 电机指令和信号设 备, 电源电子
本质安全型		Ex i _a /i _b /i _c Ex i _a /i _b /i _c (IS) AEx i _a /i _b Ex i _a /i _b	火花和温度的 能量限制	0, 1 或 2 0, 1 或 2 类 I, 1 区 类 I, 0/1 区 类 I, 0/1 区	EN 60079-11 IEC 60079-11 <u>US</u> FM 3610/ <u>CA</u> CSA C22.2 No. 157 <u>US</u> FM 3610 <u>CA</u> CSA E 60079-11	测量控制技术 和 工 程, 传感器, 操动头
正压型		Ex px/py(pz) Ex px/py(pz) AEx px/py(pz) Ex px/py(pz)	易爆环境是和 点燃源分开的	1 或 2, {3} 1 或 2, {3} 类 I, 1 {2} 区 类 I, 1 {2} 区	EN 60079-2 IEC 60079-2 <u>US</u> ISA E 60079-2 <u>CA</u> CSA E 60079-2	开关 和 控制柜, 电机, 计量 和分析设备, 计算机
浇封型		Ex m _a /m _b /m _c / Ex m _a /m _b /m _c AEx m _a /m _b /m _c / Ex m _a /m _b /m _c	易爆环境是和 点燃源分开的	0, 1 或 2 0, 1 或 2 类 I, 0/1/2 区	EN 60079-18 IEC 60079-18 <u>US</u> ISA 60079-15	继电器线圈 和 电子, 磁阀门, 连 接系统
充油型		Ex o Ex o AEx o Ex o	易爆环境是和 点燃源分开的	1 或 2 1 或 2 类 I, 1 区	EN 60079-6 IEC 60079-6 <u>US</u> ISA 60079-6 <u>CA</u> CSA E 60079-6	变压器, 继电器, 启动控制单元, 开关
充沙型		Ex q Ex q AEx q Ex q	排除了通向外界 的爆炸传输过程	1 或 2 1 或 2 类 I, 1 区 类 I, 1 区	EN 60079-5 IEC 60079-5 <u>US</u> ISA 60079-5/UL 60079-5 <u>CA</u> CSA E 60079-5	变压器, 继电器, 电 容器
无火花型 »n«		Ex nA,nC,nL,nR Ex nA,nC,nL,nR AEx nA,nC,nL,nR Ex n	对于2区不同的 保护原理	2 2 类 I, 2 区 类 I, 2 区	EN 60079-15 IEC 60079-15 <u>US</u> ISA 60079-15 <u>CA</u> CSA E 60079-15	只应用于2区
光学辐射		Ex op Ex op	限制, 避免光学 辐射的传输过程	1 或 2 1 或 2	EN 60079-28 IEC 60079-28	光电子设备, 如, 光纤
非易燃型		[NI]	避免火花和高温	类 I, 2 区	<u>US</u> FM 3611/ <u>US</u> ISA 12.12.01/ <u>CA</u> CSA C22.2 No.213	
防爆型		[XP]	排除了通向外界 的爆炸传输过程	类 I, 1 区	<u>US</u> FM 3615/ <u>US</u> UL 1203/ <u>CA</u> CSA C22.2 No.30	

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美国EC类型测试证书

按CENELEC/IEC/NEC分类，爆炸气体和蒸汽分类							附加条件	
	T1	T2	T3	T4	T5	T6	条件	标识
I	甲烷	-	-	-	-	-	无限制机器应用	-
II A	氨 甲烷 乙烷 丙烷	酒精 环乙烷 丁烷 正己烷	一般燃料 飞机燃料 燃料油	乙醛	-	-	遵循特殊应用条件	x
II B	灯用煤气 丙烯腈	乙烯 乙烯氧化物	乙二醇 硫化物 甲氢化呋喃甲醇	乙醚	-	-	部分认证不能单独应用在某些防爆设备；CE 认证是通过在一整套设备中的组装而认证的	u
II C	氢气	乙炔	-	-	-	二硫化碳		



Marking of electrical equipment

Gas-explosive endangered areas



Ex-mark

Notified body		
Notified body	Country	Code No.
TÜV NORD	Germany Hannover Essen	0032 0044
PTB	Germany	0102
DEKRA EXAM	Germany	0158
FSA	Germany	0588
BAM	Germany	0589
IBExU	Germany	0637
INERIS	France	0080
LCIE	France	0081
KEMA	Netherlands	0344
SP	Sweden	0402
LOM	Spain	0163
BASEEFA	Great-Britain	0600
SCS	Great - Britain	0518

Conditions in the explosive endangered areas							per EC directive 94/9/EC	
Flammable material	Temporary behaviour of the flammable material in Ex zones	Classification of the explosive endangered areas			Equipment group	Equipment category		
		IEC/ CENELEC	US NEC 505	US NEC 500				
Gases, vapours	Are present permanently, long time or often	Zone 0	Class I Zone 0	Class I Division 1	II	1G		
	Are likely to occur	Zone 1	Class I Zone 1		II	2G or 1G		
	Are unlikely to occur, if occur, though only rarely or for a short time	Zone 2	Class I Zone 2	Class I Division 2	II	3G or 2G or 1G		
Methane	–	Mining	–	Mining	I	M1		
	–	Mining	–	–	I	M2 or M1		

Equipment groups to IEC/CENELEC/NEC 505				to NEC 500	
Group I		Group II		Class I	
Mines susceptible to firedamp		Gas explosive atmosphere		Gas explosive atmosphere	
		Sub groups		Sub groups	
Methane		IIA	Propane	Group D	Propane
		IIB	Ethylene	Group C	Ethylene
		IIC	Hydrogene	Group B	Hydrogene
			Acetylene	Group A	Acetylene

Equipment group and equipment protection level (EPL)				
To Atex 94/9/EG		To IEC (2007) and CENELEC (2009)		
Group	Equipment category	EPL		Sufficient security
Mines susceptible to firedamp				during rare malfunctions until de-energizing of the equipment
I	M1	Ma		
I	M2	Mb		
Gas explosive atmosphere				
II	1G	Ga	Zone 0	during rare malfunctions
II	2G	Gb	Zone 1	during expected malfunctions
II	3G	Gc	Zone 2	during normal operation

II 2G Ex deb IIC T6 Gb

Equipment protection level (EP

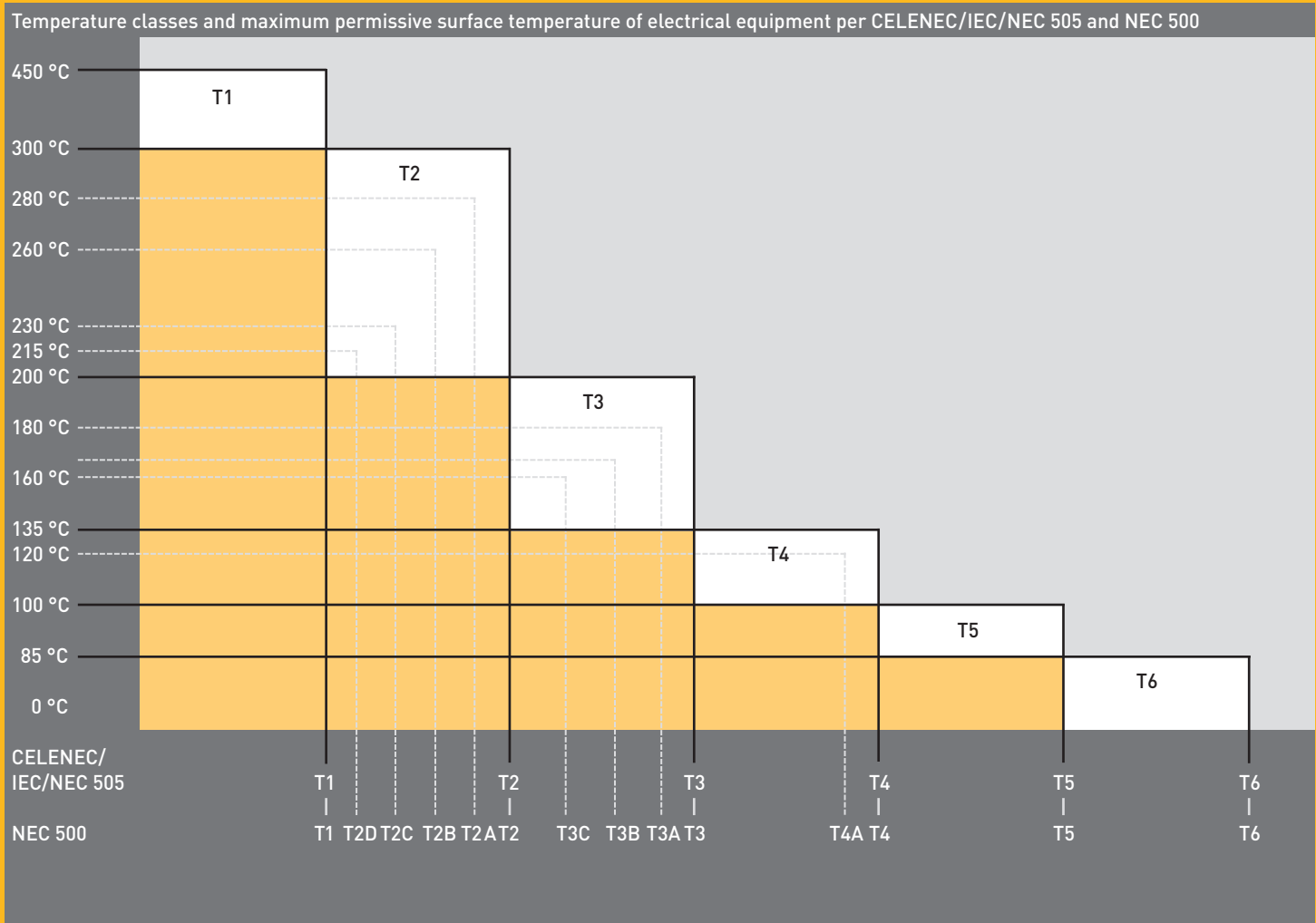
Protection methods

Protection method	Symbol	Marking	Protection concept	Zone	CENELEC IEC FM/UL/ISA/CSA	Application
General requirements		Ex Ex/AEx Ex	–	20, 21, 22 20, 21, 22 Class I, Div. 1/2	EN 60079-0 IEC 60079-0/UL 60079-0/US ISA 60079-0 US FM 3600/CA CSA C22.2 No. 0 CA CSA E 60079-0	All applications
Increased safety		Ex e Ex e AEx e Ex e	Avoidance of sparks and temperatures	1 or 2 1 or 2 Class I, Zone 1 Class I, Zone 1	EN 60079-7 IEC 60079-7 US UL 60079-7/US ISA 60079-7 CA CSA 60079-7	Junction and terminal boxes, enclosures, motors, lights, terminals
Flameproof enclosure		Ex d _a /d _b /d _c Ex d _a /d _b /d _c AEx d _a /d _b /d _c Ex d _a /d _b /d _c	Transmission of an explosion to the outside is excluded	1 or 2 1 or 2 Class I Zone 1 Class I Zone 1	EN 60079-1 IEC 60079-1 US ISA 60079-1 CA CSA 60079-1	Switchgear, control units, motors command and signalling devices, power electronics
Intrinsic Safety		Ex i _a /i _b /i _c Ex i _a /i _b /i _c (IS) AEx i _a /i _b Ex i _a /i _b	Energy limitation of sparks and temperatures	0, 1 or 2 0, 1 or 2 Class I, Div. 1 Class I, Zone 0/1 Class I, Zone 0/1	EN 60079-11 IEC 60079-11 US FM 3610/CA CSA C22.2 No. 157 US FM 3610 CA CSA E 60079-11	Measuring, control technology and engineering, sensors, actuators, instrumentation
Pressurized		Ex px/py(pz) Ex px/py(pz) AEx px/py(pz) Ex px/py(pz)	Ex atmosphere is kept apart from ignition source	1 or 2, (3) 1 or 2, (3) Class I, Zone 1 (2) Class I, Zone 1 (2)	EN 60079-2 IEC 60079-2 US ISA E 60079-2 CA CSA E 60079-2	Switchgear and control , cabinets, motors, measuring and analysis devices, calculators
Encapsulation		Ex m _a /m _b /m _c / Ex m _a /m _b /m _c AEx m _a /m _b /m _c / Ex m _a /m _b /m _c	Ex atmosphere is kept apart from ignition source	0, 1 or 2 0, 1 or 2 Class I, Zone 0/1/2	EN 60079-18 IEC 60079-18 US ISA 60079-15	Coils of relays and motors, electronics, magnetic valves, connecting systems
Oil immersion		Ex o Ex o AEx o Ex o	Ex atmosphere is kept apart from ignition source	1 or 2 1 or 2 Class I, Zone 1	EN 60079-6 IEC 60079-6 US ISA 60079-6 CA CSA E 60079-6	Transformers, relays, start-up control units, switchgear
Sand encapsulation		Ex q Ex q AEx q Ex q	Transmission of an explosion to the outside is excluded	1 or 2 1 or 2 Class I, Zone 1 Class I, Zone 1	EN 60079-5 IEC 60079-5 US ISA 60079-5/UL 60079-5 CA CSA E 60079-5	Transformers, relays, capacitors
Protection method »n«		Ex nA,nC,nL,nR Ex nA,nC,nL,nR AEx nA,nC,nL,nR Ex n	Different protection concepts for zone 2	2 2 Class I, Zone 2 Class I, Zone 2	EN 60079-15 IEC 60079-15 US ISA 60079-15 CA CSA E 60079-15	Only applications zone 2
Optical radiation		Ex op Ex op	Limit, avoid etc. transmission of optical radiation	1 or 2 1 or 2	EN 60079-28 IEC 60079-28	Optoelectronic devices, e. g. with fibreoptics
Non-incendive		(NI)	Avoidance of sparks and temperatures	Class I, Div. 2	US FM 3611/US ISA 12.12.01/ CA CSA C22.2 No.213	
Explosion-proof		[XP]	Transmission of an explosion to the outside is excl.	Class I, Div. 1	US FM 3615/UL 1203/ CA CSA C22.2 No.30	

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EC type test certificate

Classification per CENELEC/IEC/NEC 505, Explosion sub-group gases and vapours							Additional conditions	
	T1	T2	T3	T4	T5	T6	Conditions	Marking
I	Methane	–	–	–	–	–	Equipment applicable without restriction	–
II A	Ammoniac Methane Ethane Propane	Ethyl alcohol Cyclohexane n-Buthane n-Hexane	Fuel in general Aircraft fuel Fuel oil	Acetaldehyde	–	–	Observe special application conditions	x
II B	Lighting gas Acrylonitrile	Ethylene Ethylene oxide	Ethylene glycol Hydrogene sulphide	Ethyl ether	–	–	Ex device with part certificate cannot be used alone; CE conformity will be certified through assembly in a complete equipment	u
II C	Hydrogene	Ethine (Acetylene)	–	–	–	Coal disulphide		



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REALISE EXPLOSION PROTECTION WITH A COMPETENT PARTNER





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