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Switches for extreme environments Just about indestructible

Ambient conditions can be extreme, whether in opencast mining or fertiliser production. Dust, damp, aggressive substances and vibrations all take their toll on equipment. Robust and resistant switches are therefore needed if human and machine safety are to be guaranteed. steute Technologies has recently extended its range of Extreme products to include a new emergency pull-wire switch and a new belt alignment switch.

At the last SPS IPC Drives in 2018, steute Technologies presented two new products: the company from Löhne launched its ZS 92 S emergency pull-wire switch and its ZS 92 SR belt alignment switch. Both devices are from the steute Extreme range and will also be presented at the Powtech, as a focal point of the steute booth. But what exactly does Extreme mean, what is so special about these switches, and which applications are they suitable for?

The steute business unit Extreme has existed since the SPS in 2010. Together with the business units Wireless and Automation, it primarily addresses industrial applications. The fourth and final steute business unit is Meditec, which produces switchgear for medical equipment. So what is the difference between Extreme products and those in the other three business units?

On the steute website it says: "Where other switches meet their limits, the products from the Extreme range are in their element." Rainer Lumme, Product Manager for steute Extreme, adds: "For us it is all about the Extreme, the motto of our



Following a vertical pull on its wire, the ZS 92 S guarantees a reliable emergency stop – even on larger machines

business unit. The most important thing is that our switches can withstand whatever environment we put them in. We have built up a very comprehensive product range

especially designed for extreme conditions. But, as Rainer Lumme emphasizes, this does not just mean devices for explosive zones: "Our range also fulfils numerous other requirements, such as corrosion resistance, high IP protection class and resistance to very high or very low temperatures." The two new switches ZS 92 S and ZS 92 SR have been designed for precisely such environments.

Bi-directional emergency stop function

The basic requirement made of an emergency pull-wire switch is to guarantee a reliable emergency stop, even on larger machines. The switching function is triggered by a vertical pull on the wire. Actuation is possible anywhere along the wire. In the emergency stop position, the switch latches and can be unlocked by actuating the release lever. According to the EN 60947-5-5 standard, during vertical pull on the wire to actuate the switch, the maximum values of 200 N for the actuation force and 400 mm for the actuation travel may not be exceeded. In addition to this requirement, the pull wire must be able to withstand ten times the vertical force used to generate the emergency stop signal.

The steute ZS 92 S emergency pull-wire switch fulfils both of these criteria. It can also impact in two directions – with wire lengths of up to 100 m each way. The second important function of such switches is the monitoring of wire breaks. For this the wire must be mounted with a certain pretensioning force.

Keeping conveyor belts on track

Belt alignment switches, such as the ZS 92 SR from steute, monitor the running of conveyor belts. If a belt is no longer running straight between the conveyor

rollers, the switch will communicate this. Common reasons for crooked belts include incorrectly positioned freight or dirty rollers and/or pulleys. Without detection this can quickly lead to damage, pile-ups or spillage. The ZS 92 SR incorporates an additional and practical monitoring feature: the switch has staggered contacts with individually adjustable switching points. Each switching point for monitoring and stopping can thus be individually adjusted within a range of 5 to 35 degrees. Adjustment is simple because the switching inserts can be unlocked and moved into the desired position by hand.

Also helpful is the option of setting the switches to first emit a warning. The conveyor belt is only halted if the switch is actuated a second time. These warning contacts can help to reduce downtimes of conveyor belts because users have the chance to intervene and solve the problem before the conveyor belt stops.

The ZS 92 S and ZS 92 SR belong to the steute Extreme range, meaning that their suitability for heavy duty applications and extreme ambient conditions takes on a particular significance. For example, the switches can be used in extreme temperatures of between -40 and +85 °C. In each case, the interior of the switch is protected by a robust, anti-corrosive aluminium housing with a special passivation, priming and powder coating; the mounted parts are made of stainless steel. In addition, top-quality sealing materials protect the interior of the switches from any penetration of dirt or damp. Both devices are approved for IP 66 and 67.

Not mass-produced, but hand-crafted

In order to guarantee the quality of its products, steute does not only rely on first-class materials and intensive research & development, but also on careful production and attention to detail. Rainer Lumme: "Unlike many of our competitors working in normal industrial automation and concentrating on high quantities and low prices, we do not favour mass production. Many of our products are crafted by hand."

In addition, once they have been completed, the switches are subjected to extensive testing. "Every switch that we produce is subsequently tested for its performance and functionality. In most cases we also conduct a leak test in order to guarantee the quality of the sealing", Carsten Both, Head of Industrial Product Development at steute, adds. "Our customers must be able to rely on the performance of our switches."

Hard times for switching devices

And regarding performance, the switchgear manufacturer is now going one step further. Besides the usual laboratory tests, the company is now increasingly favouring tests in real-life conditions. Thanks to a cooperation between the Fraunhofer Institute IFAM and Carsten Both with his team, truly hard times have dawned for the switchgear in the steute Extreme range.

Devices are now exposed to harsh weather on the North Sea island of Helgoland for 12 months at a time. "We wanted to test our switches in real-life conditions. Usually they are only tested in the laboratory. But laboratory conditions can only reflect reality to a certain extent", Both says.

Thanks to the special workmanship and robust design of the ZS 92 S and ZS 92 SR, both switchgear series are suitable for many different fields where particularly harsh conditions prevail. Typical uses include recycling plants, gravel pits, mining applications, waste disposal sites, coal-fired power stations or fertiliser production.

One example where emergency pull-wire switches are exposed to particularly harsh environmental conditions is in the manufacture of fertilisers. In order to create a specialised and highly effective fertiliser from potash ore, for example, complex techniques are necessary, such as flotation. In the basins of flotation plants, the various potash components are separated using electrostatic charge. The problem: the saline solution in the flotation basin is extremely corrosive, and at temperatures of around 40 °C the ambient air also contains magnesium chloride fumes. Even stainless steel rusts very quickly; and the fumes also attack the interior of the switching device.

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