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ONE FITS ALL

A new series of emergency pull-wire switches demonstrates the benefits of modular construction in electromechanical switchgear. This switchgear series can withstand extreme ambient conditions, can be used universally and is highly versatile with regard to installation, mounting and integration in existing equipment.

Emergency pull-wire switches must fulfil their task reliably, whether in dusty atmospheres, extreme temperatures or corrosive environments. They are the "heavy workers" among electromechanical switches – and the steute Extreme range.

IMPORTANT FACTOR: ACTUATION FORCE

The actuator of an emergency pull-wire switch is a lever connected to the pull wire. If the operator pulls on the wire in an emergency, the switch is actuated and the conveyor belt or machine stops safely.

An important factor here – especially with long wires – is the actuation force required. The steute engineers designing the new ZS 92 S series have developed a whole new mechanism. Amongst other things, this has enabled them to achieve significant reductions in the actuation force and travel required to trigger the emergency-stop function. This in turn makes operation easier, while still reliably

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complying with all the relevant international standards – e.g. for emergency-stop switchgear, emergency pull-wire switches or the safety of continuous conveyors.

UNIVERSALLY APPLICABLE

Thanks to universal mounting options, the switches in this series are very versatile. The ZS 92 S is fully operational in any of nine different settings for the position of its trigger and release levers. This means that it can be installed more or less anywhere, including for the first time from the rear. And yet the basic model is still the same, just configured differently. Another feature guaranteeing that the new emergency pull-wire switch is universally applicable is that its mounting points are compatible not only with those of its predecessor, the ZS 91, but also with those of other commercially available pull-wire switches. This makes retrofitting of existing (conveyor) systems with the new series very easy.

FROM FREEZING COLD TO BOILING HOT

In guaranteeing the widest possible application range for steute Extreme switchgear, the ambient temperature is an important factor. Extracting plants with their conveyor machinery are often located in regions with extreme temperatures

» **THE SWITCH CAN BE INSTALLED FROM ANY DIRECTION, INCLUDING THE REAR**

and/or extreme differences between day and night temperatures. The ZS 92 S can be used in temperatures ranging between -40 and +85 °C, and this extended feature really is needed in practice.

Like the ZS 92 S pull-wire switch, the ZS 92 SR belt alignment switch derived from it is an example of intelligent modular design

WELL PROTECTED – ALSO IN EX-ZONES

In addition, the ZS 92 S series is perfectly equipped for applications in damp areas, dusty atmospheres and corrosive environments. The saltwater-resistant, die-cast aluminium housing has a multiple coating and is thoroughly sealed, the connector blocks are well protected inside a terminal box, and a plug-in safety bus module can be optionally integrated inside the housing. Protection classes IP66/67 are further proof of suitability for extreme applications. And a maximum wire length of 2×100 m facilitates use alongside very long (conveyor) systems.

Features also include suitability for explosive zones. Versions for dust Ex zones 21 and 22, as well as gas Ex zone 1 will be available shortly.

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Interim checks after seven months of outdoor exposure on the island of Helgoland: the emergency pull-wire switches are still fully functional

BELT ALIGNMENT PERFECTLY MONITORED

Emergency pull-wire switches guarantee machine safety in line with the current standards, whereas process safety is the chief concern for a different type of heavy-duty switchgear also to be found along conveyor (belt) machinery: belt alignment switches monitor the correct alignment of the conveyor belt. Here the actuator is a large roller lever which moves if the belt is not running centrally, e.g. because it is has been unevenly loaded. It is then necessary to correct the belt alignment or to stop the conveyor system. These devices usually work in two stages: when a misalignment is detected, a warning signal is sent. If the signal is ignored, or if the misalignment becomes worse, then the belt stops. An undetected belt misalignment can cause

AS ROBUST AND VERSATILE AS POSSIBLE

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Not only as robust as possible, but also as versatile as possible: this was the guiding idea during development of the new ZS 92 series. This is why the new emergency pull wire switches have different mounting points and diverse settings for the actuation and release levers. Users of the belt alignment switches can adjust the switching points for both the advance warning and the actuation. It was important that all options could be realised with just one basic model. This reduces the differences between variants – which also benefits the user, e.g. through simplified storage.

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Typical application for emergency pull-wire switches along a conveyor belt, here in a limestone quarry in the United Arab Emirates

SAFETY SWITCHGEAR FOR ADVERSE ENVIRONMENTS

The special requirements for emergency pull-wire switches result from their use as "extended emergency stop buttons" along conveyor belts, i.e. where ambient conditions are often adverse. Dust levels, in particular, are often high. Because these are outdoor applications, the temperature range also needs to be extensive. And last, but not least, conveyor systems are often used in bulk handling installations or process equipment in ports, which means that corrosion resistance is also key.

huge disruption, and the switch prevents this.

The steute engineers have developed a new belt alignment switch based on the ZS 92 S: the ZS 92 SR. A new switching mechanism has also been developed for this switchgear series, facilitating realisation of a solution with staggered contacts using a type of cam. Here the switching points for the advance warning signal and for the shut-down can be set within a range of 5 to 35°. This is performed by simply unlocking, moving and re-locking the switching inserts. The basic position of the roller lever can also be adjusted – depending on the variant – in 12° steps using a cog system, or freely using a clamp. The switch can thus be adapted to the application in question quickly and easily.

In all other respects, the features and application profile equal those of the ZS 92 S, for example regarding ambient conditions (temperature range, mechanical wear and tear, dust, damp, humidity, protection class, corrosion resistance...).

TESTED IN REAL-LIFE CONDITIONS

The switches in the steute Extreme range are, of course, thoroughly tested to check whether they meet the relevant standards, e.g. for corrosion resistance. Standard procedures include a salt spray test to DIN EN ISO 9227. This test makes it easy to compare devices with regard to this single feature.

However, experiments at the Fraunhofer IFAM have shown that standard tests are not always representative of the behaviour of workpiece samples and components in practice. In the tests, the impact of the salt spray is constant, whereas in reality switches are exposed to water and saltwater at irregular intervals, depending on the weather, the tides and the waves. Additional factors, such as fouling, also affect corrosion behaviour.

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For this reason, the Fraunhofer IFAM operates an outdoor exposure site on the North Sea island of Helgoland where tests can be conducted in real-life conditions in splashwater or at tidal level. steute takes advantage of this service, repeatedly booking 12-month tests on several samples each from selected Extreme switchgear series, including the emergency pull-wire switches.

Both the appearance of the switches after one year in splashwater and the final test report clearly show: nearly all tested devices are saltwater-resistant and still fully functioning after 12 months. Even the labels and the attached laser enscriptions are still present and legible. In May this year, after 7 months outdoors, the housings of the emergency pull-wire switches presented themselves for their interim checks in a very good condition. The "innards" of the switches, like switching inserts and plungers, were corrosion-free. This is testimony to the high quality of both the coating and the sealing.

KNOW-HOW FOR FUTURE USE

The steute engineers are building on the results from the outdoor exposure tests to optimise their existing switchgear series, as well as in the development of new Extreme products. One piece of valuable information gained, for example, is that the high-performance plastics used for the housings can definitely withstand the Extreme demands made on them.

In addition, the modular principle successfully tried and tested during the construction of the ZS 92 S/SR series will also be employed in further developments. The high-performance switching devices are produced in a modest, yet considerable variety of variants. With the ZS 92 S, very different demands and specifications can be met with one and the same basic model, and yet the user is able to choose from a wide range of options.

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