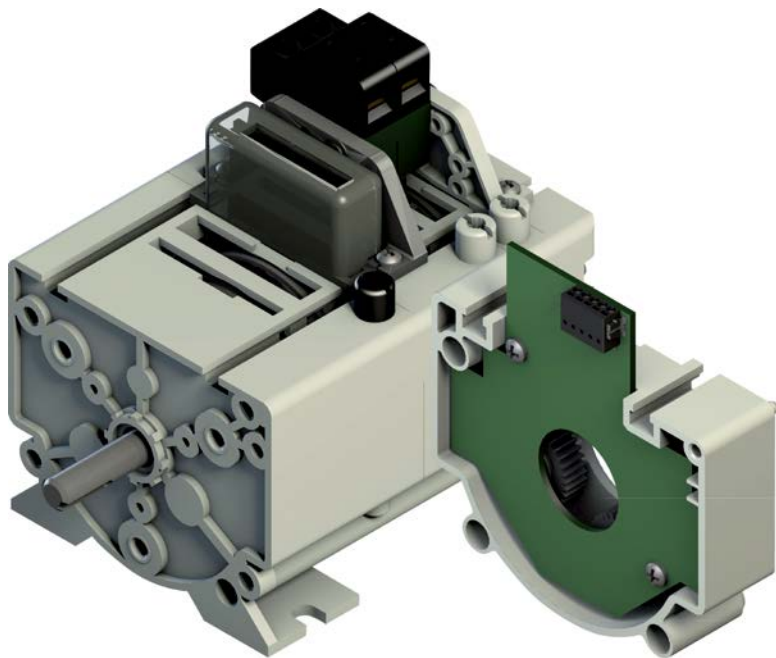




# SMART CAM<sup>®</sup>

THE INTELLIGENT COMPACT SOLUTION



# Stromag

Founded in 1932, Stromag has grown to become a globally recognized leader in the development and manufacture of innovative power transmission components for industrial drivetrain applications. Stromag engineers utilize the latest design technologies and materials to provide creative, energy-efficient solutions that meet their customer's most challenging requirements.

Stromag's extensive product range includes flexible couplings, disc brakes, limit switches, an array of hydraulically, pneumatically, and electrically actuated brakes, and a complete line of electric, hydraulic and pneumatic clutches.

Stromag engineered solutions improve drivetrain performance in a variety of key markets including energy, off-highway, metals, marine, transportation, printing, textiles, and material handling on applications such as wind turbines, conveyor systems, rolling mills, agriculture and construction machinery, municipal vehicles, forklifts, cranes, presses, deck winches, diesel engines, gensets and stage machinery.



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### SOLUTIONS FOR EVERY APPLICATION

Stromag has been building geared cam and spindle limit switches for over fifty years. With a wide range of gear systems, switching contacts, and housings of metal or plastic, we can offer solutions for every application.

With modern 3D design equipment, we support our customer in every phase of the new development. All analogue and digital encoder systems can be integrated.

Our geared cam limit switches reliably switch off sequences of movements and position or restrict these with independently and precisely configurable cam discs.

Stromag Geared Cam Limit Switches are the optimal customized solution for every application in the following fields:

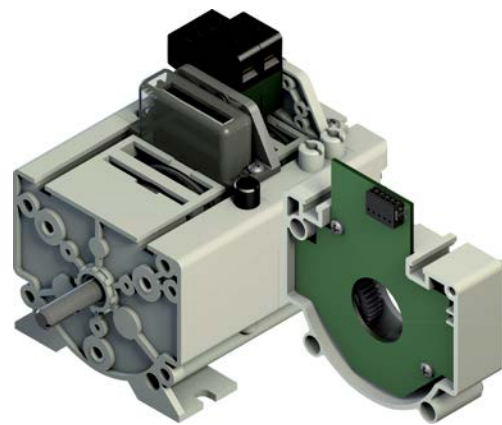
**Stage engineering • Crane market • Wind power**

### STROMAG SMART CAM® MULTI-TURN ENCODER

#### OUR INTEGRATED TOP SOLUTION FOR THE TRIED AND TESTED 51 SERIES

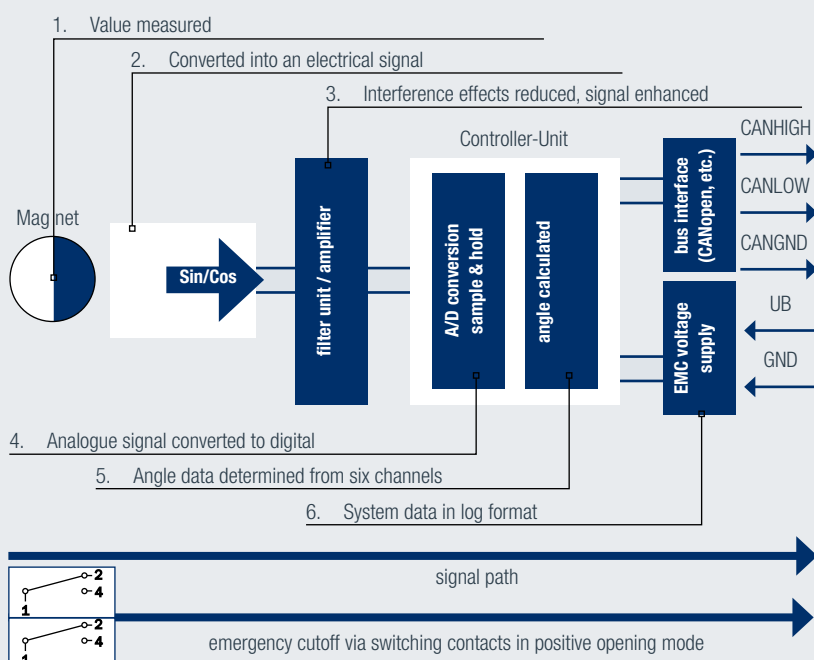
##### Perfect combination for your condition monitoring system

The Smart Cam® is integrated in the modular gear from the 51 Series. The mechanical switching contacts continue to be responsible for the reliable deactivation at the end positions. Additional data like absolute position on the lifting and traverse path, sense of rotation, speed, acceleration, and operating hours are sent separately via the Smart Cam® bus systems like CANopen to the control system.



### BENEFITS INCLUDE

- Integrated in a new 51 Series module
- Multi-turn encoding without backup battery for recording absolute values and initiating safety cutoffs at the end positions
- Easy setup of multichannel, redundant, and diverse systems in conjunction with all kinds of additional encoder systems





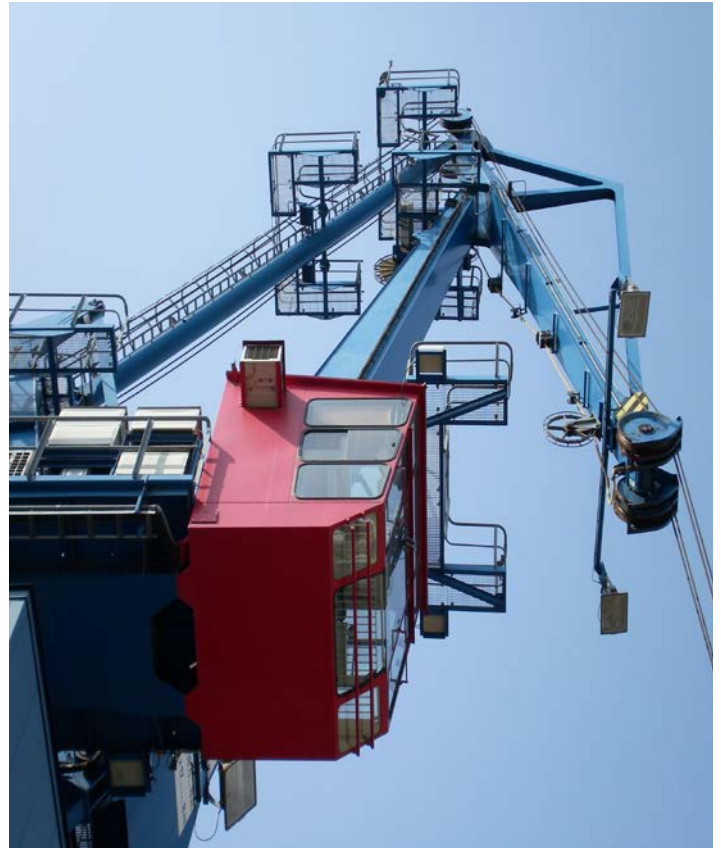
## Product overview

### CRANE MARKET

Stromag has been building geared cam and spindle limit switches for over fifty years. With a wide range of gear systems, switching contacts, and housings of metal or plastic, we can offer solutions for every application.

Our geared cam limit switches reliably switch off sequences of movements and position or restrict these with independently and precisely configurable cam disc.

Combined integrated solutions with this intelligent Stromag Smart Cam® can detect not only absolute positions, but also the sense of rotation and overspeed. System integration is then perfected by a bus system that conveniently transfers all parameters to the crane controller's condition monitoring system.



### APPLICATIONS

#### A must for every condition monitoring system!

Reliable deactivation at the end positions with additional feedback on absolute positions:

#### 1) Bridge cranes

- Compact hoisting gear
- Open winches

#### 2) Mobile cranes

- Crawler cranes
- Truck cranes
- Rail-Bound mobile cranes

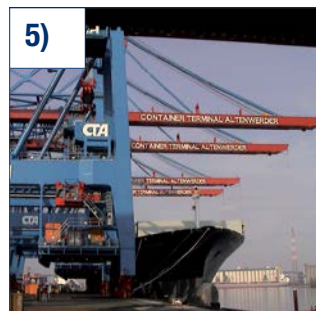
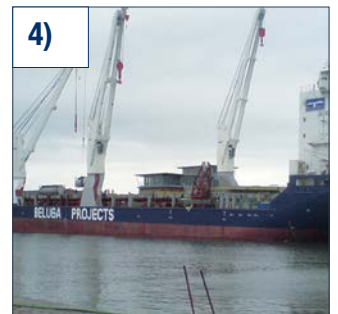
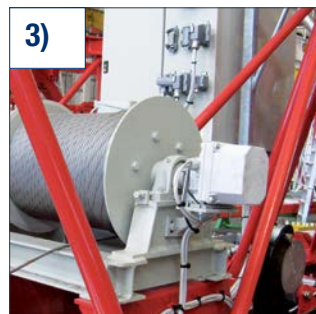
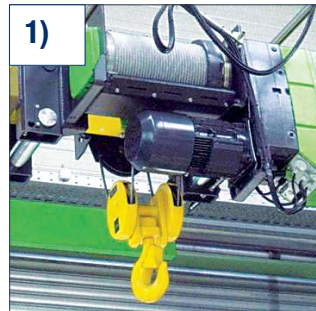
#### 3) Tower cranes

- Top slewing cranes
- Bottom slewing cranes

#### 4) Deck cranes

#### 5) Harbour cranes

- Ship to shore
- RTGs
- Straddle Carriers



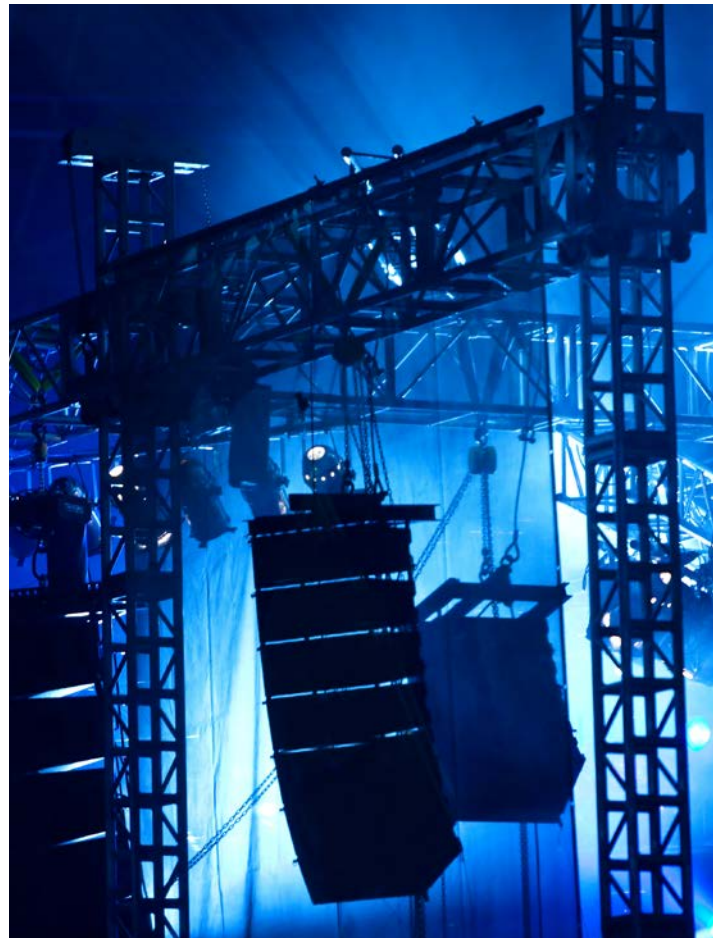
### STAGE TECHNOLOGY

Depending on the stage setting, podia weighing several tonnes must be raised or lowered quickly in a long stroke or “creep” extremely slowly over the whole duration of the performance. At the same time they must be deactivated reliably and precisely at their end positions.

Actors often work under suspended loads that also change positions in the dark. For this reason, the electrical drives for the above and below stage machinery are also fitted with redundant braking systems and special gear limit switches that deactivate the system reliably and to high precision.

A critical role is likewise assigned to the sync tolerances in the most diverse structures. This is a typical application for Stromag geared cam limit switches complying with DGUV 17 that are used for both reliable deactivation in the mobile flying equipment above stage and the high precision positional feedback on the screw type hoist elements below. In particular the 51 Series based on positive crown gears has proved its usefulness for applications demanding a high level of safety in the wide field of theatre engineering.

Integrated in these systems, the Stromag Smart Cam® provides the optimal solution for absolute positioning as well.

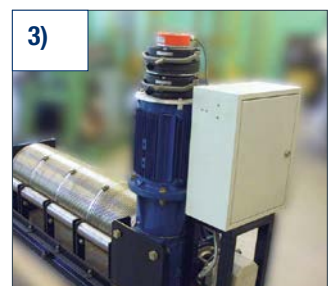
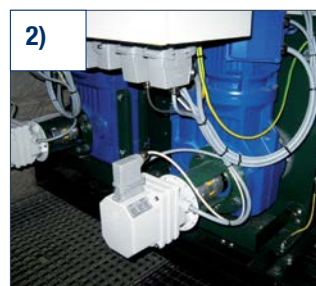
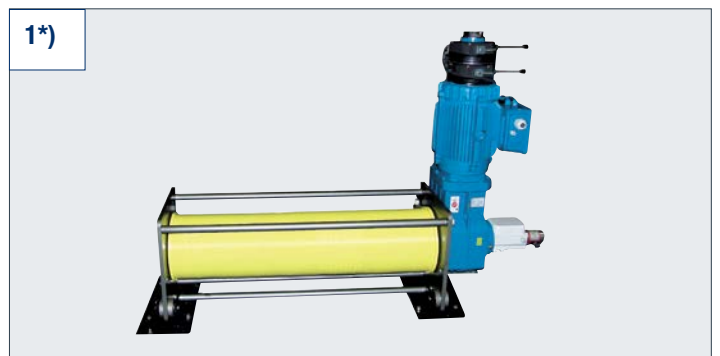


### APPLICATIONS

#### Plays an invisible, but key role

Sync tolerance in the most diverse structures adopts a key role in stage and theatre engineering. This is the domain of the Stromag Series 51 complying with BGV C1 (VBG 70). Its design purpose is reliable deactivation, e.g. in the following main categories:

- 1) Above stage machinery
- 2) Below stage machinery
- 3) Line sets
- 4) Screw type hoist elements
- 5) Hoisting and lighting installations





## Product overview

### WIND ENERGY

For yaw drives, the mechanical switching contacts for deactivating the rotating nacelle take the form of antitwist cables at the predefined end positions and a range of positional feedback systems integrated in the one housing. On request, customised plug-in solutions can ensure time saving, simple installations free of potential confusion. We shall be pleased to join forces with you in developing special cam configurations that e.g. can map Gray code binary systems.

Ever greater cut-off precisions demand high precision sensors for the determination of absolute positions. Integrating this safety critical signals via appropriate bus systems like e.g. CANopen provides the basis for the Smart Cam®.

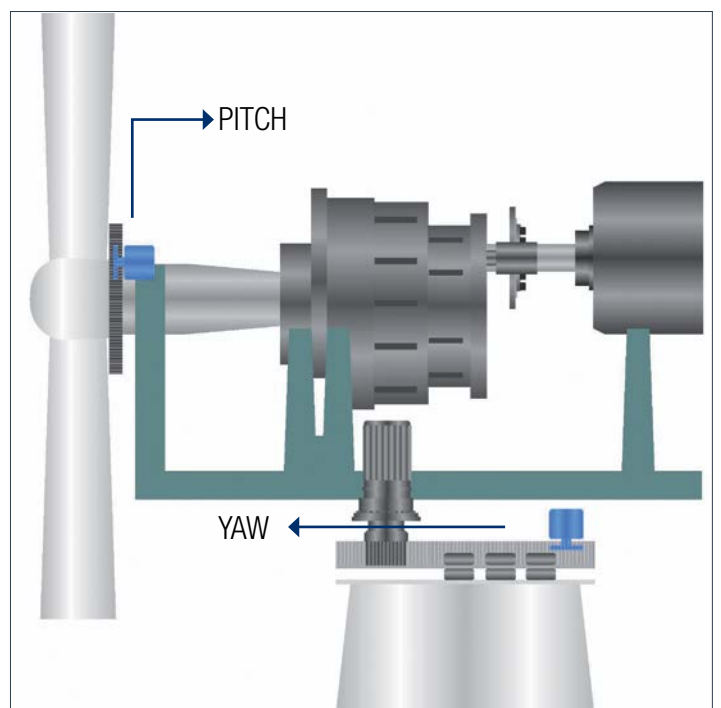
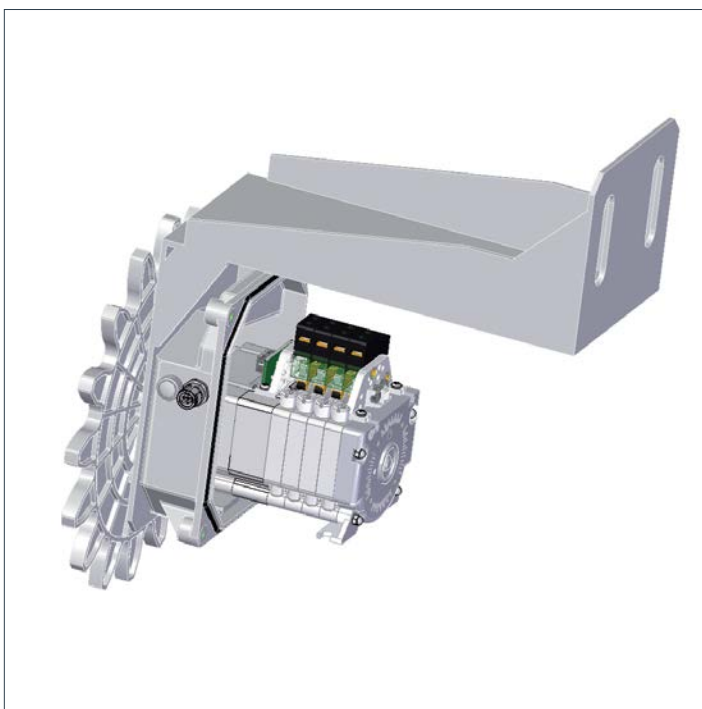
For pitch drives, the mechanical switching contacts and the precision multi-turn absolute encoder are integrated in a housing. Besides reliable deactivation at the end positions, Smart Cam® also sends the controller feedback on the rotors' absolute position in the wind.

Pretensioned drive gears, also in conjunction with wheel adjustments, help to ensure rotary movements free of backlash from the slewing ball ring to the rotary encoder's input shaft through form-fit connection. Also at the pitch switch, customised plug-in solutions can on request ensure time saving and simple installations.



### APPLICATIONS

**The primary task of Stromag geared cam limit switches is the reliable deactivation of rotating parts in wind turbine generators.**



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