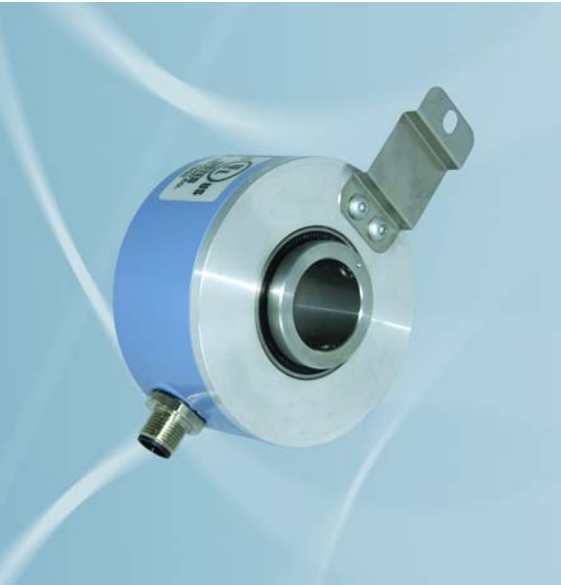


Cranes and construction

The use of encoders in the construction of cranes

- High accuracy in positioning of cranes
- High reliability in rough environment
- Safe and comfortable operation
- Joint design with customer
- Wide temperature range: -40 °C up to +80 °C



A custom product is used in conjunction with limit switches

Geared cam limit switches have for a long time been an integral part of cable winches. They are constructed in such a way that they reproduce numerous turns of a shaft on the angle of rotation of the integral cam-disc or camshaft.

As they move, the individual lobes operate mechanical switch contacts, which for example ensure the emergency shut-down of the winch before the end of the cable is reached, or for slower unwinding of the winch shortly before this point. Geared limit switches are essential component parts of power-operated hoisting equipment, their use being stipulated by accident prevention regulations. They are required for independent limiting of travel on cranes and conveying equipment. However movement in the opposite direction must still be permitted after operation of the limit switch.

New challenges

For some time now cam gears have also been used in the construction of theatre and stage equipment, as modern stages become evermore mobile and versatile. For also 75 years the Stromag Company from Unna in Germany has been manufacturing clutches, brakes, flexible couplings and geared limit switches. They are one of only a few German companies who have obtained for their geared limit switches the certification required for the stage construction industry. Experience in the manufacture of geared limit switches has been built up over the years. Stromag's design and development department faced a new challenge as a result of the fact that in modern power-operated hoisting equipment geared limit switches are not only required to fulfil their traditional functions but that now there is also the requirement that electronic detection of the winch position has to be provided to the crane operator. This is particularly helpful, because the human eye is not able to accurately estimate large distances and so the crane operator also has to rely on external help. However by using a digital display it is possible to see the exact length of cable that has been paid out or the height to which the crane arm has been raised. This small addition

makes operating a hoist considerably easier and improves the ease of operation especially with heavy loads.

Ability to retrofit as top priority

In the meantime Stromag has integrated various combinations of geared limit switches with position feedback systems into a flexible choice of housings. However it had been a long road to get there:

The immediate goal for Stromag was to find a system that would be easy to retrofit to already existing systems.

Retrofitting incremental measuring systems to existing geared limit switches can be achieved using an assembly-bell with integrated encoder systems.

Search for electronic data acquisition

Even the first of these requirements posed a problem, as the hollow-shaft encoder, which was to collect the desired data, together with all the necessary connections, had to fit into the quite small housings of the various cam gears. Furthermore it also had to be capable of accommodating a relatively large 14mm diameter shaft with spring coupling, for retrofitting to older existing systems.

Wachendorff gets the order

In the face of stiff competition, the Wachendorff Company from Geisenheim in the Rheingau managed to successfully secure the order. They were able to fully comply with the requirements of Stromag by customising their encoder model WDG 58 H, so that the new dimensions of the encoder met Stromag's specifications, with a diameter of 58 mm and an overall length of 44.5 mm. The accuracy of the incremental encoder, with up to five thousand pulses per revolution, is sufficiently high enough for use in the corresponding limit switches.

Dependable over a long service life

The functionality of the encoder is assured even under adver-

se conditions, thanks to its high IP65 protection level. The maximum allowable operating temperature is in the range of $-40\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$.

The encoder's permissible maximum shaft loadings are 80 N radial and 60 N axial. The encoder is double-supported. Two precision ball-bearings provide backlash-free support for the encoder. The service life is 109 revolutions at 100% of full rated shaft load and is extended to 1010 revolutions at only 20% bearing load. The infrared LED that is used has a life of around 100,000 hours – a figure normally only rarely achieved in limit switches applications.

WDG58 encoders also come equipped with an early warning output that transmits a warning signal if the light intensity of the diode falls to more than 10% below the original value, which signals an imminent failure. Despite this, the encoder will go on working without any problems for more than another 1,000 hours, with the advantage that it can thus be exchanged during a normal maintenance period.

As a rule all encoders are wired up via a radial connector, however in this case this would have taken up too much space in the housing, so for the application with Stromag limit switches this was replaced by a cable output. This cable now leads to a connector that is attached externally on the cam gear. The cable length with Wachendorff encoders can be up to 100 metres. In reality however only a few centimetres are necessary. Simple mounting, reliable system

Simple mounting, reliable system

If Stromag now receives an order for a cam gear with a position feedback system then the encoder is simply slipped onto the shaft of the cam gear. The separate housing that accommodates and fixes the WDG 58H is then screwed to the gear and wired up – the rest of the limit switch remains totally unaltered.



Image 1
Encoder in assembly-bell and cam gear



Image 2
The encoder in his position at the limit switch. The assembly bell has been removed



Image 3
The cable output goes from the encoder to the connector at the assembly bell



Image 4
The hollow shaft encoder



Image 5
A cam gear and the encoder with assembly-bell

Any Questions? Just call Dieter Schömel +49 (0) 67 22/9965-10, send him an E-Mail at sco@wachendorff.de or call your local distributor.



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