With lifting capacities (SWL) of up to 1,000 t and 2,000 t, the cranes manufactured at TWK are the most powerful in the world when operated in tandem. The fact that complex technology is used in these mighty systems is clearly revealed by the control technology, and particularly the sensor system that is implemented. Important parameters that have to be registered include e.g. the boom angle, the turret position (azimuth), and the winch speed for the lifting speed. The ship’s heel (list) is additionally registered by means of an inclinometer. If the ship reaches a specific limit value when “rolling” around its longitudinal axis and a corresponding boom angle is registered, the function is limited due to safety reasons. TWK has been supplying TTS NMF with sensors since 1986. Type PP27 potentiometric angle of rotation encoders were initially supplied. These encoders use contacts for sampling, and have a limited electrical working range. These small, robust rotary encoders that are suitable for industrial use were used primarily in smaller deck cranes to determine the distance between the load on the crane hook and the revolving crane (working radius). Type TBA50 contactless absolute rotary encoders are now increasingly being used. They come with CANopen Safety option and support CiA 301, Version 4.1, CiA 406 Version 3.0, as well as CiA 305. The T series rotary encoders operate internally using Hall technology, i.e. magnetically. They are designed in
dual-chamber which e.g. enables the electronics to be cast. The extended temperature range of -40 °C to 85 °C is standard. Thanks to its wall thickness of 5 mm to 10 mm, the housing, which is manufactured from aluminum or, in this case, stainless steel, is extremely robust. With a diameter of 12 mm, the stainless steel shaft can cope with loads of up to 250 N axially and radially. A Simmerring seal ensures leak tightness. Protection class IP69K can be achieved by casting the electronics in the housing. This encoder series is particularly suitable for harsh environments that are characterized by wet conditions and extreme temperatures.

It can be networked together with other sensor system and actuator system subscribers in e.g. CANopen using a network interface. SIL2 and TÜV-certified variants are also available (CANopen Safety). In automating complex assemblies, these perform a number of tasks as position feedback sensors and speed sensors.

**Rotary encoder**

One further rotary encoder that has been developed specifically for cranes is an absolute multiturn encoder with slewing ring functionality. These enable the number of teeth of the slewing ring and rotary encoder pinion to be set directly in the rotary encoder. As a result, all conceivable gear ratios can be implemented, and the rotary encoder can be adapted precisely to the respective slewing ring by the customer. The rotary encoder then supplies the position of the slewing ring in degrees (resolution adjustable) and its speed in degrees/unit of time (unit of time adjustable) as output values. An optional play-free gear ZRS from TWK is available for coupling to the slewing ring. Manufactured from special, permanently elastic plastic, this gear is particularly resistant to temperature influences, moisture, aggressive substances, and permanent mechanical stress. The special tooth shape guarantees that a tooth's flanks are constantly in contact with the gear that is to be measured. This prevents falsification of the measurement signal on switching between forwards and backwards rotation (backlash).

In the field of inclinometers, TWK has developed the NBx65 model series based on so-called Mems technology.
Inclinometers with Dynamic Acceleration Compensation

Compensation of External Accelerations

Clean Angle Measurement During Dynamic Movements

Optional Output of Acceleration and Rate of Rotation

IP69K Protected to Meet the Requirements of Mobile Equipment

Accuracy 0.5° During Dynamic Movements

Available with CANopen Interface

POSITAL’s Accessories

Rugged Connectors and Cables

www.posital.com