HOLLOW-SHAFT ENCODERS WITH INDUCTIVE CIRCUMFERENTIAL SCANNING

New hollow-shaft encoders have been introduced by HEIDENHAIN, extending the manufacturer’s range of products that use inductive position measurement and at the same time expanding the application range of torque motors.

Scale drum (centre); scanning unit (right); typical motor (left).

Designated ECI 4000 and EBI 4000, the robust encoders have a hollow shaft dimension of 90 mm, no integral bearing and offer high accuracy and

repeatability. They allow the replacement of toothed belt drives when coupling a feedback system to a torque motor, boosting drive dynamics and functionality as well as reliability, as there are fewer components involved.

Electric drives are popular due to their small environmental impact, quiet operation, low wear and minimal maintenance. In particular, direct drive via a torque motor is gaining in significance, as it needs no additional mechanical transmission elements in the drive train. Based on its power density and dynamics, it is often indispensable for achieving the required production throughput.

The ECI 4000 single-turn encoder has a resolution of 20 bits, while the EBI 4000 multi-turn version has a revolution counter option with a resolution of 16 bits and an external battery backup. With an overall height of just 20 mm, they consist of a scanning unit that attaches to the stator and a scale drum for the rotor. Highly accurate positional readings are taken by circumferential scanning and evaluating two incremental tracks of differing periodicity, a scanning principle that allows more open mounting tolerances.

Compensation of position errors when the centre of rotation of the drive shaft alters is achieved by all-round scanning, up to a maximum speed of 6,000 rpm. Image 2 shows a typical accuracy graph with a radial drive shaft eccentricity of 0.2 mm and otherwise ideal mounting conditions. In the case of rotary encoders with a single scanning track, under identical conditions the uncertainty of measurement is much higher.

The inductive rotary encoders have a digital EnDat 2.2 interface for continuous, closed-loop monitoring and are suitable for safety-related applications up to SIL (safety integrity level) 3, provided that additional

measures in the subsequent electronics are employed.

In addition to providing noise-free transmission, the interface supports other device-specific functions such as signal diagnostics and the transmission of data from an internal and an external temperature sensor. Additional connections are possible, with the Siemens DRIVE-CLiQ interface available as an option for the single-turn encoder.

Power supply range is 3.6 to 14 V and the encoders may be used at temperatures up to +115 °C. Stator vibration of 400 m/s² and rotor vibration of 600 m/s² to EN 60068-2-6 can be tolerated.

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