

FAG Axlebox Bearings with Integrated Sensors in the V250 for HSL-Zuid, Netherlands



Examples of Application Engineering

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Rolling bearing with an integrated sensor system for the wheelsets of the high speed train V250

In the Netherlands, a new high speed rail line is being built that will provide a faster connection between Amsterdam, Schiphol Airport, Rotterdam, The Hague, Breda, Antwerp, Brussels and Paris. The Dutch lines and the lines to Antwerp and Brussels will be serviced by the new electrical V250 trains built by Ansaldo Breda.

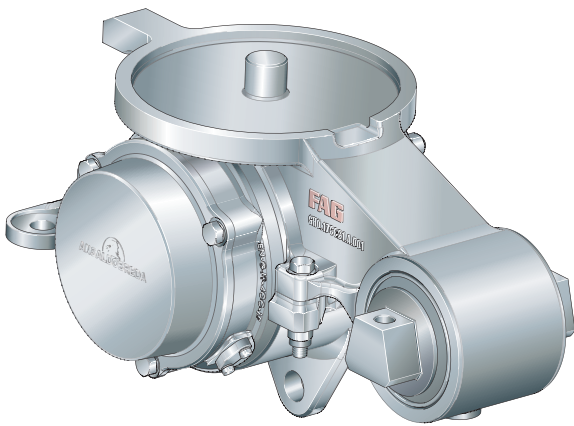
HSA (High Speed Alliance, a subsidiary of Dutch National Railways (NS) and the airline KLM) has ordered 16 trains, and Belgian National Railways (SNCB) has ordered another three. The vehicles consist of two functionally equivalent half-trains with a total of 32 axles, of which 16 are driven.

With a drive power of 5,500 kW, the trains can reach travelling speeds of up to 250 km/h.

Schaeffler Group Industrial supplies TAROL units with integrated sensor systems and housings for the wheelsets of the V250 trains.

Axlebox

Various designs of the FAG axleboxes of type **ANM130-T** are available, depending on the cover configuration. They consist of a so-called swing-arm housing with a housing ring into which the bearing is mounted, as well as a housing cover and a housing base. This design offers the advantage of simplified wheelset dismounting from the bogies. All axleboxes are fitted with a **TAROL130/230**. As a special feature, the bearings have an integrated sensor system that monitors the bearing temperature and the speed of the wheels.



Functions of the sensor system

The integrated sensor system is a self-calibrating measuring system that uses a ferromagnetic material measure. The non-contact sensors are wear-free. The system measures:

- Speeds in the range from 0 to 2500 min⁻¹
- The sense of rotation by means of out-of-phase signals
- The temperature inside the bearing by means of two independent sensors

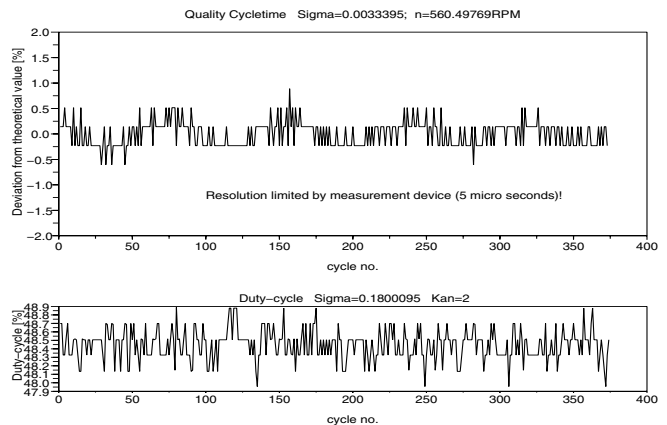
Optionally, radial and axial accelerations can be measured as well.

Technical data of the sensor system

- Two channels, out of phase by 90° ± 20°
- Temperature sensors: Pt 1000
- Drivers: 7/14 mA
- Temperature range: -40 °C to +125 °C (sensor + cable)
- Oil resistant, hermetically sealed (IP 68)
- End connector to customer's specifications
- Current consumption (without load): < 60 mA
- 80 pulses/rev; duty cycle 50% ± 2%
- EMC: EN50121-3-2; insulation 500 V
- Environmental standards: EN 61373 and EN 50155

High signal accuracy

During the test stage, the excellent signal quality - characterized by a stable duty cycle, cycle time and phase angle - was confirmed.



Accuracy of the cycle time and duty cycle
(= 1% accuracy or better)

Advantages

- Ready-to-mount unit
- Bearing units interchangeable with un-sensored bearings
- Simple mounting and maintenance
- Savings in terms of mounting space and weight
- Sturdy construction for the demanding operating conditions in trains
- Cable outlet in housing compatible with plug-in transducers
- Electrical compatibility with existing systems
- System can be combined well with grounding contacts or other add-on units
- High level of reliability and measuring accuracy
- No wear
- Long bearing life
- Can be integrated into existing systems

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