

Highly available track vacancy detection systems by means of axle counting

In the second half of the 19th century track circuits were introduced to detect the vacancy of track sections in order to allow automatic and safe operation of signalling control systems. Track circuits have been used in many countries around the globe ever since. Martin Rosenberger and Gerhard Grundnig describe the basics, the advantages and limitations of axle counting systems as an alternative to track circuits for track vacancy detection.

Because of new requirements axle counting systems were introduced in Europe in the early 1960s to replace track circuits. These requirements were:

- Electrification of many lines
- Increase of axle loads from 20 to 30 and even 35 tons
- Flexibility in the length of track sections and in case of changes
- Reduction of maintenance efforts
- Availability and maintainability

Functional principle of axle counting systems

At the beginning and at the end of each track section is a wheel sensor RSR - also called a counting head, track switch or treadle - detecting all the wheels of the trains traversing this section as well as their driving direction. Each wheel sensor is connected to an evaluation board EB by means of a four-wire signalling cable. The axle counting board ACB processes the axle detection data provided by the evaluation boards EB and generates a track clear or track occupied indication, which is output by direct relays (potential-free). In order to initially start the system (reset the counter) the axle counting board ACB features reset inputs.

Figure 1: Principle of axle counting systems

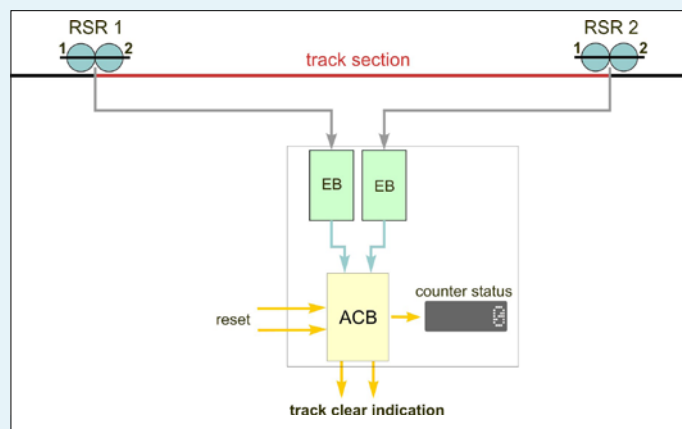


Figure 2: Outdoor equipment



Figure 3: Indoor equipment



Basically axle counting systems are schematically divided into two parts, the outdoor equipment and the indoor equipment. Components in and near the track such as wheel sensor and track side connection box (to connect the four-wire wheel sensor cable with the four-wire signalling cable leading to the evaluation board) are considered as outdoor equipment (Figure 2). All electronic components such as the board rack including the evaluation board EB and axle counting board ACB that are usually installed in the signalling / interlocking room are

considered as indoor equipment (Figure 3).

Applications and features

Because of its modular design, the axle counting system ACS2000 can be used in various applications: The ACS2000 can be configured to provide track clear and track occupied information for one single track section (single section axle counter) e.g. a point (Figure 4) but also for a station as well as for an entire line including block sections (multi section axle counter) (Figure 5).

Figure 4: Point application – Single section axle counter

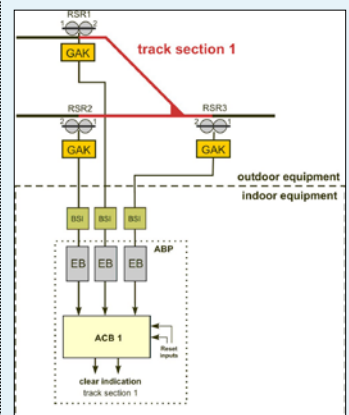


Figure 5: Station and block application – Multi section axle counter

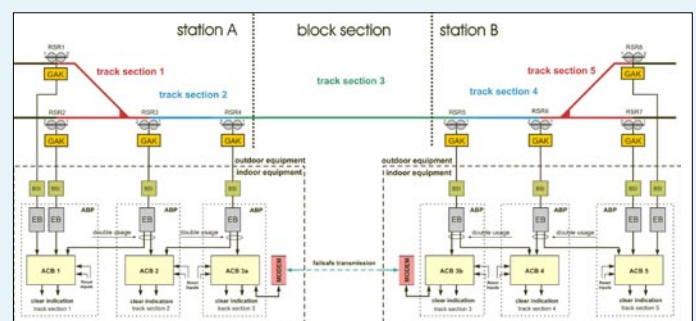


Figure 6: Wheel sensor under rough environmental conditions



The ACS2000 is used to replace existing track circuits in rough environmental conditions e.g. areas that are flooded (Figure 6) or exposed to conductive material such as coal or iron ore dust. However, it is also used for level crossings, on passenger and freight lines as well as urban commuter, metro and light rail networks.

In addition to the track clear and track occupied indication the following information can be provided:

- Driving direction
- Wheel centre
- Diagnostic data

Easy design and configuration (e.g. reset procedures, trolley suppression), quick and precise

mounting of the wheel sensor by means of a rail claw along with simple commissioning and maintenance cycles of 2 years allow a cost effective implementation of the axle counting system ACS2000 into the signalling system.

Summary

Frauscher Sensor Technology products are used in more than 40 countries based on a development according to the CENELEC standards EN50126, EN50128, EN50129 and

EN50159, assessment by an independent safety assessor that confirm SIL 4 and approvals by a number of railway authorities e.g. Austrian BMVIT and German EBA.

FOR MORE INFORMATION

Frauscher GmbH

Martin Rosenberger, sales manager
 T: +43 7711 2920-0
 E: martin.rosenberger@frauscher.com

Gerhard Grundnig, sales engineer
 T: +43 7711 2920-0
 E: gerhard.grundnig@frauscher.com

www.frauscher.com

Visit us at hall 26 stand 227