



# The Az S 350 U Microcomputer Axle Counting System

Vacancy and Occupancy Detection of Track Sections

Transportation Systems

**SIEMENS**

# The Az S 350 U Microcomputer Axle Counting System

The safety of many individual components are vital for safe railway operations. Signalling and safety systems, equipment and devices are required that interoperate smoothly. Track vacancy detection systems provide reliable information on the clear and occupied states of track sections, thereby having an important role to play in smooth railway operations.



The Az S 350 U axle counting system from Siemens (Achs Zählsystem Siemens 350 Universal) has been designed for use with main line and industrial railways, secondary lines and light rail transit systems. This system successfully and convincingly meets the requirements of many main line and mass transit operators.

The Az S 350 U system offers a high level of

- > economic efficiency,
- > availability,
- > technology adaptable to
- > future needs.

## A system offering numerous benefits

### Fast, trouble-free, multipurpose

The Az S 350 U axle counting system can be used

- > with all traction types,
- > with all common types of wagons,
- > in station areas and on single- and multiple-track lines,
- > for track sections of any length,
- > for train speeds up to 400 km/h.

## Az S 350 U – the economical axle counting system

- > High economic efficiency by low life cycle costs (LCC), high reliability and low-cost stocking of spare parts
- > No track insulation required
- > Low maintenance and repair expenditure
- > High availability by fault-tolerant evaluation of the pulse count through multiple-axle counting method
- > Space-saving compact design
- > Easy reconfiguring using DIP switches
- > Connection to all interlocking types via parallel relay interface

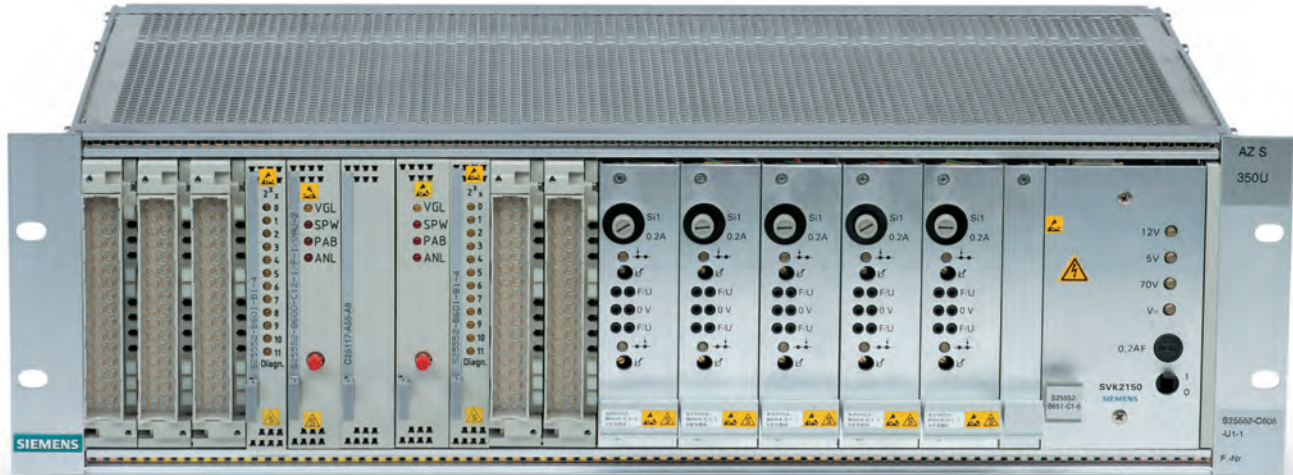
## Sophisticated range of features

### Compact, versatile, simple

- > Fail-safe computer in a 2-out-of-2 configuration on the basis of the well-proven Simis® principle
- > Rapid implementation of customer demands through simple configuring
- > Interaction of Az S 350 U with other Az S 350 U systems via serial data transmission (modem)
- > Serial interface permits the bidirectional transmission of binary operator-specific information, e.g. as block information, between the evaluation computers
- > Two types of reset procedures can be configured: "Immediate axle count reset (AzGrT)" and "Preparatory axle count reset (vAzGrT)"
- > Modular structure, rapid fault diagnosis due to LED displays and rugged design of wheel detection equipment
- > No need for air conditioning because the indoor equipment is designed for ambient temperatures from -25 °C to +70 °C
- > Adaptable to existing power supply systems due to a large input voltage range (24 V DC to 60 V DC)

# Detect Axles and Monitor Track Sections

## System Components



### Overall Az S 350 U system

#### How it works

Double wheel detectors mounted on one of the rails detect the axles of the passing vehicles. As they pass, the wheels change the alternating electromagnetic field between the transmitter and receiver of each detector and hence the voltage induced in the receiving coil of the detector.

The changes in amplitude and their chronological sequence are evaluated. The offset arrangement of transmitter and receiver permits direction-of-travel identification.

The signals required for counting and determining the direction of travel are transferred to the evaluation computer in the form of frequency- and amplitude-modulated signals.

#### The Az S 350 U axle counting system

- > interprets the signals transmitted by the counting heads,
- > compares the number of axles which have entered and left a track vacancy detection section,
- > monitors the track vacancy detection sections and issues clear/occupied indications.

### Overall Az S 350 U system

#### Its structure

The overall Az S 350 U system includes the following components:

- > ZP 43 counting heads (component consisting of a double wheel detector incl. cable and a trackside connection box)
- > Evaluation computer
- > Connecting cables between trackside connection box and evaluation computer

The normal control distance between evaluation computer and counting head can be up to 6.5 km. With additional measures the control distance can be extended to a maximum of 21 km.

### ZP 43

#### Double wheel detector

Each double wheel detector consists of two components. One component is mounted to the outer side of the rail and accommodates the transmitter; the other one is mounted to the gauge side of the rail and houses the receiver.

Two detectors are accommodated in each component. Reducing plates between the transmitter/receiver and the rail reduce the interference caused by the traction return current.

### ZP 43

#### Trackside connection box

The trackside connection box is a plastic housing without a mounting rack (ZP 43 V). A housing made of injection die-cast aluminium containing a mounting rack (ZP 43 E) can also be supplied.

The function units accommodated in the trackside connection boxes receive the signals supplied by the receivers of the detectors and edit the data for transfer to the evaluation computer.

# Highlights for the Railway Operator

## Evaluation computer

The standard hardware used for the evaluation computer is the Simis® platform in a 2-out-of-2 configuration.

The evaluation computer is the central processing and detection unit of the system. It establishes an overall result from the detection information proceeding from the counting heads and generates a track clear or track occupied indication, taking account of the operating state. The track clear or track occupied indication is output via two channels using floating relay contacts with opposite or the same normal condition.

The plug-in printed circuit boards of the evaluation computer are inserted into a single-tier 19" rack. All inputs and outputs, including the power supply, plug into the front/rear of the rack.

The evaluation computer is fitted with LEDs and measuring sockets. The LEDs are used for fault diagnosis and for the output of statistical information. Usually, a board of the evaluation computer or counting head can be determined to be the cause of a fault. The measuring sockets are used in conjunction with some of the LEDs for adjusting and checking the system.

## Cabling

The signals are transmitted from the trackside connection box at the counting head to the evaluation computer via two cores of a star-quad signalling cable. This cable is also used to power-supply the counting heads.

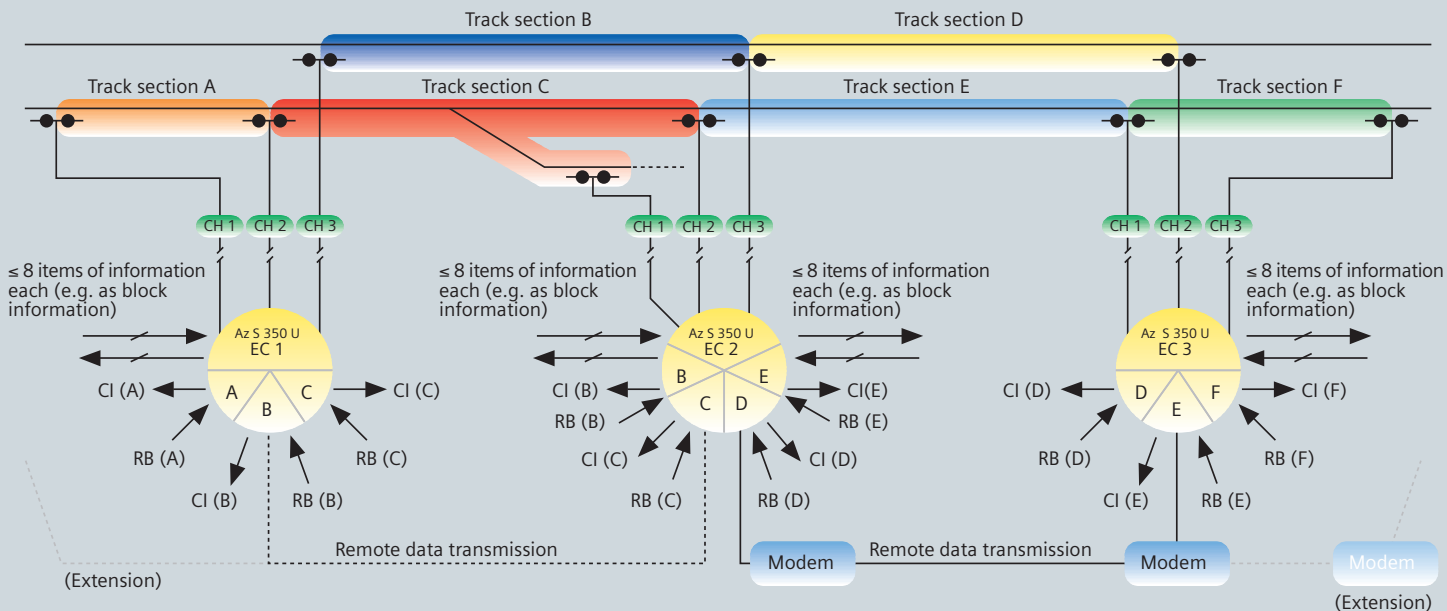
Technical data	
<b>Counting capacity</b>	32,767 axles per track vacancy detection section
<b>No. of counting heads attachable per computer</b>	max. 5, directly; max. 6, "remotely" (3 from the left partner system, 3 from the right partner system)
<b>No. of track sections</b>	max. 4
<b>Computer interfacing</b>	Example: 3 remote connected computers enable 12 track clear indications with 15 counting heads
<b>Control distance</b>	typ. 6.5 km
<b>Control distance with special measures</b>	≤ 21 km
<b>Output information via floating relay contacts</b>	0 to 4 clear indications: equivalent or non-equivalent; max. 24 items of operator-specific information (e.g. as block information); reset restriction; reset acknowledgement indication
<b>Types of traction</b>	all electric and non-electric types
<b>Train speed, depending on wheel diameter</b>	$v_{\max} = 400 \text{ km/h}$ (for a wheel diameter $d \geq 865 \text{ mm}$ )
<b>Wheels</b>	
– Material	steel, cast iron
– Diameter	≥ 300 mm
– Width	≥ 115 mm
– Wheelbase	≥ 700 mm
<b>Track</b>	
– Sleepers	wood, concrete, steel, ballastless track
– Ballast resistance	no effect
– Rail profiles	P6, S49, S54, S64, UIC60, R65 (others on request)
– Protective device	deflector (optional)
<b>Supply voltage</b>	
– Uninterruptible	24 V DC to 60 V DC
<b>Power consumption of axle counting system</b>	
– Each counting head (CH)	≤ 2.5 W (without cable losses)
– 2-out-of-2 computer (without CHs)	≤ 10 W / track section (depending on configuration)
<b>Ambient temperature range</b>	
– Indoor equipment	–25 °C to +70 °C
– Outdoor equipment	–40 °C to +80 °C

## A Wide Range of Applications

# Az S 350 U Axle Counting System

### Example of configuration

3 evaluation computers, 9 counting heads, 6 track sections (extendable)



### Wide range of application

Due to its versatility, the Az S 350 U microcomputer axle counting system offers a wide range of applications which meet the needs of main line and mass transit operators.

### For large track sections

The Az S 350 U microcomputer axle counting system is able to process the pulse count of up to five directly attached and up to six "remote" counting heads per evaluation computer.

"Remote" counting heads are counting heads whose pulse count is transmitted via serial interfaces, as they interact with other Az S 350 U systems.

One evaluation computer detects a maximum of four track vacancy detection sections.

For the transmission of axle counting data and for bidirectional transmission of binary information (e.g. block information) the Az S 350 U microcomputer axle

counting system can be connected with the "left" and "right" computer partners via serial interfaces (modem connection).

Using this configuration in combination with remote data transmission via modem or data transmission without modem, the pulse count of up to 15 counting heads and up to 12 track vacancy detection sections can be processed with a single axle counting system.

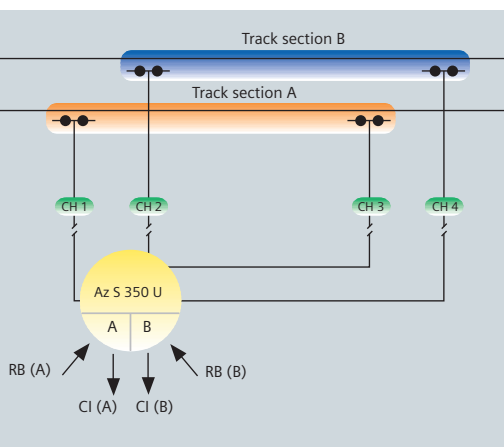
Depending on the configuration, up to 24 binary items of information which are available to the user can be additionally transmitted.

The configuration is extendable, as any number of Az S 350 U systems can be linked (cascading).

Since the distance for data transmission is limited only by the physical characteristics of the detection system, the Az S 350 U axle counting system is suitable for the detection of very long track sections.

### Example of configuration

1 evaluation computer, 4 counting heads, 2 track sections



- CH Counting head
- CI Track clear/occupied indication
- EC Evaluation computer
- RB Axle count reset button

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