

Rail Geometry Measurement

Industries: Railway
Application type: Position measurement

Description

The geometry measuring trolley is a modern device used for measuring track geometry in railway infrastructure. It is primarily designed to assist in the maintenance and monitoring of railway tracks, ensuring their safety and functionality by providing precise measurements of various track parameters, some of them are:



Fig 1: Measuring process

Measuring Track Alignment and Leveling: The device measures the horizontal alignment and vertical leveling of the railway track. This helps in determining whether the tracks are positioned correctly and aligned to design specifications, which is critical for safe and smooth train operations.

This is crucial for preventing derailments and ensuring that the trains can run on the track safely.

Twist and Super-elevation (Cant) Measurement: The device can also measure the twist in the track (i.e., the difference in elevation between the two rails) and the cant (the banking of the rails on curves). These parameters are important for ensuring passenger comfort and train stability at higher speeds.

Measurement of Irregularities: It detects irregularities in track geometry, such as deviations from straightness or levelness, which could pose safety risks or lead to accelerated wear and tear on both the track and the trains. Early detection allows for timely maintenance and repairs

Data Logging and Analysis: It records all measurement data, which can be stored and analyzed to assess the condition of the track over time. This makes it easier for railway maintenance teams to plan repairs and prioritize sections of track that need immediate attention

Track Gauge Measurement: The device measures the track gauge, the distance between the inner sides of the rails, ensuring that it stays within permissible limits.



Fig 2: Laser Distance Sensor

The trolleys are designed for flexible movement along the rail, either manually operated or mechanically coupled to an engine for powered transport. The onboard electronics are powered by a battery and are capable of storing comprehensive measurement data for post-processing and analysis. Thanks to the standard RS-232 communication protocol, the customer was able to integrate the sensor easily.



DIMETIX APPLICATION EXAMPLE

ARE-1701

Customer advantages:

- RS-232 serial communication interface for reliable data transmission. More interfaces available as standard.
- High precision with a measurement accuracy of ± 1 mm and repeatability of ± 0.3 mm
- Operating temperature range of -10°C to $+50^{\circ}\text{C}$, ensuring performance across varied environments
- Robust, IP65-rated enclosure for protection against dust and water ingress

Dimetix Sensors – the solution for applications with high precision requirements

Thanks to the clearly arranged product portfolio the evaluation of a suitable Dimetix Laser Distance Sensor is simple and uncomplicated.

Dimetix Sensors offer numerous features, which are integrated in each and every device as standard, including, among others, various interfaces like SSI, RS-422/485, RS-232 and 2 digital outputs. Optionally, the Industrial Ethernet interfaces PROFINET, EtherNET/IP and EtherCAT are also available. Furthermore, all devices are IP65-protected and impress with a weight of less than 500 grams!

Particularly noteworthy, however, is the accurate measurement of 1 millimeter over distances of up to 500 meters, even under the most extreme conditions. This is possible with the sensors of the types DPE, DEN and DEH.

No less interesting are sensors of types DAE, DAN and DBN. Preferably, they can be used for projects which do not require a range over 500 meters or are cost-sensitive.

	DPE-10-500	DPE-30-500	DEN-10-500	DEH-30-500
PARTNUMBER	500630	500636	500637	500638
SPECIFICATION				
Typical accuracy $\cong \pm 2\sigma$	± 1 mm	± 3 mm	± 1 mm	± 3 mm
Mensurierung range on natural surfaces	0.05...~100 m	0.05...~100 m	0.05...~100 m	0.05...~100 m
Measuring range on reflective foil	~0.5...500 m	~0.5...500 m	~0.5...500 m	~0.5...500 m
Max. measuring rate	250 Hz	250 Hz	100 Hz	100 Hz
Operating temperature	$-40...+60^{\circ}\text{C}$	$-40...+60^{\circ}\text{C}$	$-10...+50^{\circ}\text{C}$	$-10... +60^{\circ}\text{C}$

	DAE-10-050	DAN-10-150	DAN-30-150	DBN-50-050
PARTNUMBER	500633	500632	500634	500635
SPECIFICATION				
Typical accuracy $\cong \pm 2\sigma$	± 1 mm	± 1 mm	± 3 mm	± 5 mm
Mensurierung range on natural surfaces	0.05...~50 m	0.05...~100 m	0.05...~100 m	0.05...~50m
Measuring range on reflective foil	~40...50 m	~40...150 m	~40...150 m	
Max. measuring rate	100 Hz	100 Hz	100 Hz	10 Hz
Operating temperature	$-40...+60^{\circ}\text{C}$	$-10...+50^{\circ}\text{C}$	$-10...+50^{\circ}\text{C}$	$-10...+50^{\circ}\text{C}$