



1 *Precise and reliable monitoring is an important prerequisite for efficient maintenance of the catenary system.*

2 *A camera combined with special LED lighting enables overhead rail lines to be measured.*



WIRE WEAR MONITORING SYSTEM WWS

The Wire Wear Monitoring System WWS provides valuable information for condition-based maintenance. The optical system determines the residual thickness of contact wires without touching them.

is capable of determining the residual thickness of up to ten contact wires simultaneously. Height and stagger are used to control the focus of the cameras.

Fraunhofer Institute for Physical Measurement Techniques IPM

Heidenhofstrasse 8
79110 Freiburg, Germany

Contact

Prof Dr Alexander Reiterer
Head of Department
Object and Shape Detection
Phone +49 761 8857-183
alexander.reiterer@ipm.fraunhofer.de

Dr Markus Leidinger
Business Development Manager
Phone +49 761 8857-413
markus.leidinger@ipm.fraunhofer.de

www.ipm.fraunhofer.de/railway

Inspection runs up to 350 km/h

WWS has been designed for velocities of up to 350 km/h and can therefore run on high-speed lines without hindering regular traffic. Raw data is taken every millimeter and typically processed in real-time to one value every 14 mm at 100 km/h.

Ten contact wires simultaneously

The degree of wear of contact wires with a round profile can be deduced from the width of the sliding surface. Two cameras detect these sliding surfaces. The system

Active illumination

The WWS is enclosed in a double-cased housing. The interior housing is sealed hermetically (IP67) and climatized. Desiccator cartridges keep the humidity level in the housing at a minimum.

The system works at ambient temperatures of $-20\text{ }^{\circ}\text{C}$ to $+55\text{ }^{\circ}\text{C}$. The outer casing protects the sensor unit from mechanical impacts as well as from rain, snow or foliage. A cleaning unit controlled from inside the inspection car cleans the entrance window semi-automatically. Thus, the system can be operated without maintenance over a long period. The WWS works practically



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independent from ambient light conditions. The illumination unit with high power LEDs is now integrated into the interior sensor housing.

The laser based Contact Wire Recording System CRS as part of WWS is eye-safe according to IEC60825.

WWS is also available as part of the Contact Wire Inspection System (CIS). This multi-sensor system combines measurement technology for wire wear, wire position and, optionally, pole detection.

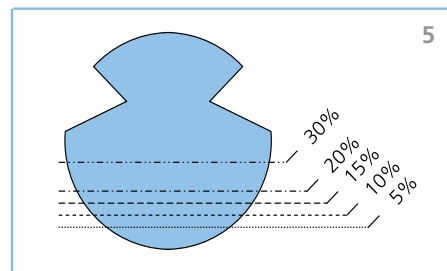
3 Worn-out contact wires entail the risk of rupture – with severe consequences for rail traffic.

4 WWS mounted on an inspection train.

5 The degree of wear of a round contact wire can be deduced from the sliding mirror's width.

Operation

WWS cannot be operated as a standalone device. It is delivered with the Contact Wire Ranging System CRS or can be combined with CRS already in operation.



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Technical Specifications

**CLASS 1
LASER PRODUCT**

Height range	800 mm – 2,100 mm above mounting plane
Uncertainty	from ± 0.3 mm to ± 0.5 mm (mainly determined by the degree of wear)
Sampling frequency	25 kHz (1 mm distance at 100 km/h)
Measurement density	typically processed to 14 mm at 100 km/h
Velocity of inspection car	up to 350 km/h
Max. number of detectable contact wires	10 (maximum height distance of 40 mm)
Active illumination	high power LEDs
Ambient temperature	-20 to +55 °C (in operation) -20 to +60 °C (in storage)
Humidity	up to 100 percent (IP67)

Railway Measurement Technology at Fraunhofer IPM

Fraunhofer IPM develops optical measuring systems for monitoring the condition of rail infrastructure. Experts in measuring techniques and optics, designers, electrical and software engineers work together on supplying turnkey solutions for the special requirements of infrastructure operators and providers of surveying services. The robust measuring systems are deployed throughout the world and are characterized by their speed, precision and reliability. Railroad measurement systems made by Fraunhofer IPM:

- High-Speed Profiler HSP
- Clearance Profile Scanner CPS
- Contact Wire Recording System CRS
- Laser Pole Detection System LPS
- Sector Profile Scanner SPS
- Rail Track Scanner RTS

All specifications and features are subject to modification without notice.