



**ARGOS**<sup>®</sup>

DATA FOR MAINTENANCE AND CHECKPOINTS

# Wayside train measurement plus monitoring

# ARGOS® from HBK: Precise and Reliable Measurement Data for the Rail Industry

WITH ARGOS® SYSTEMS YOU BENEFIT FROM THE ADVANTAGES OF EXPERT MEASUREMENT TECHNOLOGY FROM HBK – ONE OF THE WORLD'S LEADING SUPPLIERS OF PRECISE AND RELIABLE SENSORS.

## Free choice of technologies.

HBK knows current sensor technologies and therefore always selects the appropriate technology for your application, regardless of whether it is strain gauge, fiber optic, or piezo technology.

## Precision pays for itself.

The more accurate the measurement data in WTMS systems, the more safely and precisely you can implement changes to your existing rail system. Only valid measurement data allow the development of further business models and strategies for preventive maintenance and cost reduction measures.

## A safe future.

The modular design of Argos® is its strength. Argos® is continuously developed to adapt to changing application requirements. Argos® can be extended from the cost-effective and simple wayside train monitoring system (WTMS) to the precise and efficient wayside train monitoring and measurement system (WTM+M system) at any time.

## Interfaces are our language.

Integration with main control centers and third-party systems via standardized or customer-specific interfaces is simple. Modern vehicle management concepts are supported via a complete RFID integration.

## Automatic ROI.

Studies have shown a proven high return on investment (ROI) for WTM+M systems. Short-term results can be achieved by preventing derailments, while in the medium and long term, the track systems and vehicles can be protected (supporting preventive maintenance based on the actual condition).

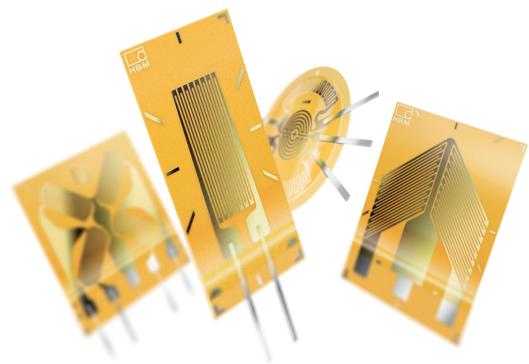


**HBK OFFERS A CHOICE OF SENSOR TECHNOLOGIES. YOUR ADVANTAGE: YOUR REQUIREMENTS DETERMINE WHICH TECHNOLOGY IS USED. AND NOT THE OTHER WAY AROUND ...**

## STRAIN GAUGES

### Tried and tested

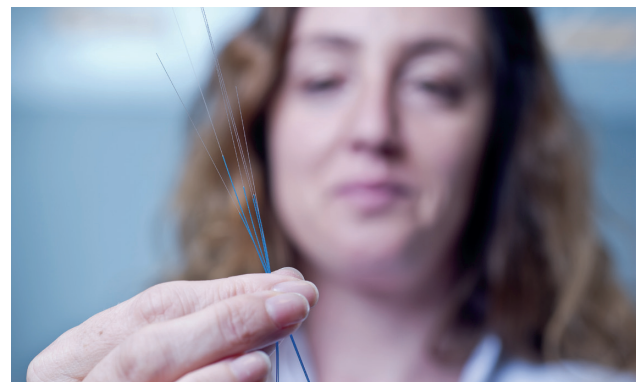
The tried and tested standard technology: compact, cost-effective and robust. Implemented millions of times and quick to install, the strain gauges benefit from HBK's in-house development and production capacities.



## FIBER OPTICS

### The long-distance system

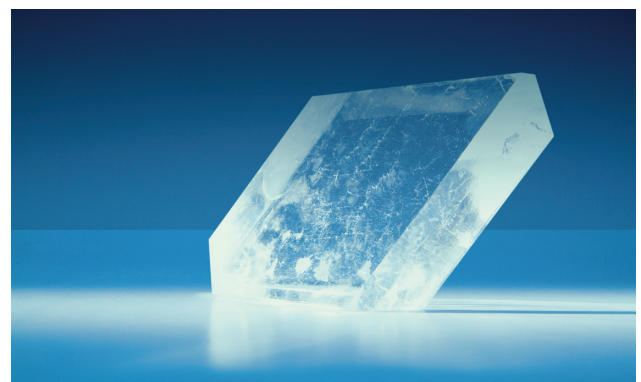
Optical fiber Bragg grating technologies demonstrate their strengths when it comes to long distances, exposure to extreme EMC influences, or measurements at high-voltage levels. There is no signal loss and it is not affected by electromagnetic interferences over long distances. You benefit from HBK's own development and production center for optical sensors and electronics. The technology and knowledge on how to achieve accurate results is maintained in-house.



## PIEZO

### The dynamic solution

Piezo sensors can help when dynamic forces occur. For a long time, HBK has showcased its skills in the piezo technology sector with its „PACEline“ brand.



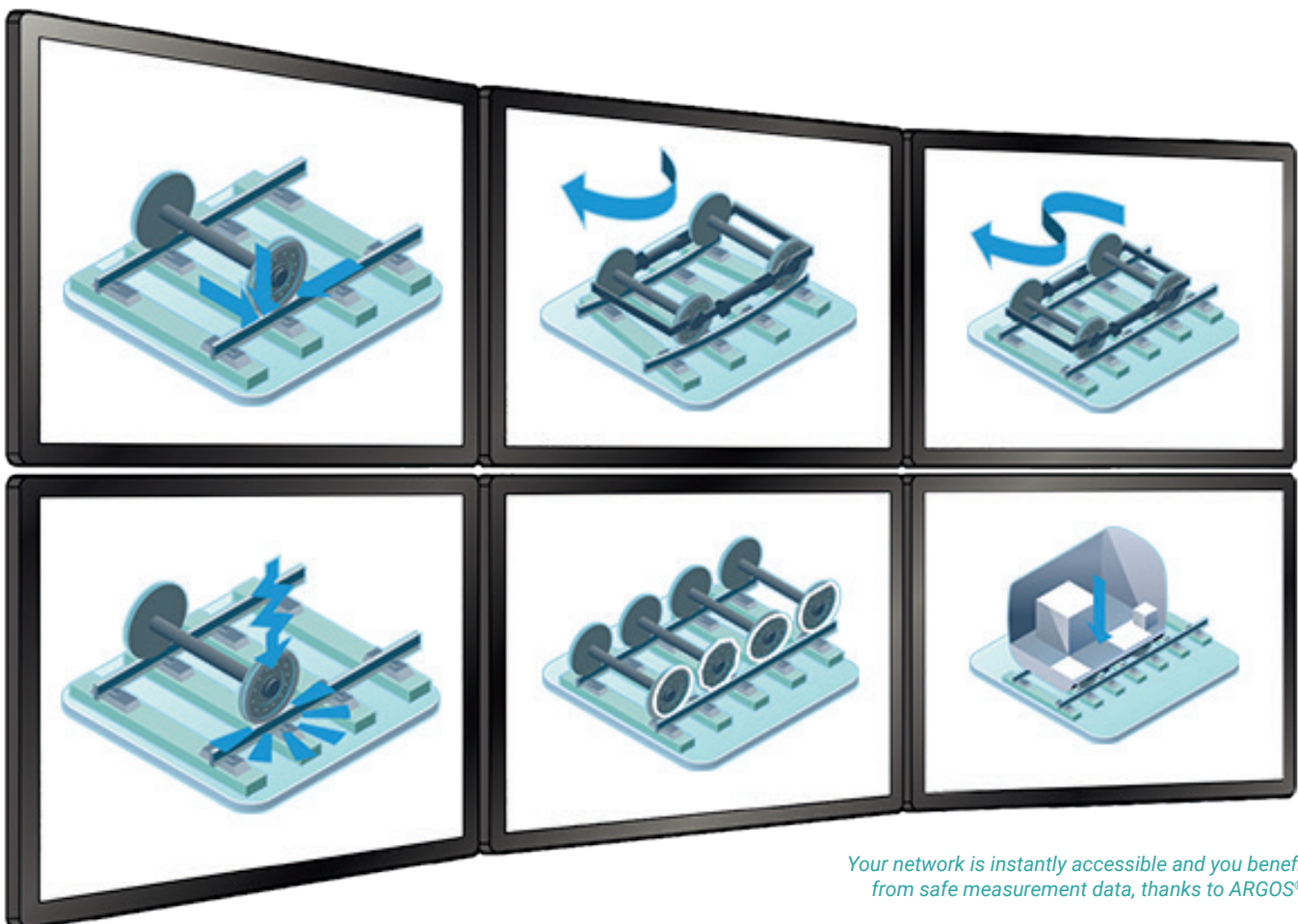
# The advantage of safe measurement data

## WAYSIDE TRAIN MONITORING PROVIDES ADDED VALUE

A variety of WTMS systems are available. However, ARGOS® can offer more: We do not only assess vertical static and dynamic forces as well as horizontal and longitudinal forces but we also evaluate operational behavior and highly accurate wheel shapes. And, not least: there is the precision and safety of our measurement data. This is why we also call ARGOS® a wayside train monitoring and measurement system.

Our WTM+M system offers infrastructure operators and rail companies (WTM+M system) the maximum level of safety and efficiency during operation. Thanks to the precision of our technology, we provide reliable data that enables the operator to monitor and set limit values with a high degree of reliability.

- Experienced engineers
- Maximum safety and efficiency
- Fully-installed systems
- Available worldwide
- Proven return on investment
- Easy to get started - simple to upgrade



*Your network is instantly accessible and you benefit from safe measurement data, thanks to ARGOS®.*

# ARGOS® provides information on various issues

## WTM+ – Wayside Train Measurement Systems

- **WILD** Detection of highly dynamic wheel forces
- **WIM** Highly accurate measurement of the loading state
- **OOR** Exact measurement of wheel shape irregularities - online data for maintenance
- **RBM** Straight Straight line: monitoring of the sine run - instability detection (hunting oscillation)
- **RBM** Curve Derailment safety; Y/Q in bends
- **Long** Monitoring of longitudinal forces (braking and driving forces) during operation

## WTM – Wayside Train Monitoring Systems

- **Instant Simple** WTMS to measure the loading state and dynamic wheel forces
- **Instant RBM** Monitoring of horizontal forces
- **Instant OL** Mobile recording of load spectrums on the infrastructure

## WILD – Wheel Impact Load Detection

## WIM – Weighing In Motion

## OOR – Out Of Roundness

## RBM – Running Behaviour Measurement

## OL – Overall Load

## A FULLY INSTALLED SYSTEM - AVAILABLE AROUND THE WORLD

ARGOS® provides you with a fully installed system: this means that ARGOS® sensors and measurement instruments are installed and put into operation by HBK or our partner. The corresponding software then provides immediate access to the measurement data at any time. A connection to main control centers is easy to establish via interfaces.



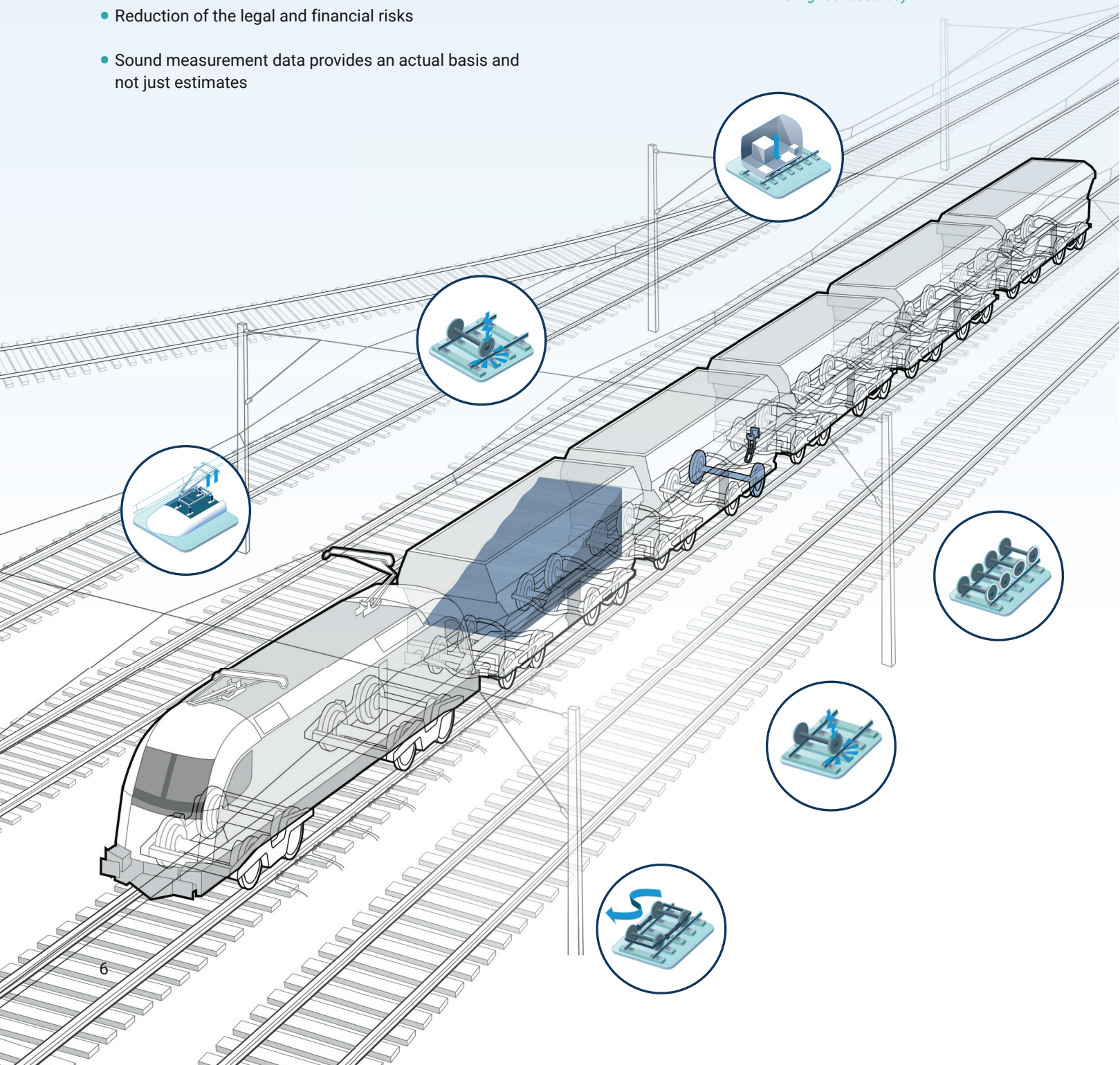
# Optimized for infrastructure applications

ARGOS® PROVIDES AN IMMEDIATE OVERVIEW OF THE RELIABLE DATA REGARDING THE ACTUAL LOAD ON YOUR RAIL NETWORK.

- Preventive measures to avoid derailments
- Reduction of risks caused by non-compliant vehicles
- Optimization of track maintenance
- Reduction of the legal and financial risks
- Sound measurement data provides an actual basis and not just estimates

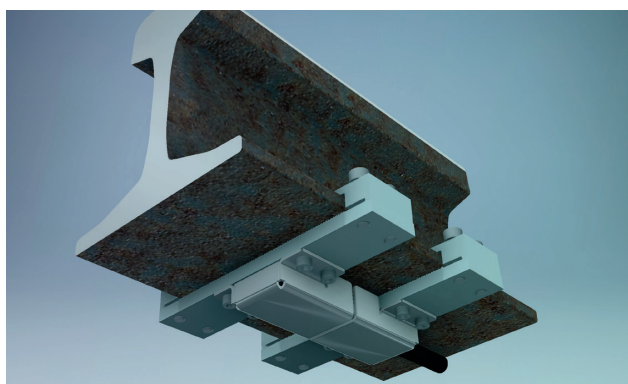
## WIM Module

*A dynamic scale which controls the load distribution on vehicles with the highest accuracy*



## VALID OVERVIEW OF THE LOAD ON THE TRACK

- Reliable live data about the load on the track - real-time information management and statistics
- Determination of dynamic forces and quasi-static loading - vertical and lateral
- Prompt detection of changes to the use of the infrastructure
- Reliable and real-time warnings sent to infrastructure users (incorrect loading, charge transfers, lack of maintenance)
- Maintenance planning and component optimization thanks to measured fatigue loads



Clamping device

## DERAILMENT PREVENTION

- Early detection of warning signs and prevention of derailments:
  - Early detection of incorrectly loaded vehicles by determining the loading state
  - Instabilities (hunting oscillation) on straight lines (e.g. light vehicles can be affected by hunting, if the conicity of the wheels is not correct).
  - Monitoring the derailment factors on bends, not exceeding the Y/Q value



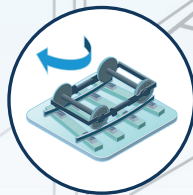
Measurement rail

# Solutions for vehicle operators – data for maintenance

ARGOS® SYSTEMS PROVIDES YOU WITH PIONEERING SOLUTIONS FOR THE MODERN AND EFFICIENT OPERATION OF VEHICLES. HERE, YOU CAN ALSO TAKE ADVANTAGE OF RELIABLE AND ACCURATE MEASUREMENT DATA.

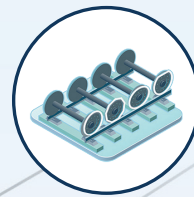
## **RBM Curve Module:**

Continuous tracking of horizontal and vertical forces enables the measurement of curve running behavior, track displacement forces, and staggering properties.



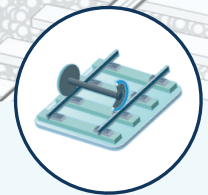
## **OOR Module**

Detects deviations from the ideal roundness of a wheel (flat positions, polygonizations, duality, eccentricity) with high precision – accuracy 0.05mm



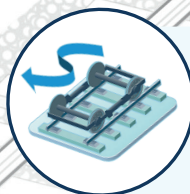
## **Profile Module**

Cross-wheel profile measurement with an accuracy of 0.1mm



## **RBM Straight Module**

Measurement of the horizontal forces for detecting unstable running behavior of vehicles



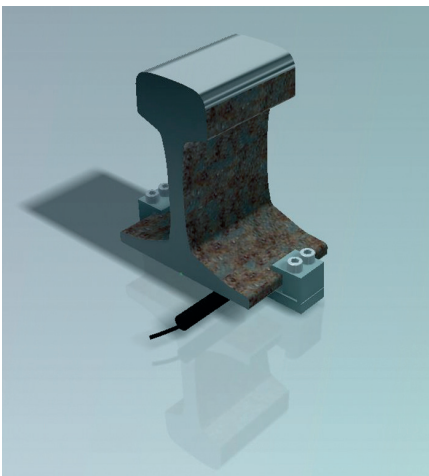


## SUPPORTS MODERN AND COST-EFFICIENT PREDICTIVE MAINTENANCE CONCEPTS

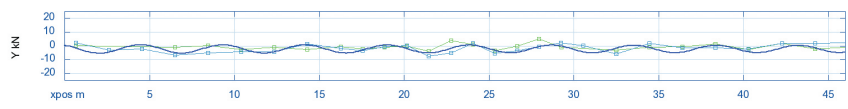
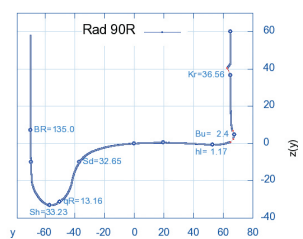
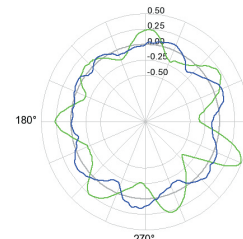
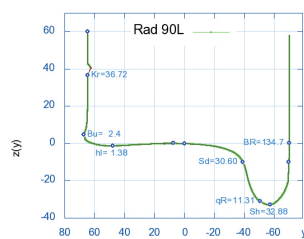
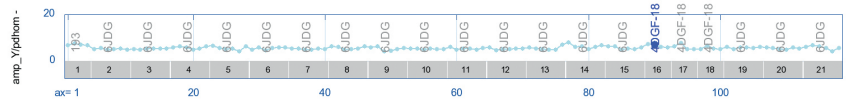
- Detecting of maintenance delays based on the running behavior
- Precise measurements of defects of the wheel shape. The detection of defects can be traced to schedule maintenance in the best time slots available.
- Condition-based maintenance combined with time-based maintenance. Virtually no need for expensive repairs of defects.
- Full quality control and complete maintenance over the vehicle's entire service life
- Assessment of suppliers and components (e.g. regarding deterioration of mounted wheels on an axle)

## COMPLETE INFORMATION ON VEHICLE

- Reduction of maintenance and downtimes due to increased dynamic loads and wheel shape damages (damages of storage, fatigue strength of mounted wheels on an axle, and vehicle structure)
- Optimized use of assets
- Conformity assessment of vehicles always available
- Increased safety and reliability in operation. Reduces commercial and safety risks



Out of roundness

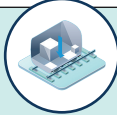

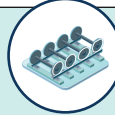


Running behaviour

RBM straight

# ARGOS® modules at a glance

ARGOS® IS A MODULAR SYSTEM. DEPENDING ON YOUR APPLICATION, YOU CAN COMBINE ONE OR SEVERAL MODULES WITH ONE ANOTHER. EXISTING SYSTEMS ARE SIMPLE TO EQUIP.

				
Functionality		WIM Vehicle weight, axle loads, wheel forces & loading state	WILD Dynamic wheel forces	OOR Wheel shape irregularities
Measurement	WTM <sup>+</sup>	<b>ARGOS® WIM</b>	<b>ARGOS® WIM/WILD</b>	<b>ARGOS® OOR</b>
	WTM <sup>+</sup> Performance	Train weight: 1 % to 100 km/h 2 % to 200 km/h  Vehicle weight: 1.5 % to 100 km/h 2 % to 200 km/h	Dynamic force: 3%	Exact qualification and classification of wheel shape irregularities: • Resolution better than 0.01 mm, measurement repeatability 0.05 mm as trend function, 0.1 mm as individual measurement • Flat point 30 mm or greater • Polygonization order, 2nd to 32nd
	WTM <sup>+</sup> Installation	Measurement Rail	Measurement Rail	Clamping Device
Monitoring	WTM	<b>ARGOS® Instant</b>	<b>ARGOS® Instant</b>	
	WTM Performance	Train weight: • Instant HP <3% • Instant 3% • Instant OL 8%  Vehicle weight: • Instant HP <3% • Instant 5% • Instant OL 8%	• Detection of wheel shape irregularities via dynamic force • Classification of the dynamic • Maximum force for warning and alarm • Dynamic force: 5%	
	WTM Installation	Clamping Device	Clamping Device	

## Ambient conditions

IP67, -30 °C to +75 °C

The system is protected against fine dust, ice and snow, impacts from rocks (track ballast), chemical products (sulfur, oil, phosphate) from the vehicles, and rail-specific electromagnetic effects.




## Operational conditions of use

Operating conditions for practically all vehicles used in the network

Axle loads: 800 kg to 40 t;

Wheel diameter: 300 to 2,000 mm

MAKE YOUR CHOICE FOR YOUR MAINTENANCE AND/OR MONITORING SYSTEM.

		
<b>RBM Straight</b> Horizontal forces, unstable vehicle run	<b>RBM Curve</b> Horizontal forces, curve	<b>LONG</b> Longitudinal forces, braking and driving forces
<b>ARGOS® RBM Straight</b>	<b>ARGOS® RBM Curve</b>	<b>ARGOS® LONG</b>
Train weight: 1 % to 100 km/h 2 % to 200 km/h Vehicle weight: 1.5 % to 100 km/h 2 % to 200 km/h Horizontal forces: 3 % to 100 km/h 5 % to 200 km/h Striking angle +/-20 mrad	Train weight: 1 % to 100 km/h 2 % to 200 km/h Vehicle weight: 1.5 % to 100 km/h 2 % to 200 km/h Horizontal forces: 3 % to 100 km/h 5 % to 200 km/h Striking angle +/-20 mrad	Longitudinal forces: 3%
Measurement Rail	Measurement Rail	Measurement Rail
<b>ARGOS® Instant RBM</b>	<b>ARGOS® Instant RBM</b>	
Train weight: 3 % Vehicle weight: 3 % to 100 km/h 2 % to 200 km/h Horizontal forces: 3 % to 100 km/h 5 % to 200 km/h Striking angle +/-20 mrad	Train weight: 3 % Vehicle weight: 3 % to 100 km/h 2 % to 200 km/h Horizontal forces: 3 % to 100 km/h 5 % to 200 km/h Striking angle +/-20 mrad	
Clamping Device	Clamping Device	

**Interfaces**

TCP/IP, FTPS, XML, CSV, ARAMIS, UIC broker:  
 2807, 2101, 2201, 2295, 2296, RFID, SCADA, integration of train information systems (uni- and bi-directional)  
 Professional data management for processing, statistical analysis, and reporting

**Delivering precision for progress:  
Our cutting-edge sensing  
technology and insights drive  
solutions for a safe, more  
efficient, and sustainable  
rail system.**



### **Precision with advanced sensing technology**

#### **RAIL ENGINEERING PIONEERS**

Our rail engineering team excels in delivering precision for progress. Utilizing cutting-edge sensing technology and insights, we drive solutions that enhance safety, efficiency, and sustainability in rail systems, paving the way for a better transportation future.

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