



# SMART CARBON

*Wear-detection system for pantographs*

Advanced solution for real-time wear condition monitoring of pantograph carbon strips. Smart Carbon is a cloud-based monitoring system for pantograph applications, including:

Sensor-equipped carbon strips

Autonomous IoT-signal transmitters placed on the pantograph.

Warning signal emissions by the system with data-processing by Wabtec

## PRODUCT FEATURES

Detection of abnormal wear or behavior

Monitoring sensor fitted in carbon strip

Customizable wear limit (e.g. alert triggered at 95% wear level)

Minor impact to the pantograph head design

Lightweight (<400g), compact, autonomous module

Retrofittable to almost any pantograph

## CUSTOMER BENEFITS

### Improved reliability and availability

Reduced service intervals

Fleet monitoring 24/7

Service-centric planning for parts availability

### Easy deployment

Non-intrusive solution

Limited downtime

Immediate access to fleet management

Successfully tested at Alstom Citadis 402 in Tours, France

## NORMS

Compliant with EN 50155, EN 50121-3-2, ETSI EN 300 220-1, EN 45545-2 HL3, IEC 62443-3-3



Statistics



Live Alerts



Real Time  
Monitoring

Power supply	From 16 to 143VDC
Power consumption	6W max 1W average
External power (option)	12VDC external/internal battery
Serial Communication	Isolated RS232 Isolated USB (host) Internal extension 1X SPI/I2C bus UART
Analog / Digital inputs	4x 4-20mA signal 2 x 0 / 10V signal 4 x isolated digital inputs (6V-138V: ON; <6V: OFF) 4 x 12V protected output 3 X GPIO
Storage	50MB available for data storage
Protection Class	IP65
Specific peripherals	1 x PT1000 input measurement 6 axis accelerometer Internal temperature and HR measurement
Wireless communication	SUB-1G 434MHz 300m in open field BLE 100m in open field Internal or external antennas GSM 4G/LTE CAT4 / wifi as an option
Crypto	Hardware cryptographic acceleration for AES 128/256, SHA-1, SHA-2 (SHA-224 & SHA-256) & ECC

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