

## *Automatic Pantograph Monitoring of Carbon Strips*

### *The properties of our APMS*

- Alarm for damaged carbon strips within 3 minutes
- Alarm for a worn-down carbon strip (option)
- The original image of a damaged carbon strip is saved in the detector
- The detector may be controlled and upgraded via GSM-R phone modem or Ethernet
- The equipment is compact, robustly designed and effectively protected against vandalism
- Our carbon strip detector is very reliable and cost effective
- Service and maintenance of the detectors can be done without disturbing ongoing traffic



*Photo of an undamaged pantograph on a train passing at 209 km/h.*



*Photo of a damaged pantograph. The image is transferred to the Master Controller (MC) and further to the Image Processing Unit which separates and checks the image of the carbon strips.*

## Description

The Automatic Monitoring of Carbon Strips on Pantographs method makes it possible to maintain the detector without interrupting the traffic.

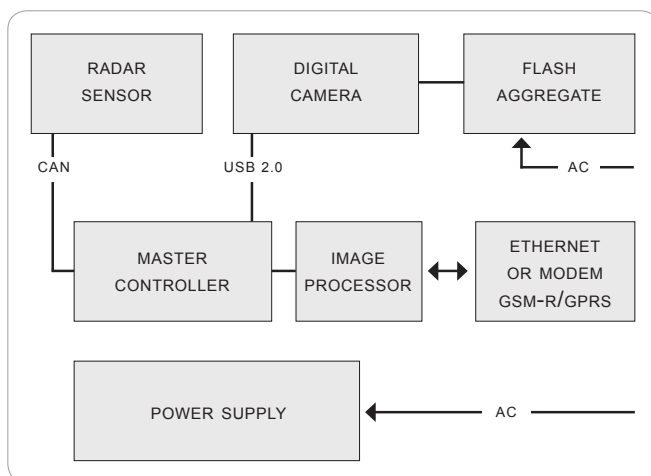
The radar sensor first detects the radar echo from the current collector when the approaching train is roughly 100 meters away. As the train moves towards the sensor, the echo signal is tracked until the current collector is 7 meters from the camera.

At this point the image quality is optimal and the picture is taken. To protect the train engineer from being blinded by the flash, the flash is equipped with a red filter.

After the camera captures the image of the current collector, the digital image is transferred to the Master Controller (MC) and further to the Image Processing Unit which separates and checks the image of the carbon strips.

If the check shows that the carbon strip has been damaged or worn down (option), an alarm is transmitted through Ethernet or a GSMR/GPRS modem.

## Block diagram



## Technical data

### Radar Sensor (Sensys RS240-LD)

Speed	3 - 300 km/h
Distance	5 - 100 m
Frequency	24.1 +/- 0,025 GHz
Output power (EIRP)	< 100 mW
Power Consumption	< 15 W
Power Supply	DC 12 V
Weight	1.6 kg

### Digital Camera Unit

Resolution	12.4 Mpixels
Focus	Manual
Shutter	Electronic/mechanical
Optics	85 mm lens
White Balance	Automatic
Sensitivity	ISO 3 200
Image Format	JPEG
Data Interface	USB 2.0
Power Supply	AC *
Weight	1.1 kg

### Flash Unit

Flash Energy	1 200 Ws
Flash Duration	0.4 ms
Power Supply	AC
Weight	2.7 kg