

RELIABLE WEATHER MONITORING FOR RAIL TRANSPORT

 **Lufft**
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HydroMet

Applications Overview

Table of Contents

- | | |
|---|---|
| 1 | Switch Heating Control using Lufft Weather Sensors |
| 2 | Measuring Cross Winds with Lufft Ventus & V200A |
| 3 | Flood Warning Station with Lufft Weather Sensors |
| 4 | Platform Monitoring with the Lufft WS Series |
| 5 | Visibility Monitoring with the Lufft VS20k |
| 6 | Monitoring Noise and Vibration with the Lufft WS Series |
| 7 | Snow Warning using the Lufft SHM31 and WS600 |
| 8 | Monitoring Radiation & Rail Temperature with the WS501 |

**Do you want to make
your railways safer, too?**

**Our team of experienced
traffic monitoring
specialists and skilled
technicians is happy
to help you!**



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that protect lives
and the environment.**



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PODCAST
Let's Talk about the Weather

Challenge

Railway switches can get blocked or stuck due to ice, snow or freezing rain. This often results in a breakdown of public transport. In fact, electrical heating can overcome this blockage – but it comes with high energy costs.

Solution

The WS series offers a large variety of versatile compact weather stations. Precipitation, dew point and rail temperature information are gathered locally and therewith control the heating to optimize power consumption.

Benefits

The switch heating is aligned with hyper-local weather parameters. They can be heated individually, only when and where needed. This enables automatic control and monitoring while saving energy and keeping the trains rolling.

Setup

To keep railway switches working even on frosty winter days, traffic operators need to gather weather insights directly from the site. An efficient and modular solution is based on compact, reliable, and versatile weather sensors from the Lufft WS series.

The WS600, e.g., monitors precipitation (radar-based: type, amount and intensity), air temperature and pressure, humidity, dew point, wind (direction and speed). One connection cable for communication and power facilitates installation & integration. A second probe measures the rail temperature. Optionally, a snow height sensor Lufft SHM31 can be added.

Either a PLC or a supervisory system processes the data and controls the rail heating. Several communication protocols are available such as UMB, MODBUS, and SDI-12.



Monitoring station with a compact weather sensor Lufft WS601 (tipping bucket rain gauge). *Image: OTT HydroMet*

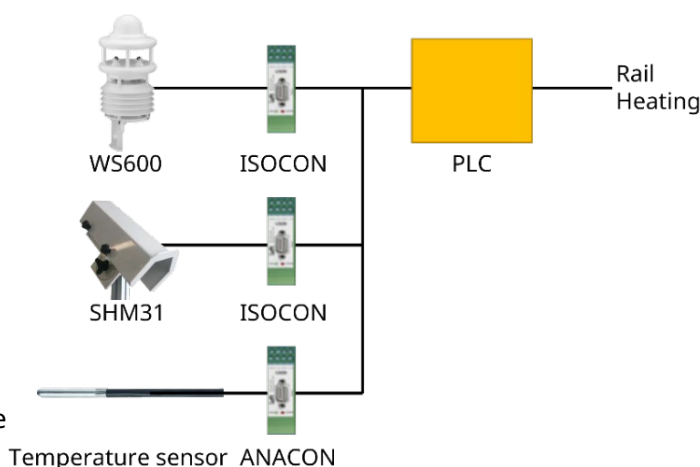
System components

WS500/600/601
ISOCON,
ANACON,
power supply
24 VDC,
cabinet, mast,
Connection
(RS-485, SDI-12).

Additional

SHM31,
Rail temperature
sensor

Schematic Layout



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Further information

[Discover the Lufft WS Series](#)

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Challenge

High-speed trains are prone to derailment when cross winds are too strong. In worst cases they cause major accidents. Delays often impact not only specific trains but the entire railroad network and connections.

Solution

The Lufft V200A and its ruggedized version Ventus provide WMO-compliant wind measurements on speed and direction, peak value, averages, gusts, and more. The ultrasonic technology enables fast data collection and transmission.

Benefits

Monitoring the wind along the high-speed train lines enables fast reaction to changing weather. V200A & Ventus are maintenance-free sensors with no moving parts, easy to install and to integrate thanks to open protocols.

Project

The Lufft V200A and Ventus are compact and robust ultrasonic wind sensors. They provide reliable wind data for rail networks around the world, such as for the high-speed train network in China. To quickly monitor the speed and direction of cross winds it requires a dense sensor network, considering the micro-climate and topology.

Wind can vary largely depending on surrounding mountains and resulting turbulences causing an uplift to passing high-speed train.

Further parameters as precipitation type, amount, and intensity; air temperature, humidity, and dew point can be included using Lufft WS weather sensors.

Thanks to open protocols, Lufft sensors can be easily integrated into existing train monitoring systems.



Lufft ultrasonic wind sensor on a railway monitoring system for high-speed trains in China. *Credit: OTT HydroMet*

Product List

Lufft V200A or Ventus, ISOCON, power supply 24 VDC, cabinet, mast, Comms connection (RS-485, SDI-12).

Schematic layout



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Further information

[Blog: Wind gust measurement with Lufft Ventus and V200A](#)

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Challenge

Flooding, washed out track beds, landslides on embankments – Precipitation can have dramatic consequences for railway tracks and train traffic, in worst cases major accidents with casualties and damaged infrastructure.

Solution

Lufft's smart weather station WS600 combined with sensors for soil moisture and ground motion (tilt) enable monitoring of embankment conditions and stretches of rail tracks prone to flooding, washouts, and landslide.

Benefits

The sensors provide all necessary information for quick decision making related to passenger safety and train traffic. Critical stretches on the network are constantly monitored with little maintenance requirements.

Project

The Lufft WS600 is a comprehensive and robust weather station, offering various measurements in one compact housing. Combined with sensors for soil moisture (or water level) and ground tilt they form a full track bed monitoring system alongside the rail track network.

This approach had been taken by Network Rail, UK. Due to very local and heavy precipitation causing flooding and landslides a close monitoring of local conditions was key to keep the train network safe.

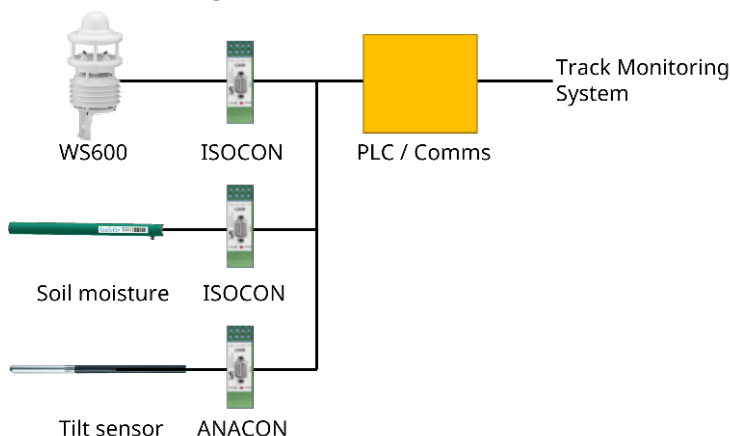
Gathering all relevant weather, water, and ground data allows for quick decision making. Because water flows and ground saturation are difficult to predict, current monitoring of parameters as precipitation type, amount, and intensity; ground moisture saturation and water level; moving ground is vital.



Flooding on the rail tracks after a storm in the State of New York/USA
Credit: MTA, Wikimedia

System components

WS-series, ISOCON, power supply 24 VDC, cabinet, mast, sensors for soil moisture & tilt angle, communication connection (RS-485, SDI-12)



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Further information

[Network Rail installs Lufft WS601
at UK's West Coast main line](#)

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Challenge

Growing numbers of passengers in public transport and harsh weather events make it increasingly important to maintain platforms, stops, and stations as well as to inform passengers of potentially hazardous conditions.

Solution

Tailored bundles of various sensors provide information on slippery platforms and bus stops adding hyper-local weather data. Combining those with general weather forecasts helps to inform and warn passengers proactively.

Benefits

Safety and timeliness of public transport improve. Closely observing the conditions in your area empowers you to react quickly and save passengers from having accidents – and yourself from their later claims.

Project

To monitor the wind and weather conditions on the platforms in a city near the coastline, several wind sensors were installed on bus stops and metro stations. Thus, constant wind gust monitoring enables users to react and close stations instantly when conditions worsen, e.g., in cases of heavy precipitation, snowfall, and icy surface.

The V200A wind sensor in combination with a WS400 weather station and a pavement sensor (e.g. MARWIS) offer the full parameter package necessary to enable informed decision making.

The communication takes place via a proprietary network along the network or via any other means, such as radio link or mobile phone. The installation requires little extra investment as existing infrastructure, such as masts, can be used.

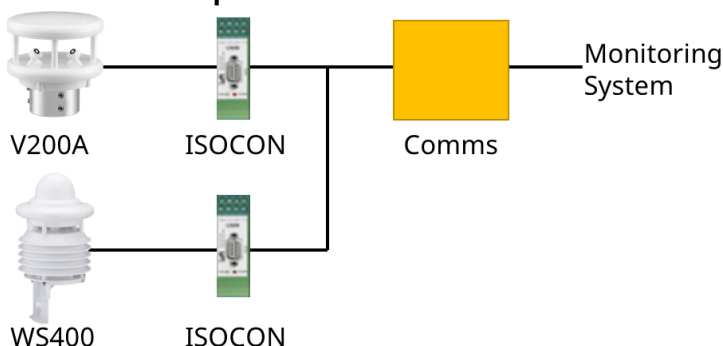


Slippery platforms can be dangerous for passengers, especially in winter.
Credit: Colin Lloyd/Unsplash

Product List

V200A, WS400, power supply 24 VDC, communication module
mains supply, mast and foundation

Schematic Setup



Further information

[Blog: Wind gust measurement
with Lufft Ventus and V200A](#)

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Challenge

Visibility is impacted by various parameters such as precipitation, aerosols, light, and the human eye. To keep enough reaction time, it is crucial to monitor visibility conditions and potential fog along the track day and night.

Solution

Measure the visibility at critical spots in the network and determine the precipitation there. This objective data enables railway operators to duly slow down trains and keep the operations going even under impeding conditions.

Benefits

Being able to perceive optical signals on time increases the conductors' confidence. Trains can run at an appropriate speed. Real-time detection of changing weather conditions and their root cause enables informed decisions.

Project

Fog is a very local phenomenon, especially in autumn. It can occur suddenly at limited spots. The visibility sensor Lufft VS20k reliably determines the visibility within a distance of up to 20 km while requiring little maintenance, even keeping the spiders away from its lenses to avoid false alarms.

Together with the precipitation sensor Lufft WS100 this easy to install and to maintain combination offers all the details required to determine the current weather conditions along the track. The WS100 reports all WMO precipitation codes. Thus, the speed limitations can be imposed whilst optical signals are still readable for the train conductor.

The flexible data output and the reliable data reported make the two sensors a perfect and cost-effective solution for railway operators.

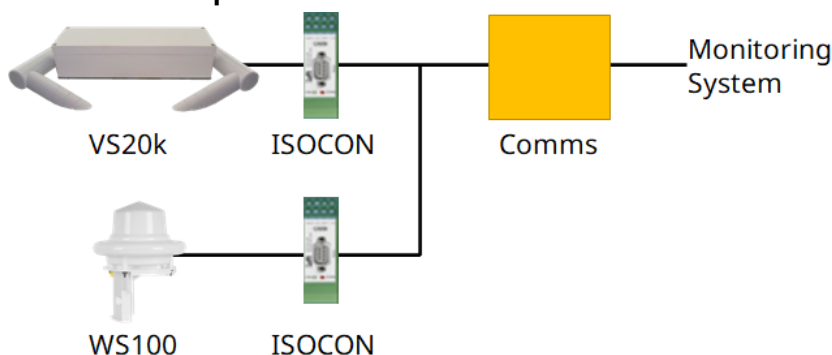


Keeping up safety precautions for rail traffic requires visibility monitoring in areas prone to fog or dust.

Product List

VS20k, WS100, power supply 24 VDC, communication module, mains supply, mast and foundation

Schematic Setup



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Further information

[Podcast: Roads \(and Railways\)
Safe in Low Visibility](#)

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Challenge

Train traffic by its own nature causes noise and vibration. It has to follow local regulations, as reduced braking noise or limited night-time traffic. Whether these efforts are effective, is monitored under varying weather conditions.

Solution

Sound travels differently under different weather conditions, be it precipitation, humidity, wind, or clouds. This also applies to vibration in the ground. The Lufft WS series provides hyper-local weather data in one housing.

Benefits

Accurate weather data helps to investigate the actual level of noise and vibration that might disturb residents. This knowledge enables traffic operators to adapt train speed to comply with regulations and keep disturbance low.

Project

The Lufft WS series is a compact all-in-one weather station series, easy to install and maintenance-free. The WS600 includes an ultrasonic wind sensor and sensors for air temperature and humidity, pressure, and precipitation.

Combined with additional sound measurements the objective data can be presented in a monitoring system that enables traffic operators to make decisions regarding train speed to keep noise within regulation limits.

Monitoring precipitation is important to comprehend ground moisture, which influences the distribution of vibrations within the ground. The WS600 uses radar technology to measure type, amount, and intensity of precipitation. Optionally, soil moisture sensors can be integrated easily.

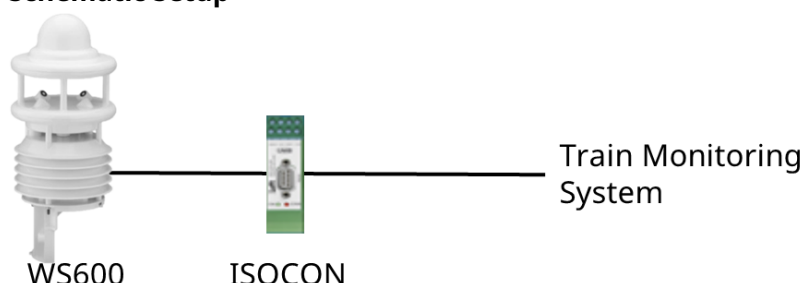


Noise monitoring station at a rail track including a Lufft WS600 weather sensor. *Credit: OTT HydroMet*

Product List

WS series such as WS600, ISOCON, power supply 24 VDC, cabinet, mast, Comms connection (RS-485, SDI-12).

Schematic Setup



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Further information

[Blog: Railway noise and vibration measurements](#)

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Challenge

Snow accumulates on rail tracks due to heavy snowfall and/or snow drifts. Carried forward by the wind, snow drifts can occur days later at unexpected locations. Once the snow gets compressed, it requires heavy equipment to remove it.

Solution

Continuous weather and snow monitoring with appropriate alarms and reliable sensor technology should be carried out at neuralgic points. This includes precipitation, wind, snow height, and, optionally, other parameters.

Benefits

Passenger safety and probability to keep traffic schedules increase. Maintenance measures can be taken in time before critical points in the network get blocked leading to a traffic breakdown and high costs for ice and snow removal.

Setup

Combining information on snow height with present weather data provides valuable insights for railroad network operators and maintenance services.

The snow height sensor Lufft SHM31 measures the snow height accurately based on laser technology. By measuring at an angle, the station can be sited far enough from the track to not interfere with passing trains. The compact all-in-one weather sensor Lufft WS600 adds data on wind, precipitation, barometric pressure, air temperature, and relative humidity.

Installation and integration are simple. The station requires little maintenance and provides data constantly. Communication takes place over a proprietary network along the tracks or via any other means, such as radio or mobile networks. This setup works for monitoring flooding situations, too.

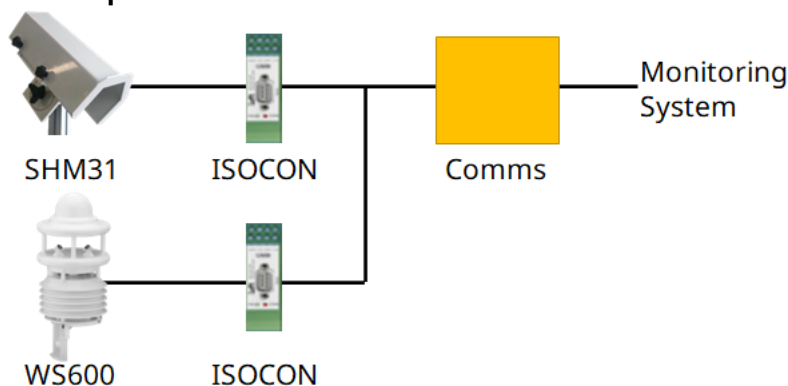


Railroad weather station with a snow height sensor Lufft SHM31 and a compact weather sensor. *Credit: OTT HydroMet*

System Components

SHM31, WS600, power supply 24 VDC, communication module mains supply, mast and foundation

Schematic Setup



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Further information

[Snow Height Measurement:
Technologies & Applications](#)

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Challenge

During prolonged periods of hot temperatures and exposure to sunlight, the metal rails expand. Weak connections to the sleepers can loosen or break and lead to bucking rails – making any train traffic impossible.

Solution

By measuring the rail temperature and the solar radiation, the stored energy in the rails can be estimated and actions planned accordingly. Vegetation and track bed can be watered to increase the cooling and shading.

Benefits

Knowing the right time for action will keep the track open will allow the traffic to flow as scheduled and save roads, rails, and crossings from major breaks and harm. The cost implications on maintenance and potential accidents are huge.

Project

Once the rails cannot expand any further and sleeper connections being weak, there is little room for the rails but to buckle. This happens in locations that are hot for weeks with little cooling at night-time.

A constant monitoring of the incident solar radiation, air and rail temperature offers room for decisions related to watering the tracks and its surrounding shading by vegetation to allow for cooling in summer.

The Lufft WS501 weather sensor measures the solar radiation and other atmospheric weather parameters to determine the temperature load on the steel tracks in a single housing that is easy to install and to maintain. Mounting the temperature sensor next to the rails and installing the WS501 on a mast near the track takes little effort compared to damage imposed by the heat.

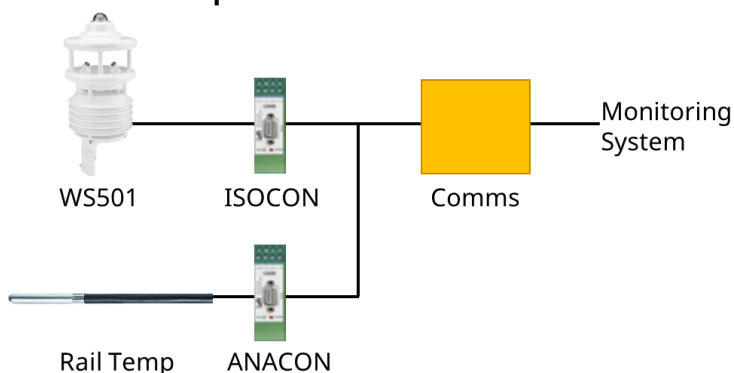


Bucking rails as a result of continuous exposure to heat make train traffic impossible. *Credit: Wikimedia*

Product List

WS501, Temperature Sensor, power supply 24 VDC, communication module, mains supply, mast and foundation

Schematic Setup



Further information

Network Rail installs Lufft WS601 at UK's West Coast main line

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