



*Optimised for road tunnel applications*

*Monitors obstruction to vision caused by fog, smoke and exhaust fumes*

*Easily integrated with systems in road and tunnel applications*

### **KEY FEATURES & BENEFITS**

- 200m to 99.99km measurement range
- Compact forward scatter design
- Not affected by lights
- Easily installed by one person
- Window heating and contamination monitoring
- EXCO and MOR Outputs
- Analogue voltage and current outputs
- Serial data output (RS232, RS422 or RS485)
- 2 Years warranty

**The RWS-30 is designed for use in road and tunnel applications where accurate and reliable visibility measurements are required. The forward scatter measurement principle provides a compact design with measurements that are both accurate and reliable in all weather conditions. The RWS-30 outputs have been chosen to match those recommended for use in tunnel systems.**

### **Applications**

As road networks become more congested those tasked with the management of traffic flow and road user safety are turning to Road Weather Information Systems (RWIS) to collect the meteorological data they need to keep the traffic moving. Road tunnels pose a unique set of problems to highways engineers and management personnel as they are affected by the weather at either end and can have their own internal micro-climates. Couple this to the added risk of pollution from stationary vehicles or fire after a crash and the need for a sensitive and accurate sensor to measure visibility and the causes of reduced visibility becomes absolute. The RWS-30 has been developed to meet the specific needs created by the tunnel environment and complies with current international guidelines as defined by the PIARC Technical Committee. The sensor is simple and quick to install reducing lane closure requirements whilst design features such as window contamination monitoring with automatic measurement adjustment allow maintenance to be undertaken only when needed.

In situations where visibility is reduced due to pollution from stationary, or slow moving vehicles or smoke from a fire the

relay outputs from the sensor can be used to trigger alarms and/or initiate signs at the tunnel entrances to prevent further vehicles from entering.

The safe operation of road tunnels present a unique challenge as whilst fog and certainly rain are unlikely the air quality can quickly deteriorate if the flow of air through the tunnel reduces due to changes in the weather outside. Visibility sensors, especially those with an extended visibility range, can act as sensitive pollution monitors allowing the ventilation systems to be activated before pollution increases to dangerous levels. Visibility sensors can also form part of a fire detection system by detecting a sudden and isolated visibility decrease. The RWS-30 has a measurement range of 200m to 99.99km (with a resolution of 1m) making it a very sensitive sensor for both air quality and fire detection. To ease integration the sensor has the ability to report EXCO or MOR as a 4-20mA current output as favoured in tunnel systems, alternatively either the serial data output or optional relays can be used.



## Visibility Measurement

The measurement of visibility by forward scatter as used by the RWS-30 is now widely accepted and seen as having significant advantages over more traditional techniques such as the use of backscatter sensors or transmissometers. Backscatter sensors share the RWS-30's advantage of being compact however the backscatter signal is strongly dependent on the type of obstruction to vision resulting in poor accuracy and limited upper range. More importantly due to the problem of reflections backscatter sensors require a large open area in front of the sensor to operate correctly. Transmissometer based sensors can produce accurate visibility measurements but the upper visibility limit is set by the sample path length which is always limited for reasons of practicality. The RWS-30 by contrast remains accurate to a range of 99.99km and is not significantly influenced by objects around the sensor. To ensure the best possible results the calibration of the RWS sensor family is traceable to a national weather service reference transmissometer.

## Interfacing, Connectivity and Cost of Ownership

The RWS sensor family is designed to be easily installed by a single person and has an interface which simplifies system integration. The ASCII text data message is transmitted at user defined time periods or in response to a polled request using a

RS232, RS422 or RS485 interface. The standard data message provides both averaged Meteorological Optical Range (MOR) and atmospheric Extinction Coefficient (EXCO).

To allow connection to analogue systems the visibility measurement is available as a voltage (0-10V) or as a current (4-20mA) output, representing either MOR or EXCO values. Three volt free contact change over relays offer user configurable outputs including visibility threshold, window contamination and sensor failure.

To keep track of the operational status of the sensor abbreviated self-test information is included in every data message with a full self-test report available on request. The advanced self-test features include window contamination monitoring which automatically corrects the output data and provides two stage warnings allowing maintenance to be performed most efficiently. Calibration checks and recalibration are simple and quickly accomplished in the field by a single person. The need for such procedures is limited however as the stability of the light source and receiver circuitry is such that recalibration intervals are typically measured in years.

## Advanced Functional Test Mode

All Biral visibility and present weather sensors have the capability to temporarily output specific data via a test mode. In this mode the user can define visibility, window contamination and fault conditions for a pre-determined time period. This functionality is useful during Factory or Site Acceptance Testing (FAT or SAT), or system integration to test downstream processing of the output data.



## Sensor Configuration Information

For a detailed explanation of the configuration options please refer to the table below.

### RWS30 - RWS-30 Road Tunnel Weather Sensor

#### Optional Relays:

**NR** - Without relay outputs

**WR** - Including relay outputs

#### Configuration:

**RC** - Regular configuration

**SC** - Special configuration

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**Example:** *RWS30.WR.RC* (Please use this code when ordering your sensor).

## Configuration Options Explained

Option	Description
Optional Relays	The sensor can be supplied with two threshold and one self-test relay. The threshold relays switch at a user defined visual range. Option <b>NR</b> : Without relay option Option <b>WR</b> : With relay option
Configuration	Reserved for customer specific configurations. Option <b>RC</b> : No customer specific configuration Option <b>SC</b> : Special customer specific configuration.

# RWS-30

## Road Tunnel Weather Sensor Specifications



### Visibility Measurement

Measures	Visibility (MOR & EXCO)
Output	Serial Digital, 4-20mA and Voltage 0-10V
Range (visibility)	MOR 200m to 99.99km EXCO 0.03 to 15km <sup>-1</sup>
Measurement Resolution	1m or 10m (default)
Measurement Error	≤10% at 200m to 10,000m ≤20.0% at 10,001m to 30,000m
Measurement principle	Forward scatter meter with 39° to 51° angle

### Outputs and Reports

Output rate (seconds)	60
Serial outputs	RS232, RS422 and RS485
Analogue outputs	0-10V and 4-20mA
Relay outputs	1 Fault and 2 Threshold Relays (option)

### Power Requirements

Sensor Power	9-36Vdc
Basic sensor	3.5W
Window heaters	1.7W

### Additional Features

Window contamination monitoring	Fitted as standard to both sensor head windows
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### Environmental

Operating temperature	-40°C to +60°C
Operating humidity	0 – 100% RH
Protection rating	IP66/IP67

### Certification & Compliance

CE Certified
EMC compliance with EN61326-1997, 1998, 2001
RoHS and WEEE compliant

### Physical

Material	Powder paint coated aluminium
Weight (incl. mounting kit)	4.3kg
Length	811mm
Warranty	2 years
Lifetime	>10 years
Colour	Grey - RAL 7045

### Maintenance

Self-test capability	As standard
User confidence check	6 months recommended
Window Cleaning	Automatic compensation and warnings
Field calibration	With optional calibration kit

### Included with Sensor

The sensor is delivered in sturdy recyclable foam filled packaging with:
- Pole mounting kit (2 x U-bolt)
- User manual and calibration certificates

### Accessories – Optional

SWS.CAL	SWS Series Calibration Kit
SWS.CASE	SWS Series Transit Case
SWS.WTY100	1 Year extended warranty

Specifications are subject to review and change without notice. E&OE.

