

*Monitors visibility and  
obstruction to vision*

*Designed for easy integration with  
intelligent road network systems as well as  
Road Weather Information Systems  
(RWIS)*

## KEY FEATURES & BENEFITS

- User selectable measurement range from 10m to 7500m
- Selectable measurement resolution of 1m or 10m (default)
- Compact forward scatter design
- Optional hood heating for use in extreme winter environments
- Window heating and contamination monitoring
- Optional 4-20mA and relay outputs
- Analogue voltage output (0-10V)
- Comprehensive self-test capabilities
- Serial data output (RS232, RS422 or RS485)
- 2 Years warranty

**The RWS-20 is designed for use in road applications where accurate and reliable visibility measurements are required. The forward scatter measurement principle and unique design ensure the output is both accurate and reliable in all weather conditions and will not be influenced by local light sources, headlights or even flashing signs and beacons.**

The 10m to 7.5km measurement range is optimal for use in road applications where fog, heavy rain, surface spray and snow can cause dangerous driving conditions due to reduced visibility. Heating of both the optical windows and sensor hoods is provided allowing use in the harshest of winter conditions. Both optical windows are monitored for contamination and the visibility output is automatically compensated to reduce maintenance requirements. The RWS-20 will even automatically alert when the measurement optics need to be cleaned.

In addition to the serial data interface, the sensor provides voltage and current (optional) outputs of visibility (MOR) or the extinction coefficient (EXCO). Optional relays provide a direct connection to road-side signage or to a data-logger or other control system allowing the sensor to intelligently (and independently) operate local warning systems.

## Visibility Measurement

The measurement of visibility by forward scatter as used by the RWS-20 is now widely accepted and seen as having significant advantages over more traditional techniques such as the use of transmissometers or backscatter sensors. Backscatter sensors

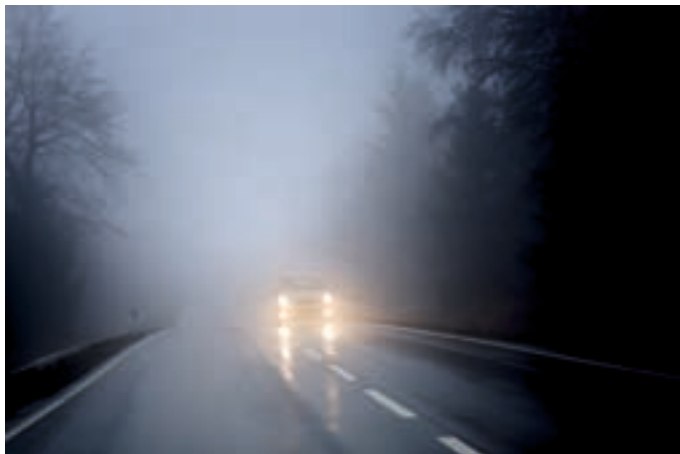
share the RWS-20's advantage of being compact however the backscatter signal is strongly dependent on the type of obstruction to vision resulting in poor accuracy and limited upper range. Transmissometers were once considered the standard method for visibility measurement due to their direct measurement of visibility however; their limited measurement range, high cost of acquisition, large size and significant maintenance costs have resulted in their use being limited to a few specialist applications. The RWS-20 by contrast is compact, requires little maintenance and has a visibility range of 10m to 7.5km, whilst its measurement performance is proven to be comparable to that of a transmissometer. The calibration of the Biral visibility sensor range was undertaken in accordance with the recommendations of ICAO 9328 and is traceable to an independent national weather service transmissometer.

Visibility is reported as averaged forward scatter Meteorological Optical Range (MOR) with a maximum measurement range of 10m to 7.5km and a 1m resolution. The start point for the measurement range is fixed at 10m, however the user is able to set the maximum value to suit their application and local conditions. This can be adjusted between 600 and 7500m, in 10m steps, via the software interface. Reporting of atmospheric Extinction Coefficient (EXCO) can be selected by the user if required.

## Application

Any sensors or measurement systems located at the side of the carriageway have to be able to withstand both the dirty and potentially corrosive environmental conditions (salt spray in winter, dirty water spray at other times), but also have to operate largely independently and for extended periods of time as access can often be restricted. The RWS-20 visibility sensor is specifically designed for harsh road-side conditions found around the world. The sensor housing is a very robust aluminium enclosure which is sealed against dirt and water ingress (IP66/67) and designed to withstand the rigours of 24/7 unattended operation. The measurement windows are protected by hoods which are designed to reduce the amount of dirt and external light reaching the optics.

The RWS-20 is a key component of any Road Weather Information System (RWIS) and provides the very important data on the visibility that the driver experiences at the carriageway level. The data and connectivity options allow the RWS-20 to be interfaced to any data collection system for data management and also directly to variable message signs via



simple relay outputs. It has been designed for easy integration into existing as well as new Intelligent Transportation Systems (ITS) adding visibility measurements into the decision making system.

## Interfacing and Connectivity

The RWS-20 is designed to be easy to use, with the ASCII text data message 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 averaged MOR and EXCO output. The inherent flexibility of the RWS-20 provides for optional 4-20mA analogue and/or relay outputs to be specified for connection to a data logger or other ancillary devices.

## Maintenance and Cost of Ownership

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 RWS-20 has a series of features that are designed to reduce maintenance requirements to a minimum whilst ensuring accurate and reliable operation in the very harsh road-side environment. These features include contamination monitoring on both the transmitter and receiver optical windows which automatically corrects the measurements to maintain accuracy for longer periods of time. The sensor also automatically issues a two stage warning of the need to clean these optical windows. This allows routine maintenance to be planned and carried out as and when required and so be performed as efficiently as possible. 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.

The RWS-20 is DC powered with the capability to accept separate supplies for sensor electronics and the high power hood heaters. Hood heating is only required in regions where blowing snow is encountered and to conserve power the heaters are only activated when the temperature drops to 2°C, and switch off at 4°C.

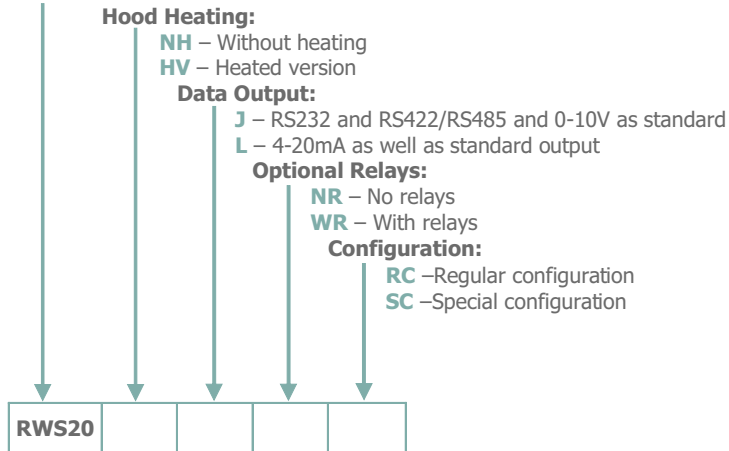
## Advanced Functional Test Mode

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.

### RWS20 – RWS-20 Sensor



**Example:** **RWS20.HV.J.NR.RC** (Please use this code when ordering your sensor).

## Configuration Options Explained

Option	Description
Heating Options	Heated hoods are available to stop snow from accumulating around the optical windows. The hood heating option is only required in regions where snow is experienced. Option <b>NH</b> : No hood heating Option <b>HV</b> : Hood heating included
Data Output	The sensor has RS232, RS422 and RS485 serial output capabilities as well as a 0-10V analogue output. A current output is available as an option. Option <b>J</b> : Standard outputs (RS232 and RS422/RS485) and 0-10V Option <b>L</b> : Standard outputs plus 4-20mA
Optional Relays	The sensor can be supplied with two thresholds and one self-test relays. The threshold relays can be configured by the user as either two visibility thresholds relays, or one visibility threshold relay and one window contamination alert relay. Option <b>NR</b> : Without relay option Option <b>WR</b> : With relay option (1 x fault, 2 x threshold, one being user definable)
Configuration	Reserved for customer specific configurations. Option <b>RC</b> : No customer specific configuration. Option <b>SC</b> : Special customer specific configuration.

# RWS-20

## Road Weather Sensor Specifications



### Visibility Measurement

Measures	Visibility (MOR & EXCO)
Output	Serial data, and Voltage, 4-20mA optional
Range (visibility)	10m to 7,500m
Measurement Error	≤10.0% at 7,500m
Measurement resolution	1m or 10m (default)
Measurement principle	Forward scatter meter with 39° to 51° angle, centred at 45°

### Outputs and Reports

Output rate (seconds)	10 to 300 selectable
Serial outputs	RS232, RS422 and RS485
Analogue outputs	0-10V (4-20mA Option)
Relay outputs	1 fault and 2 threshold relays (option)

### Power Requirements

Sensor Power	9-36Vdc
Hood heating power	24Vac or dc
Basic sensor	3.5W
Window heaters	1.7W
Hood heaters	24W

### Additional Features

Hood heaters	Fitted as an option to both sensor head hoods
Window contamination monitoring	Fitted as standard to both sensor head windows

### 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

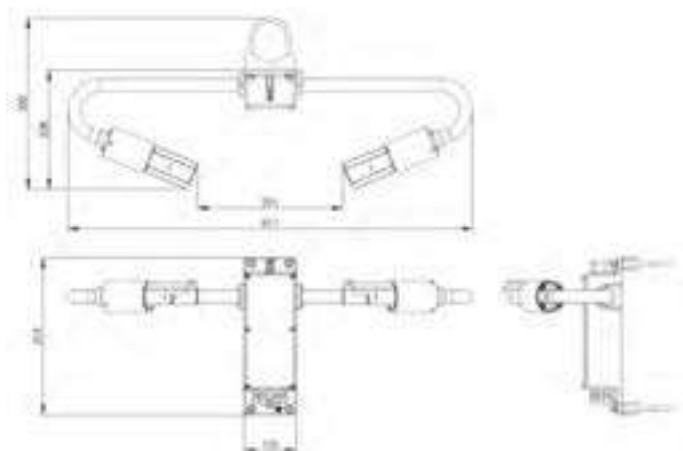
### Included with Sensor

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

### Accessories – Optional

SWS.CAL	Calibration Kit suitable for SWS and RWS series
SWS.CASE	Transit Case
SWS.WTY100	1 Year extended warranty

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



Dimensions in mm