

Biral *visibly better*

AVIATION

Visibility and Present Weather sensors you can trust...



METEOROLOGICAL SENSORS



Meteorological Sensors for Aviation Ground Use

With air traffic volumes set to increase year on year airport operators are under increasing pressure to expand services whilst maintaining or improving safety and customer satisfaction. Many of the challenges this brings can be addressed by careful planning, adopting best practice and investment in new infrastructure and technology. However, the weather will always remain outside of our control with an ability to cause major disruption. Accepting that we cannot control the weather, having accurate information about current conditions is vital for allowing operations to continue with minimum disruption whilst ensuring that safety is never compromised. Meteorological sensors therefore should be seen as an important part of any airport, whether it is a simple grass strip or a major international hub.

All Biral sensors for use in aviation systems including RVR meet or exceed the requirements of ICAO (ICAO 9837 and ICAO Annex 3), WMO, FAA, CAA (CAP437, CAP670 and CAP746) and CAAC. Calibration is in accordance with ICAO 9328 and is traceable to a reference standard transmissometer.

Declarations of Suitability for Use as per EU Regulation 552/2004 on the interoperability of the European Air Traffic Management network are available for all sensors.

Visibility Measurement for Runway Visual Range (RVR) and METAR

Knowledge of visibility along the runway is of vital importance to pilots

during landing and take-off which is why the estimation of Runway Visual Range or RVR is perhaps the most common use for visibility sensors in aviation. Visibility is also an integral part of METAR and SPECI reports provided by airports as part of their air traffic management responsibilities. In larger airports visibility measurement on taxi ways is increasingly used to improve the safety of ground movements.

Transmissometer or Forward Scatter?

Transmissometers were once the sensor of choice on airfields due to their direct measurement of extinction coefficient. However, their limited measurement range and high costs has seen more capable and cost effective forward scatter meters (FSM's) become widely used.

Advantages of Biral Forward Scatter Meters

- much more compact
- require little maintenance
- report visibilities from 10m to 75km
- performance proven to be comparable to that of transmissometers

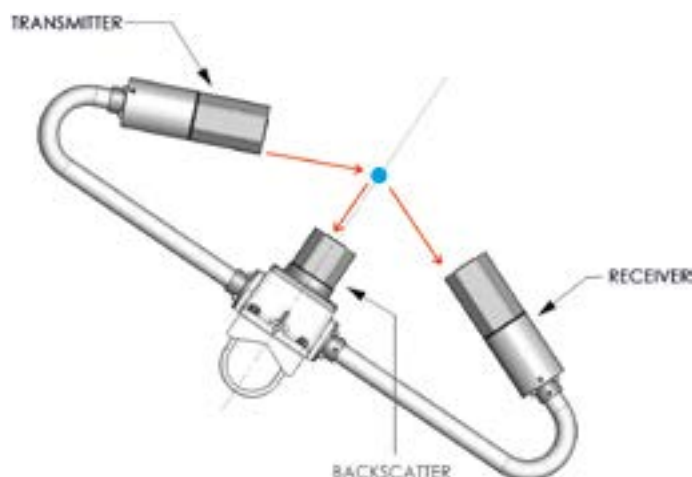
Present Weather Sensors and Measurement

The term present weather is used to describe the current conditions which might include anything from tornados to blizzards. When applied to a sensor the term covers a more limited set of conditions which generally include visibility and both liquid and frozen precipitation. In aviation present weather sensors provide information for the formulation of METAR and SPECI reports as well as airfield and regional forecasts.

Forward scatter present weather sensors can struggle to distinguish between liquid and frozen precipitation; an important capability in aviation where icing on aircraft and runways is a serious safety concern. Biral sensors are the only ones to reliably solve this problem by using a backscatter receiver.

Advantages of Biral Forward Scatter Meters

- uses a unique backscatter receiver to improve classification accuracy
- reports the correct precipitation code reliably even in the most difficult conditions



Ambient Light Sensor for RVR

When calculating Runway Visual Range three pieces of information are required; visibility, ambient light level and runway light intensity. Whilst runway light intensity is often directly available to an integrated control system both visibility and ambient light levels must be measured at the runway. The ALS-2 ambient light sensor connects directly to VPF or SWS sensors providing visibility and ambient light measurements in a single data message.

Airfield Installations

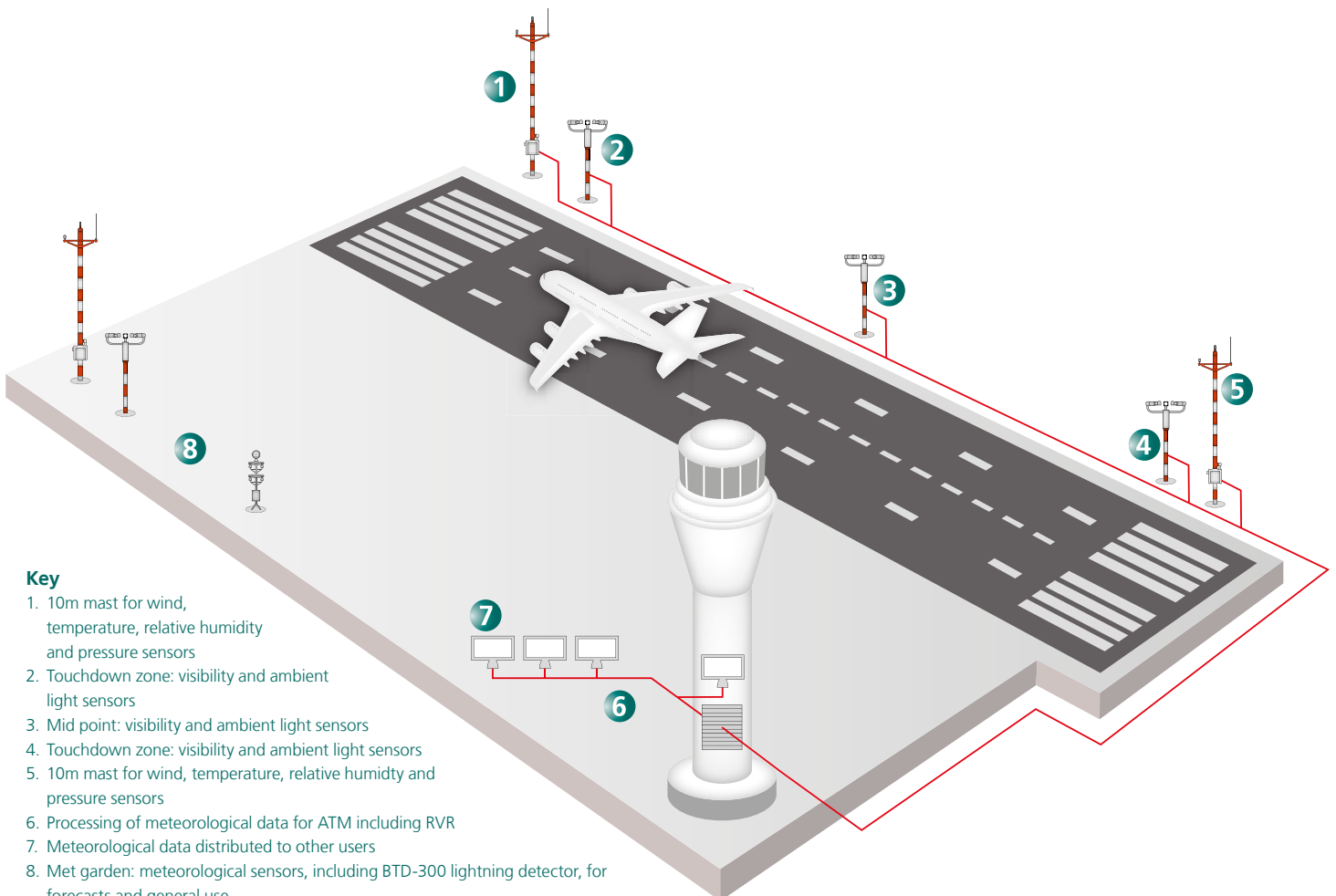
Due to the wide variation in airfield size and complexity there is no standard configuration of meteorological sensors that suits all needs. Smaller airfields without the need for RVR may cluster a set of sensors around a met-tower whilst larger more complex airports have sensors at both ends of a runway. The largest applications can have three sets of sensors per runway in addition to a dedicated set for meteorological observation and forecasting. The extensive Biral sensor range is perfectly suited to the varying needs of all these installations.

Operation and Maintenance

Meteorological sensors for aviation must be highly reliable and require the minimum of maintenance to ensure long term costs and disruption is kept to a minimum. All Biral sensors are designed for reliability and backed by the longest warranties currently available. Many VPF sensors are still in full operational service after more than twenty years.

All equipment requires routine maintenance to maintain accuracy, avoid unexpected failures and extend overall life. However, if the maintenance demands are excessive higher costs and service disruptions will occur. Biral visibility and present weather sensors have a range of features that reduce maintenance to a minimum, whilst allowing it to be performed flexibly.

All Biral sensors have simple to use field test and calibration kits allowing the operator to maintain a high degree of confidence in the measurements without the disruption and expense of removal for offsite calibration.





Thunderstorm (Lightning) Detection

BTM-300 Thunderstorm (Lightning) Detector

The BTM-300 Thunderstorm Detector is a standalone sensor that reliably detects the presence of all forms of lightning to a range of 83km, exceeding the requirements as described by the Federal Aviation Administration (FAA). The unique quasi-electrostatic operating principle gives the detector a very low false alarm rate and the ability to warn of the risk of overhead lightning. Virtually maintenance free, the BTM-300 can operate with the supplied PC compatible display software, seamlessly integrate with other sophisticated airport weather monitoring systems or directly activate local warning devices.

True Thunderstorm Detection

In many applications the thunderstorm detector is used to help protect people and equipment from the dangers of a lightning strike by providing advanced warning of a storm's approach. Detectors which rely on lightning alone are only effective if the storm is already producing lightning at a distance before moving closer towards the detector. If the first lightning strike of the storm is overhead there is no advanced warning

and so no protection. The electrostatic operating principle allows the BTM-300 to monitor the strength of the local electric field and the presence of charged precipitation, both of which are strong indicators of lightning risk. This allows the BTM-300 to provide warnings of the risk of an overhead strike even before any lightning has been produced, giving users time to take the necessary safety measures ahead of the first strike.

Range and Direction

The BTM-300 has exceptional lightning detection and ranging capability as a result of the quasi-electrostatic design, but for those applications where knowledge of both the range and direction of lightning is necessary there is an optional direction finding module. The module uses traditional radio direction finding techniques but the output is qualified by the electrostatic ranging system to ensure only true lightning discharges are reported.

BTM Field Test Unit

The BTM Field Test Unit is a simple battery powered device which simulates lightning in several range bands. It can be used as part of commissioning tests or during routine maintenance activities to enhance user confidence.



BTD-300 Thunderstorm (Lightning) Detector

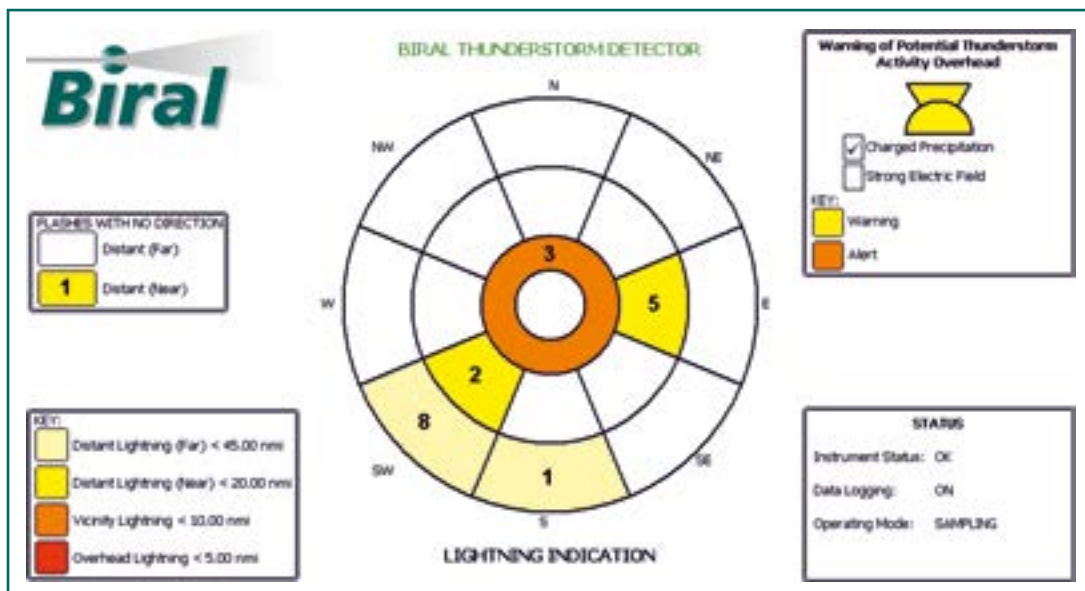
Airport managers have a duty of care towards their staff, to protect them from the dangers associated with lightning activity. Often operating in open spaces and handling volatile liquids or expensive machinery these workers are normally some distance from any safe areas. Key airside operations like baggage handling and aircraft refuelling, for example, need time to make their operations safe. The ability of the BTD-300 to provide a warning of the threat of lightning activity in the immediate area provides operations managers with the time

needed to assess the risks and initiate the appropriate actions to mitigate them.

Having the ability to track thunderstorms as they approach and leave the vicinity of the airport can also reduce the time generally given before normal activities are resumed. This provides for optimised efficiency, minimised delays to passengers and keeps the airport functioning normally. Aircraft, both on the ground and in the air, can also be made aware of the thunderstorm activity during the critical landing and take-off phases further increasing the safety of all concerned.

Advantages of Biral Thunderstorm Detectors

- Warns of overhead lightning risk even before the first lightning discharge
- Highly immune to radio interference which is the major cause of false alarms in traditional standalone detectors
- 83km (45 NM) detection range exceeds the US Federal Aviation Administration (FAA) requirements
- Detects cloud-to-ground and as well as weaker but more common cloud-to-cloud lightning
- Detects charged precipitation





VPF-750



VPF-730



VPF-710

Biral Visibility & Present Weather Sensors

Airports vary in size and complexity from grass strips serving isolated communities to multi runway international hubs serving capital cities. Weather conditions will also vary with location, so it is important to offer a range of sensors to match the clients' requirements and budgets.

The VPF Sensor Range

The VPF range offers outstanding reliability and corrosion resistance combined with the most accurate measurements and greatest number of reported present weather codes. They have been proven in use over 20 years and remain at the forefront of visibility and present weather technology. VPF series sensors are widely used in aviation and were the first forward scatter sensors to be used in a UK CAA approved RVR system on a CAT III runway.

Sensor	Visibility Range	Present Weather Codes	
VPF-750	10m to 99.99km	50 WMO	45 METAR
VPF-730	10m to 99.99km	15 WMO	17 METAR
VPF-710	10m to 99.99km	Visibility only	



SWS-200/SWS-250



SWS-050/SWS-100

The SWS Sensor Range

The SWS sensor series was introduced in 2009 and shares much of the advanced technology used in the VPF range. With a powder coated, all metal enclosure, the sensors are proven to be reliable for extended periods of operation. All SWS series visibility and present weather sensors meet ICAO and WMO requirements for use in aviation including RVR systems.

Sensor	Visibility Range	Present Weather Codes	
SWS-250	10m to 99.99km	42 WMO	36 METAR
SWS-200	10m to 99.99km	14 WMO	0 METAR
SWS-100	10m to 99.99km	Visibility and precipitation type	
SWS-050	10m to 40km	Visibility only	

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