



Datasheet

VPF-750 Visibility & Present Weather Sensor

The VPF-750 Visibility and Present Weather sensor meets the needs of aviation, automated weather observing systems, national meteorological service networks and research institutions. The wide visibility measurement range, extended weather code reporting capabilities, rugged construction and reliable operation ensure the sensor is suitable for the most demanding applications.

- ✓ **Exclusive backscatter sensor gives unparalleled ability to identify frozen precipitation**
- ✓ **Offers the widest range of visibility and present weather type identification**
- ✓ **Proven forward scatter design simplifies installation and system integration, whilst providing the most accurate measurements**

Features

- WMO Table 4680 present weather codes (50) – plus 45 METAR codes
- Integrated precipitation sensor – distinguishes between liquid and different types of frozen precipitation
- Integrated temperature and humidity sensors – highly accurate reporting
- Automatic window contamination monitoring – ensures optimum accuracy whilst minimising maintenance requirements
- Designed for aviation, research and general meteorological use – VPF series used on CAT III Runways in the UK
- Easy integration with the ALS-2 Ambient Light Sensor – fast installation, reliable results
- 5 years warranty

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Visibility Measurement

The forward scatter visibility measurement principle used in the VPF-750 is accepted by ICAO and WMO for use in aviation applications including the estimation of Runway Visual Range (RVR). The calibration of the VPF series was performed in accordance with ICAO 9328 and is traceable to a national weather service transmissometer ensuring measurement accuracy and simplifying system acceptance.

Visibility measurements are reported as forward scatter Meteorological Optical Range (MOR) and Extinction Coefficient (EXCO) in the range 10m to 99.99km.

Present Weather Measurement

The determination of precipitation type in a forward scatter sensor is made by observing the intensity of scattered light and the transit time for each precipitation particle. These parameters are used to estimate the particle size and determine if it is liquid or frozen using well established relationships, unfortunately in anything other than still conditions the relationships become unreliable, resulting in poor classification accuracy. Biral sensors are the only ones to solve this problem through the use of a backscatter receiver. The ratio of forward to back scattered light is significantly different for liquid and frozen particles, allowing the VPF-750 to report the correct precipitation code reliably, even in the most challenging conditions.



Raindrop or Snowflake

Biral's backscatter receiver reliably determines if the particle is liquid or frozen, reporting the correct precipitation code even in the most challenging conditions

The reliable determination of present weather type also requires accurate measurement of temperature and humidity. For this reason, the VPF-750 is supplied with an external temperature and humidity sensor mounted in a screened enclosure. The backscatter receiver and accurate temperature measurements combined with an external heated precipitation sensor enable the VPF-750 to report freezing precipitation codes.

Interfacing and Connectivity

All VPF series sensors are 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. The standard data message provides MOR and EXCO along with present weather codes according to both WMO Table 4680 and METAR standards. Synoptic reports of significant past weather are included along with precipitation amount, temperature and humidity.

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.

Rugged and Reliable

The VPF sensors are often installed in harsh environments such as offshore platforms, where meteorological information is essential for operational safety. The sensor's physical design is optimised to ensure accurate measurement and reliable operation even where driving rain and salt spray is common.

Low power heaters keep the windows free from dew whilst high power heaters are optionally available to keep the optics free of blowing snow.

The operational life of a VPF series sensor is well in excess of ten years, even in a marine environment, due to the hard coat anodise finish applied to the aluminium enclosure. The calculated Mean Time Between Failure (MTBF) is over 6 years, however field return data gives a figure in excess of 35 years.



The sensors physical design is optimised to ensure accurate measurement even within challenging environments.

Applications

Aviation applications demand accurate measurement of visibility and present weather to help ensure safety, whilst the economics of modern airports demand high reliability and low maintenance to ensure operational efficiency. The VPF-750 meets or exceeds all international specifications for visibility measurement with a reliability that is proven through worldwide use. Many VPF series installations are in the most extreme of environments where they have a reputation for long life. The accuracy and quality of the VPF series is recognised by these being the first forward scatter sensors to be used for Runway Visual Range (RVR) on CAT III runways approved by the UK CAA.

An optional interface to the ALS-2 Ambient Light Sensor simplifies use in aviation applications where both RVR and METAR information is required. The provision of WMO, METAR and past weather data, simplifies system design thereby reducing acquisition costs.

The features that make the VPF-750 suitable for aviation applications are equally applicable to national weather service networks and research applications.



VPF sensors were the first forward scatter sensors to be used in a UK CAA approved RVR system on a CAT III runway.

Cost of Ownership

The VPF-750 has a series of features that reduce maintenance requirements to a minimum whilst ensuring accurate and reliable operation. These 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.

The VPF-750 is 24V DC powered. Hood heaters are available for use in areas prone to snow.

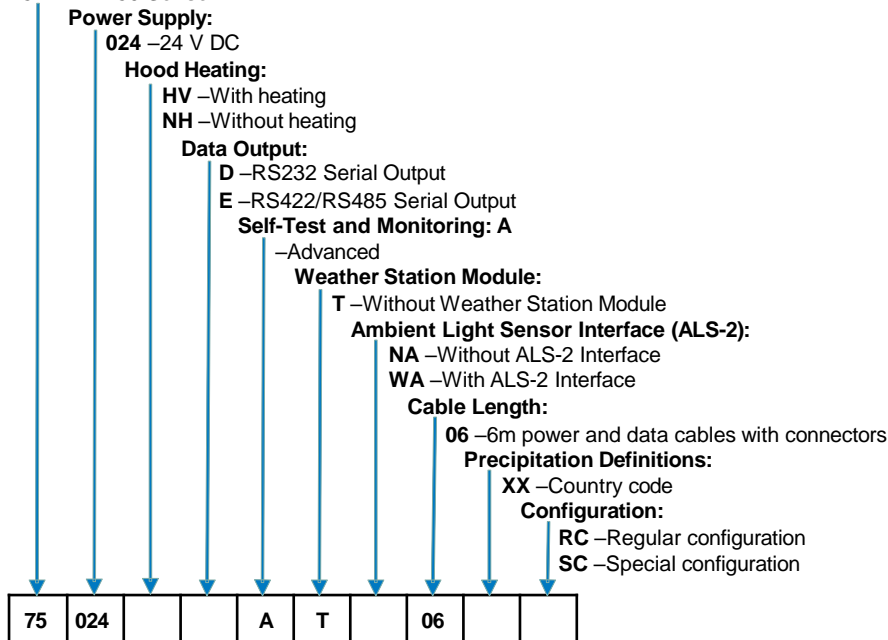
Advanced Functional Test Mode

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, present weather, 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.

75 – VPF-750 Sensor



Example: 75.024.NH.D.A.T.WA.06.UK.RC (Please use this code when ordering your sensor).

Configuration Options Explained

Option	Description
Power Options	The sensor requires 24V DC supply. Option 024 : 24V DC Supply
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 HV : Hood heating included Option NH : No hood heating
Data Output	The sensor is available with either RS232 or RS422/RS485. Option D : RS232 Serial communication Option E : RS422/RS485 Serial communication
Self-Test & Monitoring	The sensor is provided with Advanced Self-Test capability. Advanced self-test capability provides monitoring of all the essential sensor functions, including contamination of the transmitter and receiver windows, plus receiver sensitivity monitoring. Advanced self-test capability provides greater measurement confidence in applications where different levels of contamination may occur on the sensor windows, for example where strong or gusty winds are experienced. No other options are available. Option A : Advanced Self-Test
Weather Station Module	Not available with the VPF-750 (see VPF-730). Option T : Without Station Weather Module
ALS-2 Interface	The sensor may be configured to allow direct connection of the ALS-2 Ambient Light Sensor. The Ambient Light Sensor is typically used in airport applications where Runway Visual Range must be calculated. Option NA : Without Ambient Light Sensor Interface Option WA : With Ambient Light Sensor Interface
Power and Data Cable	This sensor is supplied with a 6m cable connected to the sensor using circular connectors. No other options are available. Option 06 : Standard 6m cable
Precipitation Codes	Biral present weather sensors report precipitation and visibility according to predefined intensity values. As no universal definition for intensity values is available sensors can be supplied configured to the requirements of a range of countries, or the customer may supply their own definitions. Where custom definitions are required please complete a Custom Present Weather Definition Form, available from our Sales Department. For a full list of the currently available country codes, please refer to the Present Weather Sensor Country Code List, available from our Sales Department.
Configuration	Reserved for customer specific configurations. Option RC : No customer specific configuration Option SC : Special customer specific configuration

Specifications

Visibility & Present Weather Measurement

Measures	Visibility and Present Weather (MOR & EXCO)	
Output	Serial data	
Range (visibility)	10m to 99.99km	
Measurement Error	≤1.3% at 600m	≤1.8% at 1,500m
	≤2.0% at 2km	≤8.3% at 15km
	≤10.5% at 30km	≤20.% at 75km
Measurement principle	Forward scatter meter with 39° to 51° angle, centred at 45°	
Precipitation detection resolution	Rain: 0.015 mm/hr (0.0006 in/hr)	Snow: 0.0015 mm/hr (0.00006 in/hr)
Precipitation Intensity Reporting Range	0-1000mm/hr (39.4 in/hr)	
Rain intensity accuracy	≤10%	

Outputs and Reports

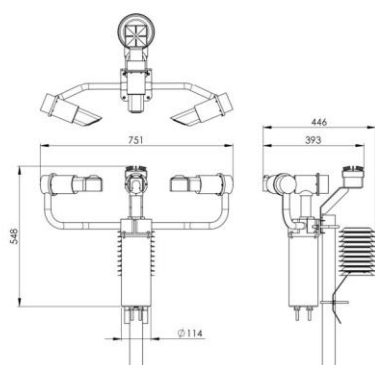
Output rate (seconds)	10 to 300 (selectable)
Serial outputs	RS232 or RS485
Present Weather	50 WMO Table 4680 codes, including Past Weather, Freezing Rain and Ice Pellets 45 METAR codes
Humidity Sensor	Capacitive type. 0 - 100% RH
Air Temperature Sensor	PT 100 type. -30°C to +70°C

Power Requirements

Sensor Power	19 to 28Vdc
Heating power	As sensor supply
Maximum Power	72W

Additional Features

Window heaters	Fitted as standard
Window contamination monitoring	Fitted as standard on all the sensor windows
Hood heaters	Optional



Dimensions in mm

Environmental

Operating temperature	-50°C to +60°C
Operating humidity	0 – 100% RH
Protection rating	IP66

Certification & Compliance

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

Physical

Material	Hard coat anodised aluminium
Weight (including external sensors)	7.4kg
Length	751mm
Warranty	5 years
Lifetime	>10 years
MTBF (MIL-HDBK-217F)	6.5 years (56,700 hours)
MTBF (Service return calculation)	>35 years

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)
- 6m power and data cable
- User manual and calibration certificates

Accessories – Optional

PW.CODE	User defined precipitation definitions. Per definition set
70.CAL	VPF Series Calibrator
70.CASE	VPF Series Transit Case
70.SK	VPF Series Spares Kit
75.WTY	1 Year extended warranty

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

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Originating from the Netherlands, Observator has grown into an internationally oriented company with a worldwide distribution network and offices in Australia, Germany, the Netherlands, Poland, Singapore and the United Kingdom.



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