

# VPF-730

## Visibility & Present Weather Sensor

The VPF-730 Visibility and Present Weather sensor provides accurate visibility and present weather measurement in a compact and highly rugged package making it suited to both general and offshore aviation applications. These features also make the VPF-730 popular in applications where reliability and long life are important such as national weather service networks and remote monitoring stations.



### Rugged and Reliable

Our sensors are often installed in challenging environments, such as offshore platforms, where meteorological information is essential for operational safety. The sensor's physical design is optimized to ensure accurate measurement and reliable operation even where driving rain and salt spray is a common occurrence. 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 typical VPF series sensor is well in excess of ten years, even in a marine environment, due to the hard coat anodize finish applied to the aluminum enclosure. The calculated Mean Time Between Failure (MTBF) is over 6 years, however, field return data gives a figure in excess of 35 years.



Designed for aviation



WMO Table 4680  
& METAR Outputs



Automatic window  
contamination monitoring



Easy integration of  
ALS-2 ambient light  
sensor



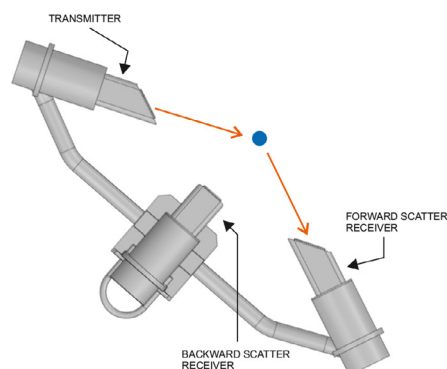
5 years warranty

### Visibility Measurement

The forward scatter visibility measurement principle used in the VPF-730 is accepted by ICAO for use in aviation applications including the estimation of Runway Visual Range (RVR). The calibration is traceable to a national weather service transmissometer and was undertaken in accordance with the recommendations of ICAO 9328. Visibility measurements are reported as forward scatter Meteorological Optical Range (MOR) and Extinction Coefficient (EXCO) in the range of 10m to 99.99 km.

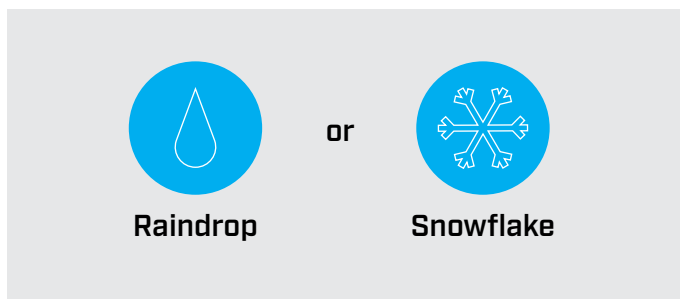
IR light is transmitted to the sample volume directly in front of the sensor.  
Particles scatter light back to the Receiver, from;

- small particles suspended in sample volume (fog)
- large particles passing through sample volume (hydrometers)
- More fog = more scatter = more signal = higher EXCO = lower MOR



## 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. The sensors are the only ones to solve this problem through the use of a backscatter receiver. The ratio of forward to backscattered light is significantly different for liquid and frozen particles, allowing the VPF-730 to report the correct precipitation code reliably even in the most challenging conditions.



*MicroSteps-MIS backscatter receiver reliably determines if the particle is liquid or frozen, reporting the correct precipitation code even in the most challenging conditions.*

## 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. An optional interface to the ALS-2 Ambient Light Sensor simplifies use in aviation applications where both METAR and RVR information is required. The ALS-2 Ambient Light Sensor data is appended to the standard sensor data message simplifying both the installation and data processing.

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.

## Applications

### Marine

In offshore and general aviation, the costs of servicing or replacing a sensor can be significant. When the equipment is installed offshore access is difficult and expensive, whilst for any aviation use there are significant costs due to restrictions

imposed when equipment is not operational. Many VPF series installations are in the most extreme of environments where they have a reputation for reliability and long life. The operational life of the VPF sensor in such environments is frequently in excess of 10 years.



*Suitable for a range of applications.*

### Aviation

Aviation applications demand accurate measurement of visibility and present weather to help ensure safety. The VPF-730 meets or exceeds all international specifications for visibility measurement with a reliability that is proven through worldwide use. The accuracy and quality of the VPF series is recognised by them being the first forward scatter sensors to be used for Runway Visual Range (RVR) on CAT III runways approved by the UK CAA. The features that make the VPF-730 suitable for aviation applications are equally applicable to national weather service networks and research applications.

## Cost of Ownership

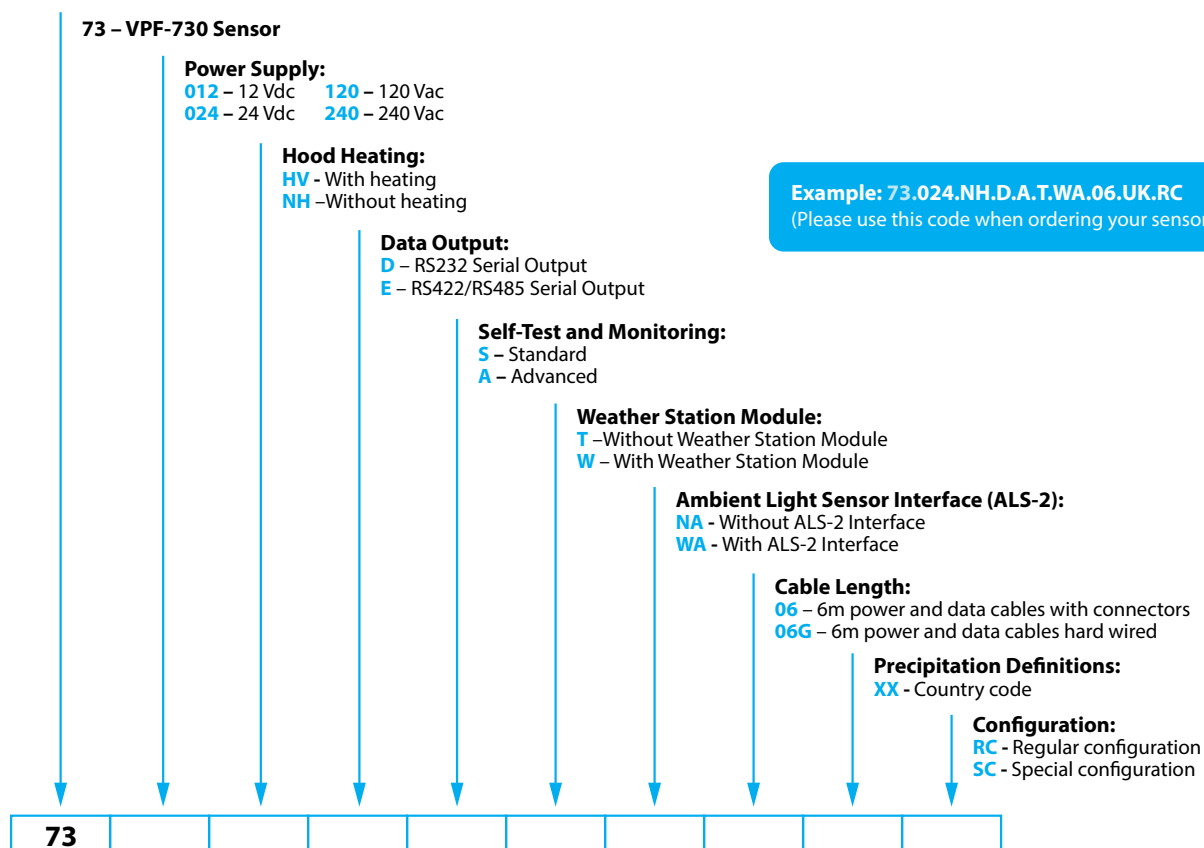
The VPF-730 has a series of features that reduce maintenance requirements to a minimum whilst ensuring accurate and reliable operation. These features include window contamination monitoring which automatically corrects the output data and provides two stage warnings allowing maintenance to be performed 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.

## Advanced Functional Test Mode

All our 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.



### Configuration Options Explained

Option	Description
Power Options	The sensor is available with a range of power supply options. <b>Option 012:</b> 12 Vdc   <b>Option 120:</b> 120 Vac <b>Option 024:</b> 24 Vdc   <b>Option 240:</b> 240 Vac
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. 12 Vdc sensors are supplied with lower power hood heaters. <b>Option HV:</b> Hood heating included   <b>Option NH:</b> No hood heating
Data Output	The sensor is available with either RS232 or RS422/RS485 serial communications. <b>Option D:</b> RS232 Serial communication   <b>Option E:</b> RS422/RS485 Serial communication
Self-Test	The sensor may be configured for either Standard or Advanced Self-Test. The standard self-test option provides monitoring of all the essential sensor functions and contamination of the transmitter window. The advanced self-test option adds receiver window contamination monitoring and receiver sensitivity monitoring. Monitoring of receiver contamination is useful in applications where different levels of contamination may occur on the sensor windows, for example where strong gusty winds are experienced. <b>Option S:</b> Standard Self-Test   <b>Option A:</b> Advanced Self-Test
Weather Station Module	The sensor can be configured to accept three 0-10V analogue inputs; this is called the Weather Station Module. <b>Option T:</b> Without Station Weather Module   <b>Option W:</b> With Weather Station 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. <b>Option NA:</b> Without Ambient Light Sensor Interface   <b>Option WA:</b> With Ambient Light Sensor Interface
Power and Data Cable	The sensor is supplied with either cables for connection to the sensor using circular connectors or with fixed cables through plastic cable glands. The standard length of all cables is 6m; other lengths are available in multiples of 1m. <b>Option 06:</b> Standard 6m cable with circular connectors   <b>Option 06G:</b> 6m fixed cable through cable glands (not available if weather station and/or ALS-2 selected).
Configuration	Reserved for customer specific configurations. <b>Option RC:</b> No customer specific configuration   <b>Option SC:</b> Special customer specific configuration

**Visibility and present weather measurement**

<b>Measures</b>	Visibility and present weather (MOR & EXCO)	
<b>Output</b>	Serial data	
<b>Range (visibility)</b>	Default 10 m to 99.99 km	
<b>Measurement error</b>	$\leq 1.3\%$ at 600 m, $\leq 2.0\%$ at 2 km, $\leq 10.5\%$ at 30 km	$\leq 1.8\%$ at 1,500 m, $\leq 8.3\%$ at 15 km, $\leq 20\%$ at 75 km
<b>Measurement resolution</b>	1m or 10 m (default)	
<b>Measurement principle</b>	Forward scatter meter with 39° to 51° angle, centred at 45°	
<b>Precipitation detection threshold</b>	Rain: 0.015 mm/hr (0.0006 in/hr) Snow: 0.0015 mm/hr (0.00006 in/hr)	
<b>Precipitation Intensity Reporting Range</b>	0 - 1000 mm/hr	(39.4 in/hr)
<b>Rain intensity accuracy</b>	$\leq 10\%$	

**Outputs and reports**

<b>Output rate (seconds)</b>	10 to 300 (selectable)
<b>Serial outputs</b>	RS-232 as standard RS-422/RS-485 as an option
<b>Present Weather</b>	15 WMO Table 4680 codes 17 METAR codes

**Power requirements**

<b>Sensor power</b>	12 V DC 24 V DC 120 V DC 240 V AC
<b>Heating power</b>	As sensor supply
<b>Basic sensor</b>	6 W
<b>Hood heaters</b>	45 W (25.5 W for 12 V sensor)

**Additional features**

<b>Window heaters</b>	fitted as standard
<b>Window contamination monitoring</b>	fitted as standard on all the transmitter windows. Additional on the receiver windows option available.
<b>Hood heaters</b>	Optional

**Environmental**

<b>Operating temperature</b>	-40 °C to + 60 °C
<b>Operating humidity</b>	0 to 100 % RH
<b>Protection rating</b>	IP 66

**Certification & compliance**

<b>CE Certified</b>	
<b>EMC compliance with EN61326-1997, 1998, 2001</b>	
<b>RoHS and WEEE compliant</b>	

**Physical**

<b>Material</b>	Hard coat anodised aluminium
<b>Weight (sensor head)</b>	5.6 kg DC sensors 6.8 kg AC sensors
<b>Length</b>	751 mm
<b>Warranty</b>	5 years
<b>Lifetime</b>	> 10 years
<b>MTBF (MIL-HDBK-217F)</b>	6.5 years (56,700 hours)
<b>MTBF (Service return calculation)</b>	> 35 years

**Maintenance**

<b>Self-test capability</b>	as standard
<b>User confidence check</b>	6 months (recommended)
<b>Window cleaning</b>	automatic compensation and warnings
<b>Field calibration</b>	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)
- 6 m power and data cable
- User manual and calibration certificates

**Accessories – optional**

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

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

