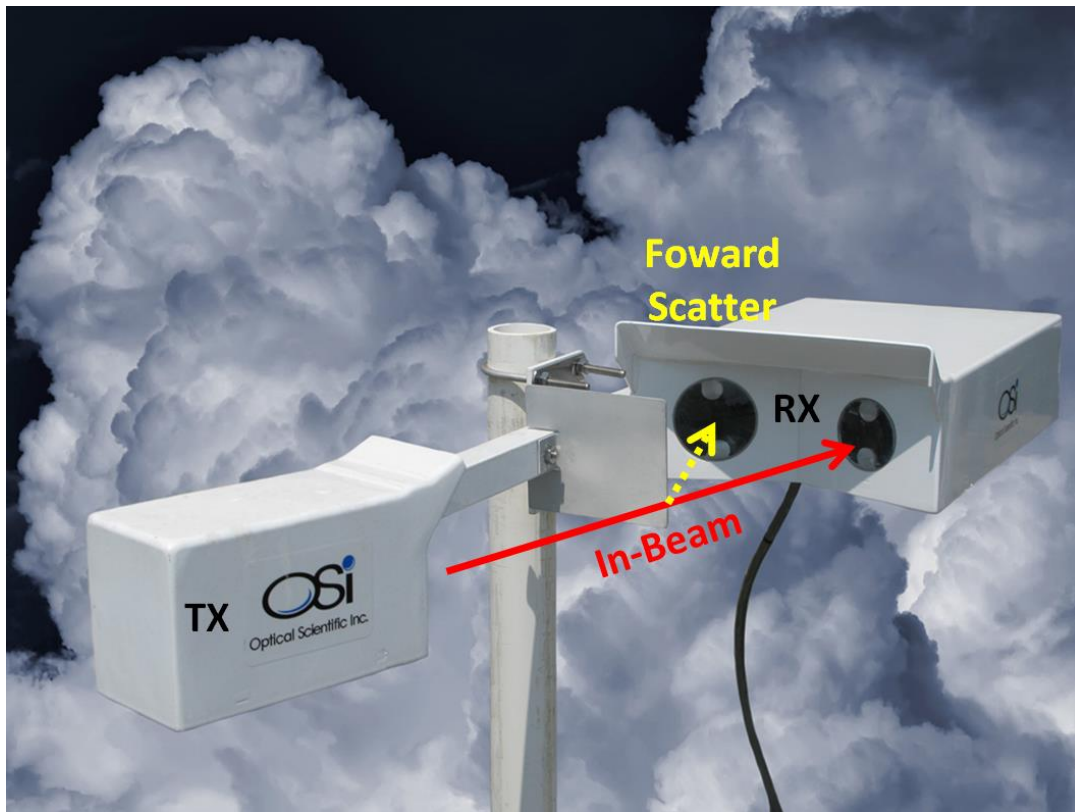


## OPTICAL SCIENTIFIC INC. OWI-430 ADVANTAGES TECHNICAL BRIEF

The OWI-430 Optical Weather Identifier is a unique combination present weather and visibility sensor. Competitors such as Vaisala, Belfort, and Biral do not use the patented technique (Patent Number US 05444530) utilized by Optical Scientific Inc, (OSi). Unlike conventional forward scatter visibility measurement instruments, the OWI-430 is able to utilize signals from forward optical scatter, in-beam optical scintillation, ambient light, temperature, and humidity to accurately determine meteorological optical range (visibility), precipitation type (rain, snow, hail, drizzle, etc.) and precipitation amount.



**Figure 1. OWI-430**

The OWI-430 uses a compact, triple aperture optical system to measure both precipitation and visibility. The sensor frame is an all aluminum, welded design. As shown in Figure 1, the small box (TX) is the transmitter unit and contains an infrared Light Emitting Diode (LED) light source and lens with dual heaters. The large box (RX) contains two (2) independent optical receiver assemblies, each consisting of a photo diode, lens with dual heaters, and pre-amplifier electronics. One of the receivers detects present weather (in-beam) and the other detects visibility (forward scatter). The two signals are processed by a Digital Signal Processing (DSP) board located behind the two receivers. A light block is attached to the sensor arm during the installation procedure to reduce stray transmitter light from entering the forward scatter receiver. The dual lens heaters which prevent dew, frost, and snow from building up on the lenses are self-regulating devices. They are "on" continuously but draw more current when the outside temperature is cold and less current when the temperature is warm. All wiring between transmit and receive heads is within the welded sensor frame.

On the underside of the OWI-430 are temperature and relative humidity sensors. The advanced algorithms in the DSP board are based on over 300 million unit-hours of field experienced OSi has gained over the past three decades. The algorithms analyze the outputs of the various sections of the sensor to accurately identify and measure precipitation and visibility.

Key advantages (summarized in Table 1) of the OWI-430 over the Vaisala PWD22, Belfort 6550, and Biral HSS VPF-700 visibility/present weather sensors include:

1. The ambient light sensor (ALS) is standard with the OWI-430. Competitors provide the ALS as a value added option.
2. The OWI-430 forward receiver and ALS use the same optics with exactly the same field-of-view, resulting in a more accurate / more representative ambient light measurement.
3. No other manufacturer of visibility/present weather sensors can match the sensitivity and reliability of precipitation detection (especially snow) of the OSi patented optical scintillation technology.
4. No narrow hoods over lenses prevent ice/snow blockage (due to hood ice/snow bridging) and insect nesting.
5. The OWI-430 includes temperature and humidity sensors. These added parameters further aid in the accurate discrimination of weather types such as snow, rain, drizzle, mist, fog and haze. The temperature and humidity data is also used to eliminate insect-induced false precipitation alarms.
6. With the addition of the acoustic hail and ice pellet sensor (HIPS) the OWI-430 provides superior snow, ice pellet, hail and freezing rain discrimination, far surpassing all other visibility/present weather sensors.
7. The OWI-430 uses both in-beam and forward scatter optical data to accurately determine meteorological optical range (visibility) and precipitation type and amount.
8. OSi's advanced artificial intelligence algorithms and all digital design eliminate the requirement of field calibration. **Unlike other manufactures' visibility/present weather sensors, the OWI-430 does not require periodic field calibration for unattended field operation.**
9. OSi's advanced artificial intelligence algorithms automatically compensate for dust, water droplets and ice/snow accumulated on the lenses, ensuring reliable measurements even when the optics are partially obscured.
10. The OWI-430 requires less maintenance and offers higher reliability than any other manufacturers' visibility/present weather sensor.
11. The sensor's calculated MTBF (Mean Time Between Failure) is well in excess of 80,000 hours. Field based statistics significantly exceed that number.
12. The OWI-430 has reserved I/O capability built in. Extra analog, digital and serial channels are available. Other sensors may be added without requiring a separate data acquisition system. This capability allows complete automated weather stations to be implemented without requiring a separate data acquisition system. This reduces costs to customer and improves system reliability. This system integration capability is not available from any other manufacturers.

<b>Item</b>	<b>Description</b>	<b>OWI-430</b>	<b>Vaisala PWD22</b>	<b>Belfort 6550</b>	<b>Biral HSS VPF-700</b>
1.	Periodic Field Calibration	Not required due to artificial intelligence algorithms	Required every few months	Required every few months	Calibration check recommend by manufacture
2.	Built-in Ambient Light Sensor	Standard	Option	Not available with Belfort 6550	Option
3.	Field of view of ALS	Same as visibility sensor	Separate sensor	Not available	Separate sensor
4.	Present weather detected by patented / proven optical scintillation techniques	Yes	No	No	No
5.	Hood which may encourage ice/snow bridging or insect nesting	No	Yes	Yes	Yes
6.	Includes temperature and relative humidity sensors	Yes	No	No	Yes
7.	Acoustic hail and ice pellet option available	Yes	No	No	No
8.	In-beam and forward scatter signal used to determine visibility	Yes	Forward scatter only	Forward scatter only	Forward scatter only
9.	Lens contamination immunity	Superior due to in-beam measurement of optical source and artificial intelligence algorithms	No. In-beam measurement not available	No. In beam measurement not available	No. In beam measurement not available
10.	Low maintenance requirements / low FRU count	Yes	No	No	No
11.	Spare analog, digital and serial channels available for integration of other sensors.	Yes	No	No	No

**Table 1. OWI-430 Advantages Summary**