

Visibility Sensor FS11



Features

- Unique window contamination correction
- Accurate and traceable forward scattering measurement
- Technical design and high-power heating according to FAA guidelines
- Frangible composite fiber mast
- Can be upgraded for sensing present weather

Visibility Sensor FS11 is intended for the most demanding weather applications, such as runway visual range (RVR), aeronautical and synoptical visibility. It provides the optimal combination of the best accuracy, the highest reliability, broad measurement range, and low maintenance need.

Benefits

- The most widely proven forward scatter RVR sensor
- Visibility sensor selected and used by FAA
- Meets FAA and ICAO specifications
- Accurate and traceable measurement
- Can be used for both aeronautical and synoptical applications
- Minimal maintenance needs
- Meets ICAO frangibility standards

The main applications of FS11 are runway visual range (RVR) and synoptical and aeronautical visibility measurements. FS11 is also well suited for other demanding applications, such as visibility measurement at ports and harbors.

Scientifically Valid Chain of Calibration

FS11 is calibrated through a scientifically valid chain of reference. The scattering response of the calibration device can be clearly traced to a reference FS11 visibility sensor, which is in continuous operation at Vaisala outdoor test field along with reference transmissometers and other instrumentation. The visibility measurement of FS11 is also traceable to FAA reference sensors.

Low Maintenance Need

FS11 incorporates a technique that measures and compensates for window contamination. It ensures unparalleled measurement accuracy between window

cleanings. It also enables much longer window cleaning intervals than compared to conventional visibility sensors.

The unique system works by monitoring the total reflectance of the window surface. It automatically compensates for visibility measurement errors caused by window contamination.

The sophisticated self-diagnostics and modular design allow for very short service times. The measurement fork and optional background luminance sensor LM21 are independent instruments that can be replaced quickly as pre-calibrated spare parts.

Reliable Operation in the Harshest Weather

Four main design features are combined in FS11 to ensure reliable operation in the harshest weather. The first is the window contamination compensation technique. The second is the "head-down" design of the optical heads, which protects them against virtually all windblown particles (even those flying horizontally).

High-power heaters are the third feature. Each heater has its own temperature monitoring and control mechanism to prevent snow accumulation during the heaviest snowstorm.

As a final measure, there is an optical path clearance monitoring circuitry to verify that measurement is not affected by obstructions.

Technical Data

Measurement Performance

Measurement range of MOR	5 ... 75 000 m (16 ft ... 46.6 mi) with 1, 3, and 10 min averaging
Accuracy	±10 % range 5 ... 10 000 m (16 ft ... 6.2 mi) ±20 % range 10 000 ... 75 000 m (6.2 ... 46.6 mi)
Scatter measurement accuracy	±3 %

Optical Specifications

Operating principle	Forward scatter measurement
Scattering angle	42°
Light source	Near-infrared LED

Operating Environment

Operating temperature	-40 ... +65 °C (-40 ... +149 °F), -55 ... +65 °C (-67 ... +149 °F) (optional)
Operating humidity	0 ... 100 %
Wind speed	Up to 60 m/s (134 mph)

Inputs and Outputs

AC (mains) power supply	100/115/230 VAC ±10 %, 50 ... 60 Hz
Power consumption	Max. 300 VA (60 VA + 240 VA defrosting heaters)
Battery backup option	Battery 2 Ah, typical backup time 30 min at 25 °C (77 °F) and 5 min at -40 °C (-40 °F)
Outputs	Serial data line RS-232 or opto-isolated RS-485 (2-wire) or optional data modem Separate maintenance line RS-232 +12 VDC max. 0.8 A output for option powering

Mechanical Specifications

Dimensions (H × W × D)	2.8 × 0.9 × 1.0 m (9.19 × 2.95 × 3.28 ft)
Weight without mast	37 kg (81.57 lb)
Weight, including Frangible Mast FSFM250	52 kg (115 lb)
IP rating	IP66
Mast	Frangible and hinged glass fiber mast

Spare Parts and Accessories

Calibration set	FSA11
Background luminance sensor	LM21
Battery backup	FSB101
Modem for long distance communication (> 1 km / 0.6 mi)	DMX501
Obstruction light	FS11OBS

Compliance

EMC Compliance	
Radiated emissions	EN55022
Radiated susceptibility	IEC 61000-4-3, 10 V/m
Conducted emissions	EN55022
Conducted susceptibility	IEC 61000-4-6
EFT immunity	IEC 61000-4-4
ESD immunity	IEC 61000-4-2
Surge	IEC 61000-4-5
Harmonics to the AC (mains) grid	IEC 61000-3-2



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Present Weather Sensor FS11P



Features

- Unique window contamination correction
- Uses the same principles as the renowned FD12P weather sensor
- Accurate and traceable forward scattering measurement
- Technical design and high-power heating according to FAA guidelines
- Frangible composite fiber mast

Vaisala Present Weather Sensor FS11P is intended for the most demanding weather applications such as runway visual range (RVR), aeronautical and synoptical visibility, and present weather observation. It provides the optimal combination of the best accuracy, the highest reliability, broad measurement range, and low maintenance need.

Benefits

- Excellent value: RVR, visibility, and present weather all-in-one
- The most widely proven forward scatter RVR sensor
- Visibility sensor selected and used by FAA
- Meets FAA and ICAO specifications
- Can be used for both aeronautical and synoptical applications
- Minimal maintenance needs
- Compatible with FD12P
- Meets ICAO frangibility standards

Scientifically Valid Chain of Calibration

FS11P is calibrated through a scientifically valid chain of reference. The scattering response of the calibration device can be clearly traced to a reference FS11P visibility sensor, which is in continuous operation at Vaisala outdoor test field along with reference transmissometers and other instrumentation. The visibility measurement of FS11P is also traceable to FAA reference sensors.

Low Maintenance Need

FS11P incorporates a technique that measures and compensates for window contamination. It ensures unparalleled measurement accuracy between window cleanings. It also enables much longer window cleaning intervals than compared to conventional visibility sensors.

The unique system works by monitoring the total reflectance of the window surface. It automatically compensates for visibility measurement errors caused by window contamination.

The sophisticated self-diagnostics and modular design allow for very short service times. The visibility measurement fork, present weather detector, and optional background luminance meter are independent instruments that can be replaced quickly as pre-calibrated spare parts.

Reliable Operation in the Harshest Weather

Four main design features are combined in FS11P to ensure reliable operation in the harshest weather. The first is the window contamination compensation technique. The second is the “head-down” design of the optical heads, which protects them against virtually all windblown particles (even those flying horizontally).

High-power heaters are the third feature. Each heater has its own temperature monitoring and control mechanism to prevent snow accumulation during the heaviest snowstorm.

As a final measure, there is an optical path clearance monitoring circuitry to verify that measurement is not affected by obstructions.

Technical Compatibility

In addition to the technological similarity, FS11P is compatible with, and can be used to replace, FD12P. They both provide the same mechanical, electrical and communication interfaces, and they transmit similar message formats widely used in aviation and meteorology.

Technical Data

Measurement Performance

Measurement range of MOR	5 ... 75 000 m (16 ft ... 46.6 mi) with 1, 3, and 10 min averaging
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Scatter measurement accuracy	±3 %

Optical Specifications

Operating principle	Forward scatter measurement
Scattering angle	42°
Light source	Near-infrared LED

Weather Measurement Performance

Weather type identification	7 different types of precipitation (rain, freezing rain, drizzle, freezing drizzle, mixed rain/snow, snow, ice pellets) Precipitation (unknown type) Fog (mist), haze (smoke, sand) or clear
Weather type reporting	WMO 4680 (SYNOP), 4678 (METAR), and NWS code tables; 49 different codes supported from the WMO 4680 code table
Precipitation detection sensitivity	0.05 mm/h (0.0020 in/h) or less, within 10 minutes
Precipitation intensity measurement	0.00 ... 999.99 mm/h (0.00 ... 39.37 in/h)
Precipitation amount measurement	0.00 ... 99.99 mm (0.00 ... 3.94 in)
Amount of new snow	0.00 ... 999 mm (0.00 ... 39.33 in)

Operating Environment

Operating temperature	-40 ... +65 °C (-40 ... +149 °F), -55 ... +65 °C (-67 ... +149 °F) (optional)
Operating humidity	0 ... 100 %
Wind speed	Up to 60 m/s (134 mph)

Inputs and Outputs

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IP rating	IP66
Mast	Frangible and hinged glass fiber mast

Spare Parts and Accessories

Calibration set	FSA11
Background luminance sensor	LM21
Battery backup	FSB101
Modem for long distance communication (> 1 km / 0.6 mi)	DMX501
Obstruction light	FS110BS
Calibration set	PWA12
Maintenance cable	QMZ101

Compliance

EMC Compliance	
Radiated emissions	EN55022
Radiated susceptibility	IEC 61000-4-3, 10 V/m
Conducted emissions	EN55022
Conducted susceptibility	IEC 61000-4-6
EFT immunity	IEC 61000-4-4
ESD immunity	IEC 61000-4-2
Surge	IEC 61000-4-5
Harmonics to the AC (mains) grid	IEC 61000-3-2



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