Vaisala Forward Scatter FD70 Series combines forward scatter and optical disdrometer technologies. It sets a new standard in precipitation identification and quantification, while offering best-in-class visibility determination.

**Innovative Technology**
The novel utilization of a single thin light sheet instead of the conventional light cone results in a high detection sensitivity. This enables a scatter-properties analysis of each single particle and allows the detection of even the smallest drizzle droplets. The particle size and fall speed distributions provide additional information, enhancing precipitation type identification. The receiver measures the forward scattered light at an angle of 42° with a very high sampling rate and powerful signal processing. The measurement arrangement and method is patent pending.

**Visibility Measurement**
Forward scatter measurement provides the most representative extinction coefficient (EXCO) determination, and therefore meteorological optical range (MOR) reporting according to WMO. For visibility calculations, FD70 Series uses information about the precipitation type and intensity.
FD70 Series covers all application needs, including measurement performance and capability requirements for runway visual range (RVR) according to ICAO and FAA.

**Precipitation Measurement**
Due to its innovative technology, FD70 Series identifies precipitation types that cannot be reliably detected using conventional technologies. FD70 Series complies with ICAO, FAA, and WMO requirements, and in reporting, uses the WMO and NWS weather codes.

**Present Weather Identification**
1. Drizzle
2. Rain
3. Snow
4. Snow grains
5. Ice crystals
6. Ice pellets
7. Freezing drizzle
8. Freezing rain
9. Snow pellets
10. Hail
11. Fog
12. Mist
13. Haze

1) Available in FD71P
2) In addition to listed types, reports a variety of mixed precipitation types

**Reliable in All Weather**
FD70 Series has multiple features to ensure reliable operation even in extreme weather conditions. Effective hood heating and the proven look-down geometry protect the sensor windows against external disturbances. These are complemented with independent optical path monitoring and window contamination compensation.
Self-diagnostics and the modular design allow for short service times. For critical operations, such as airport use, FD70 Series provides redundancy of data communication.

**Calibration Traceability**
To ensure specified performance, Vaisala continuously compares calibrated FD70 units against reference sensors in the Vaisala outdoor test field. Every delivered FD70 unit can be traced back to this set of calibrated reference sensors.

**FD70 Product Models**
- FD71 for visibility
- FD71P for visibility, present weather, and precipitation
Technical Data

Measurement Specifications

- **Operating principle:** Look-down forward scatter
- **Scattering angle:** 42° ±0.25°
- **Light source:** Near-infrared
- **Sampling frequency:** 5 MHz
- **Measurement cycle:** 5 s

Visibility Measurement Performance (MOR)

- **Reporting range:** 1 m ... up to 100 km (3 ft ... 62 mi)
- **Reporting resolution:** 1 m (3 ft)
- **Reporting uncertainty:** ±10 % or ±1 m (3 ft) up to 10 km (6.2 mi)
- **Scatter measurement uncertainty:** 3 ±%

Visibility Measurement Performance (MOR)

- **Reporting range:** 1 m (3 ft)
- **Reporting resolution:** 1 m (3 ft)
- **Reporting uncertainty:** ±10 % or ±1 m (3 ft) up to 10 km (6.2 mi)
- **Weight, measurement unit:** 6 kg (13.23 lb)
- **Dimensions (H × W × L), measurement unit:** 354 × 551 × 883 mm (13.94 × 21.69 × 34.76 in)
- **Weight, interface unit with electronics:** Max. 25 kg (55.12 lb)

Present Weather Reporting (FD71P)

- **Present weather identification:** Drizzle, rain
- **Snow, snow grains, ice crystals**
- **Ice pellets, freezing rain, freezing drizzle**
- **Snow pellets, hail**
- **Fog, mist, haze**
- **Weather codes:**
  - SYNOP: WMO table 4680
  - METAR: WMO table 4678
  - NWS codes: Light, moderate, and heavy intensities

Precipitation Measurement Performance (FD71P)

- **Precipitation Intensity**
  - **Sensitivity:** Single droplet Ø ≥ 0.1 mm (0.004 in)
  - **Reporting range:** 0.01 ... 999.99 mm/h (0.0004 ... 39.37 in/h) liquid water equivalent (LWE)
  - **Reporting resolution:** 0.01 mm/h (0.0004 in/h)
  - **Minimum intensity:** 0.01 mm/h (0.0004 in/h)
- **Precipitation Accumulation**
  - **Reporting range:** 0 ... 9999.99 mm (0 ... 393.67 in) liquid water accumulation (LWA)
  - **Reporting resolution:** 0.01 mm (0.00004 in)
  - **Reporting uncertainty:** 10% or ±0.5 mm (0.012 in), whichever is greater
  - **Reporting range, snow height:** 0 ... 9999 mm (0 ... 393.67 in)
  - **Reporting resolution, snow height:** 1 mm (0.04 in)
- **Droplet Size Distribution**
  - **Size distribution reporting:** 40 bins

Operating Environment

- **Operating temperature:** -40 ... +65 °C (-40 ... +149 °F)
- **Storage temperature:** -55 ... +65 °C (-67 ... +149 °F), non-condensing environment
- **Operating humidity:** 0 ... 100 %RH
- **Wind speed:** Up to 60 m/s (134 mph)

Mechanical Specifications

- **Material, measurement unit:** Aluminum
- **Material, interface unit:** Maritime-grade aluminum (EN AW-5754)
- **Color:** White (RAL9003)
- **Coating:** Multi-layer coating to prevent environmental corrosion
- **Dimensions (H × W × L), measurement unit:** 354 × 551 × 883 mm (13.94 × 21.69 × 34.76 in)
- **Weight, measurement unit:** 6 kg (13.23 lb)
- **Dimensions (H × W × L), interface unit with radiation shield:** 850 × 650 × 350 mm (33.46 × 25.59 × 13.78 in)
- **Weight, interface unit with electronics:** Max. 25 kg (55.12 lb)

Inputs and Outputs

- **Operating voltage:** Measurement unit with interface unit: 100/115/230 VAC ±10 %, 50 ... 60 Hz
  - Measurement unit only: 10 ... 50 VDC
- **Recommended heating voltage:** 24 V AC or VDC
- **Power consumption:** Measurement unit with interface unit: max. 150 W
  - Measurement unit, operating: 10 W
  - Measurement unit, heating: 130 W
- **Backup battery:** 12 V 2.6 Ah
- **Data communication options:**
  - 10/100 Mbps Ethernet
  - RS-232, RS-485, RS-422
  - Dataradio

Compliance

- **IP rating:** IP66
- **EMC compliance:**
  - IEC 61326-1
  - VDA 621-415
- **Environmental:**
  - IEC 60068-2-1, 2, 6, 14, 30, 31, 52, 78
  - IEC60529
  - VDA 621-415
- **Eye safety:**
  - Class 1M IEC/EN60825-1
- **Electrical safety:**
  - IEC/EN 61010-1

Compatibility

- **System compatibility:** Vaisala AviMet®
- **Backwards compatibility:**
  - Vaisala FD12(P), FS11(P), PWD Series

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