



### Features

- Reports visibility up to 100 km (62 mi)
- Reports precipitation type, intensity, and accumulation
- Exceptional precipitation detection sensitivity
- Precise type identification even for low-intensity precipitation
- Superior liquid/frozen differentiation
- Optimal forward scatter angle 42°
- Look-down geometry to minimize measurement disturbances

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 <sup>1) 2)</sup>

- Drizzle
- Rain
- Snow
- Snow grains
- Ice crystals
- Ice pellets
- Freezing drizzle
- Freezing rain
- Snow pellets
- Hail
- Fog
- Mist
- 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) ±20 % 10 ... 100 km (6.2 ... 62 mi)
Scatter measurement uncertainty	±3 %

## 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)

<b>Precipitation Intensity</b>	
Sensitivity	Single droplet $\varnothing \geq 0.1$ 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)
<b>Precipitation Accumulation</b>	
Reporting range	0 ... 999.99 mm (0 ... 39.37 in) liquid water accumulation (LWA)
Reporting resolution	0.01 mm (0.0004 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)
<b>Droplet Size Distribution</b>	
Size distribution reporting	40 bins

## Operating Environment

Operating temperature	-40 ... +65 °C (-40 ... +149 °F) -55 ... +65 °C (-67 ... +149 °F), optional
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 VAC 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
External inputs	Day/night switch input Vaisala HUMICAP Humidity and Temperature Probe HMP155 Vaisala Background Luminance Sensor LM21
Data communication options	10/100 Mbps Ethernet RS-232, RS-485, RS-422 Modem (supports V.21 300 / 300 bps FSK V.22 1200 / 1200 DPSK V.23 1200 / 1200 bps FSK) Dataradio

## Compliance

IP rating	IP66
EMC compliance	IEC 61326-1 IEC 60945 EN 55032 Class B
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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