DEGREANE HORIZON

DF320

Forward scatter sensor

The forward scatter sensor DF320 is a sensor designed for visibility measurements.

DF320 consists of a white light source and a receiver placed off axis from the source.

The intersection of the source's and receiver's visual fields defines the analysis volume. The suspended particles in this volume scatter the light in all directions.

It delivers accurate and tracable values over a wide range (up to 70 Km) of measurements, even in harsh weather conditions. Associated with a luminancemeter, it is suitable built for aeronautical meteorological purposes (Runway Visual Range-RVR, and Aeronautic visibility-AV, as defined by ICAO standards).

It also can be used for other application such as synoptic meteorology, road or harbor.

To perfectly meet measurement height as requested in ICAO rules, the DF320 uses a 4 meters frangible tilting mast with adjustable measurement heads height.

The meteorological optical range (MOR) is determined using the flux measurement of the forward scattered light. Low sensibility depending on the causes of the reduction of the visibility (fog, rain, snow hail) is obtained by a low frequency modulation of a spread spectra light in a large volume, avoiding all scintillation effects.

Functionality

Acquisition

- Every 0,5 second, the scattered energy by atmosphere is measured using a photodiode and a 12 bits converter, with an auto compensated, 3 gains selectable analog chain.

Data processing

- Elimination of erroneous data (median) and sudden abnormal variations (birds,...). Normalisation with respect to the measured emitted flux.
- 30 s to 10 minutes sliding mean of the valid data.
- Sophisticated predictive Kalman filtering to avoid noise problems and inconsistent measurements.

Measurement validation after control of the following elements

- Power supply voltage, lamp voltage, lamp operating, emitted light flux, receiver dust contamination, measurements quality, heads temperature, parameters and software validity, servicing or calibration time exceeded. Self diagnostic process available on local IHM, alarms and warning sent to remote controller.

Bi-directional data transmission

- Local area point to point : RS 232 - 1200 to 19200 Bds
- Large area point to point
- (CIBUS standard)(1):FSK isolated modem - 1200 Bds (option)
- Local/large area multi-unit : isolated RS485 (2 wires) - 1200 to 19200 Bds (option)

User interface

- User friendly local interface (16 digits LCD, three keys keyboard).
- Possibility to consult and control data or information, do maintenance or calibration operations, modify parameters. These functions are also available through a computer via the serial link.

Mechanical

- Mechanical optical heads, baffles, caps and diaphragm in a weatherproof look-down configuration provide very efficient protections against windblown and horizontally flying particles. High-power heating system (option) prevents from heavy snow or ice accumulation allowing a use in very harsh weather conditions. The wide open mechanical design, in which the analysis volume has been moved away from the heating parts, avoid shadowing or wind direction related effects, in heavy or calm wind. Modular design with separated receiver and emitter heads, articulated pole and direct user friendly interface, allow an easy installation and operating of the sensor with very short service times.

Characteristics

Measurement principle	Forward scatter of a light source modulated at 20Hz with phase change
Nature of the light Source	350 to 900 nm halogen white light balanced lamp
Lifespan of the luminous source	25 000 hours (3 years)
Analyzed volume	10 liters
Volume height with respect to ground	1.5 to 4m (ajustable in field)
Scattering angles	From 20° to 50°
Acquisition period of scatter coefficient	0,5 s
Averaging period for MOR	Parametrable from 30 s to 10mn, user selectable
Periodicity of calibration and cleaning of the optics	6 months minimum
MOR measurement range	From 5 m to 70 km, 1m resolution
MOR accuracy	± 10 % for 90 % of the measurement up to 5 km ± 15 % for 90 % of the measurement from 5 km to 20 km ± 25 % above.
Flux measurement error	± 2%
Power supply	230 V ± 10%, 50 Hz, 100 VA (280 VA with high power heating option)
Operating temperature	From -15° C to 55° C (-30°C to 55°C with high power heating option)
Relative humidity, air speed	From 0% to 100%, up to 60 m/s
Weight, height	45 kg, 1700 mm or 4200 mm
Electromagnetic compatibility	NFEN 50081-1 and NFEN 50082-1 (CE)
Accessories	Background luminance sensor LU320

(1) Normalized data transmission protocol elaborated by METEO FRANCE, allowing data acquisition from remote sensors (up to 10 km)

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