Vaisala Transmissometer LT31 RVR with New Eyes

Accurate and reliable determination of the Runway Visual Range (RVR) reduces airport downtime and improves safety of operations. The Vaisala Transmissometer LT31 is the qualified observer of RVR providing correct visibility data without interruptions and with minimal maintenance.

Measurement Range from 10 to 10 000 m

The LT31 provides the most accurate and reliable solution for the automatic measurement of RVR. The Meteorological Optical Range (MOR) measurement range is from 10 to 10 000 meters, which covers the full required RVR range (CATI ... CATIIIb), as well as the range required for Aeronautical Visibility (the ICAO defined visibility). The accuracy of the LT31 meets the ICAO and WMO requirements.

This full measurement range is achieved with a single baseline system, which makes measuring easier and more economical.

White LED Provides Wide Spectrum Light Source

The LT31 incorporates a white LED as a light source. White light is needed for the best accuracy in transmittance measurement. The WMO recommends the use of a wide spectrum (white) light sources for transmissometers as narrow spectrum light source (e.g. lasers or colored LEDs) will cause measurement error with some weather phenomena.

The Vaisala Transmissometer LT31 enables the accurate and reliable single baseline measurement for CATIIIb category airports.

Features/Benefits

- Single baseline for the MOR measurement range 10 ... 10 000 m
- State-of-the-art white light source
- Automatic alignment with quality control as a standard feature
- Automatic calibration as a standard
- Internal back-up battery
- Compatible with Vaisala Transmissometer MITRAS and SKOPOGRAPH II Flamingo
- Window contamination compensation
- Meets the ICAO and WMO requirements for RVR and visibility
- Based on decades of field experience
- Sophisticated self-diagnostics

Automatic Calibration with Integrated Forward Scatter Sensor

Calibration of a transmissometer is traditionally based on human observations. A reliable and accurate calibration has required very high visibility, stable conditions, and skilled and well trained personnel.

The Vaisala patented automatic calibration method for transmissometers is based on an integrated forward scatter sensor/present weather sensor. The system automatically detects drift and adjusts the sensor settings accordingly. Weather conditions do not need to be as good as for manual calibration; the LT31 automatically recognizes suitable conditions.

The integrated forward scatter sensor.

Automatic Fine Alignment

One of the major error sources in transmittance measurement is alignment drift. Checking and adjusting the alignment has also required skilled and trained personnel.

To maintain the measurement accuracy, the LT31 performs an automatic optimization of the alignment. The alignment quality is also continuously evaluated without any human intervention.

The automatic fine alignment also provides easy handling of the LT31 during installation. The alignment quality during harsh weather conditions is ensured by a double mast construction. The outer tube works as wind and solar radiation shield. The inner support structure is separated from thermal and mechanical stress caused by solar radiation and wind load.

Contamination Reduction

In general, precipitation leads to an increased amount of window contamination. The LT31 has long and narrow weather protection hoods that reduce the amount of window contamination caused by precipitation.

For wind driven precipitation or dust, the instrument is equipped with a powerful blower. The blower creates an air curtain in front of the instrument window. The air curtain is specially designed not to disturb the measurement path and cause the measurement errors that have been a problem with conventional blower designs.

Automatic Window Contamination Compensation

Window contamination is a significant source of error in transmissometers. Maintaining high accuracy has required frequent cleaning. However, the effects of contamination can be automatically compensated if the window transmittance can be measured accurately.

In the LT31, window contamination is also compensated for by the most accurate method: by measuring the transmittance directly through the window glass.

Extensive Self-diagnostics

The LT31 has a sophisticated self-diagnostics that provides detailed status information for all functional units. In addition, this feature helps to locate possible technical failures. It records a history of significant operational situations, warnings, and alarms from the instrument.

Internal Back-up Battery

The LT31 can be equipped with an internal back-up battery. This feature provides steady data availability during short power breaks, e.g. while back-up generators are started.

True window contamination compensation based on V-shaped windows.
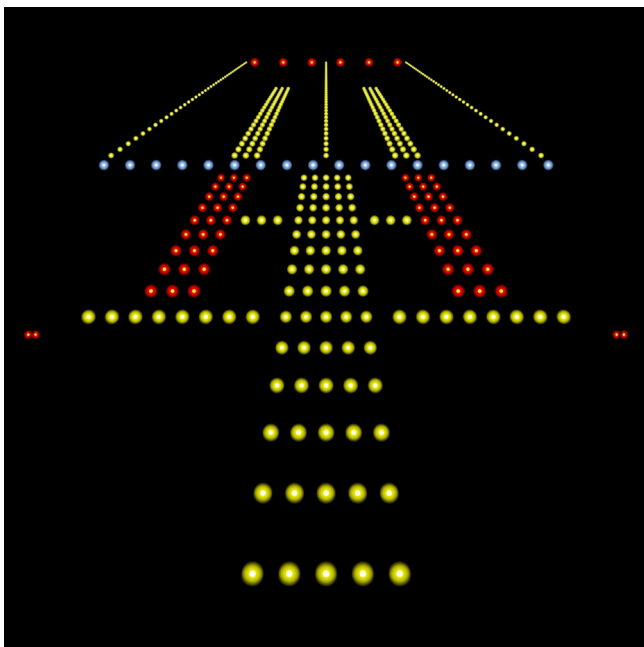
Airport runway lights at night.

Present Weather Reporting

The optional present weather reporting from RVR sites gives a full picture of the prevailing weather conditions within the entire airport area. The arrival of weather fronts and the presence of local showers can easily be monitored due to the multiple present weather observation points. The integrated present weather sensor provides the type and intensity of precipitation for METAR and local weather reporting purposes.

Background Luminance Sensor LM21

The optional LM21 sensor offers the means for measuring the ambient light level or background luminance in RVR applications. The background luminance sensor is used for measuring the background against which the runway lights or runway markings are seen.

Technical Data

Performance

MEASUREMENT RANGE

Baseline (m)	MOR range (m)	Transmittance range
30	10 ... 10 000	<0.01 % ... 100 %
50	25 ... 10 000	<0.2 % ... 100 %
75	37.5 ... 10 000	<0.2 % ... 100 %

Transmittance measurement resolution:	20 bit
Accuracy	according to ICAO and WMO specifications for RVR and Visibility
Light source	light emitting diode (LED), white
Window contamination compensation	automatic, direct window transmittance measurement
Calibration	automatic with integrated forward scatter sensor
Alignment	automatic fine alignment with servo mechanism

Environmental

Temperature range	-40 ...+60 °C
Humidity	0 ... 100 %RH
Wind	60 m/s
EMC	IEC/EN 61326-1
Electrical safety	IEC/EN 60950-1

Data messages

LT31	standard, incl. full status report
MITRAS	standard message (for replacement)
SKOPOGRAPH II Flamingo	standard message (for replacement)

Electrical

Power	100/115/230 VAC, ±10 %, 50-60 Hz
Power consumption	max. 800 W with all options
Interfaces	
data	RS232/RS485/modem (optional)
maintenance	RS232
Back-up battery (optional)	typical back-up time 1 h at +20 °C
Obstruction light (optional)	

Mechanical

Single baseline for full measurement range

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Baseline length	25 ...75 m (30 recommended)
Measurement height	2.5 m
Weight	
Transmitter unit LTT111	85 kg
Receiver unit LTR111	82 kg
Window blower	

Present weather reporting (optional)

Identifies	7 different types of precipitation (rain, freezing rain, drizzle, freezing drizzle, mixed rain/snow, snow, ice pellets)
Reports	49 codes from WMO4680 code table

Dimensions

Dimension in mm

depth	1022 mm
width	420 mm
height	2685 mm
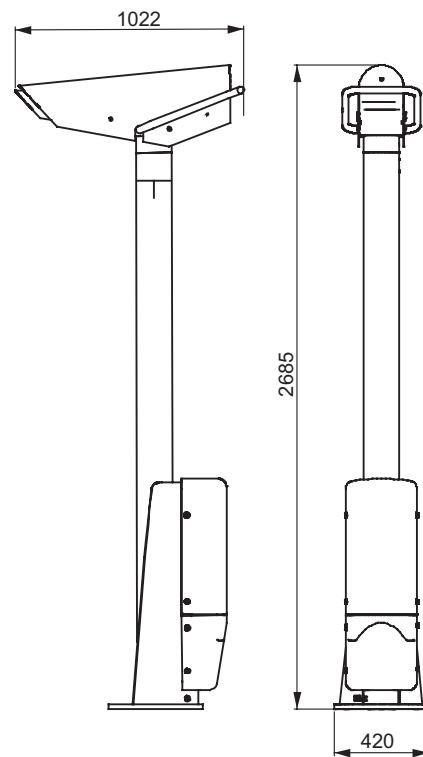
Easy installation

Installation of transmissometers has always been a time consuming task, even for trained personnel. During raw alignment of the instrument heads, the LT31 assists the installation via a service terminal and by giving acoustical guidance through beepers. The final alignment is carried out fully automatically.

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