TECHNICAL NOTE: TN-29

EMOR – New Generation Transmissometer Technology Explained

What is EMOR Technology?

Older generation Transmissometer devices were limited in range to forty times the baseline length due to Koshmieder's Law. Latest generation Transmissometers break through this barrier by extending the visibility reporting range out to 80,000m through the usage of an integrated forward scatter sensor. This advanced visibility technology has been dubbed EMOR standing for **E**xtended **M**eteorological **O**ptical **R**ange.

How does it work?

EMOR visibility sensors leverage the benefits of two different techniques of visibility detection within the one sensor: measurement of transmissivity of light and measurement of the forward scattering of light. These two techniques are at their most accurate at different levels of visibility. Transmissivity detection is most accurate at low to very low visibility conditions below 1,000 meters. Over 3000m the accuracy of transmissometer sensors drops below the level of forward scatter technology. It is for visibility ranges over 3000m that forward scatter technology is best used. The EMOR sensor master controller automatically uses the most accurate sensing technique for any given visibility condition. Measurements for both techniques are continuously run and compared. Cross-check, calibration and compensation processes are carried out with each sensor measurement cycle.

What are the benefits?

- Increased reliability.
- Increased accuracy.
- Failsafe operation.
- Reduced maintenance.
- More efficient operations
- Built in redundancy

What are the drawbacks?

EMOR technology can have a slightly higher entry cost associated with the purchase of the equipment over older technologies or forward scatter sensors on their own however this is greatly offset by the lowered total cost of ownership resulting from the increased reliability of the sensors and the increased efficiency of airport operations.

How does this technology integrate with my existing infrastructure?

The foundation, power cabling, communications cabling and mounting bolt requirements are exactly the same as for older technology MITRAS and SKOPOGRAPH II Flamingo type sensors. These devices can be removed and easily replaced with MTECH Systems 5000-200-EMOR sensors with a minimum of effort. The sensor can use any existing communications infrastructure you have including, but not limited to, PSTN modem, serial extenders, RS-232/422/485, Ethernet, Fiber, WiFi, Radio, etc

Are these devices backwards compatible?

The MTECH Systems 5000-2000-EMOR outputs a fully backwards compatible emulation of the industry standard MITRAS message type. All central software and hardware built to work with this message format will integrate seamlessly with the new sensors.

What standards does the device conform to?

Standards compliance for the MTECH Systems 5000-200-EMOR sensor includes the following international standards:

- ICAO Recommendations (ANNEX 3, ANNEX 5)
- ICAO Recommendations DOC-9328, DOC-8896, DOC-8400, DOC-7488)
- WMO compliant for AWOS & RVR (Guide DOC-8 & DOC-306 compliant)
- FAA FMH-1
- AS/NZS CISPR11:2204 Group 1,Class A
- EN 61000-3-2:1995, EN 61000-3-3:2003
- EN 61000-4-2:1995, EN 61000-4-3:1995
- EN 61000-4-4:1995, EN 61000-4-5:1995
- EN 61000-4-6:1996, EN 61000-4-11:1994
- EN 50081, EN 50082
- 100% Precipitation
- ENV 50204:1995
- IP65 (NEMA 4)
- IEC60068-2-6
- EMC IEC/EN 61326
- Electrical IEC/EN 60950

What other equipment is required?

The MTECH EMOR sensor is typically used in conjunction with a high specification background luminance sensor such as the 5000-301-M6.

What maintenance is required?

With heated and filtered air producing a laminar flow over the transmission window the device is kept as free from contamination as possible. Any contamination that might make it onto the transmission window is handled by inbuilt window contamination detection sensors and compensated for. With inbuilt calibration mechanisms the device can be re-calibrated from a remote location. Most maintenance and checking procedures can be performed from the central site requiring far less visits to the runway compared with past technologies. The sensor will report if it requires cleaning so cleaning visits can be reduced to the minimum whilst ensuring maximum quality of visibility data.

What is the reliability of these devices?

With redundant of visibility detection techniques in EMOR sensors the downtime that used to be associated with transmissometer technology has been significantly reduced.