

UNATTENDED NOISE MONITORING

General

For a quick, on the spot estimate nothing beats a competent operator having the equipment to measure and describe the noise situation. However, to assess the noise in an area for a week, a month or a year, you need a monitoring system that measures and logs data 24 hours a day with a number of noise monitoring terminals (NMTs) placed strategically. The system ensures automatic, round-the-clock data transfer and post-processing including noise parameters as well as meteorological data. Reliable measurement data, secure communication between the NMTs and the server, database integrity and openness are key to a successful system.

Data from noise monitoring is useful also to support noise maps made by modelling and calculation. Such maps are required under the EU Directive 2002/49/EC, including noise from major roads, railways, airports and industrial activities. Guidelines are under way for the integration of noise monitoring and noise mapping, to ensure the quality and credibility of the maps.

The Noise Monitoring Terminal

A noise-monitoring terminal consists of weatherproof microphone equipment for noise measurement, data storage and communication. A range of noise parameters are measured: L_{Aeq} and L_N levels as well as noise-event detection and weather information. Some provide $1/3$ -octave band frequency analysis in real-time allowing immediate calculation of indices such as EPNL (perceived noise levels) of each aircraft flyover. Some allow you to listen to the recorded noise events at your

leisure. Connection of a positioning system (GPS) unit to the noise monitoring station can identify the position of the measurement.

Database Handling

Permanent monitoring systems have extensive databases for analysis, impact research and status evaluation including periodical results. Noise events and complaints can be correlated and combined with GIS (Geographic Information System) digital cartography to show population exposure and allow high-quality presentation. The



data stored in the system can be used to maintain and update maps, to enforce noise legislation and to evaluate complaints. It can be linked to other indicators such as traffic flow or air quality recorded from general environmental monitoring stations. Measurement results obtained via the noise database could even link up with an authority's case notes in the relevant database allowing electronic reporting, archiving, retrieval or web communication to the public.

Airport Noise and Flight Track Monitoring

Public demands for quieter airports have brought about strict legislation that has made airport noise monitoring compulsory in many countries. Indeed, growing environmental concerns constitute one of the most serious obstacles to capacity expansion of airports. Interfacing radar information from the airport with a noise monitoring system allows flight tracking. This provides data on track violations and singles out offending aircraft and airlines. Knowing aeroplanes' positions and identification is useful to correlate aircraft movements with noise events and other factors: airport information, weather con-

ditions, and location of complainants. By taking the step of monitoring airport noise you can:

- Enforce legislation
- Identify and document noise events correlated with aircrafts
- Detect aircraft violating allowed tracks
- Create and publish environmental noise reports
- Minimise the noise impact caused by aircraft in both the present and the future
- Deal effectively with noise complaints, by adding statistics, location and plane detection
- Improve the environmental image of your airport
- Predict and optimise air traffic by integrating real flight traffic into calculation models

Urban Noise Monitoring

Permanent, 24 hour a day, 365 days a year, urban noise monitoring oversees adherence to noise limits and allows a wide range of additional benefits. It can indicate noise trends and help produce noise maps. GIS offers the ability to combine noise data with other factors such as air pollution, population density or property prices and present them professionally.

As alternatives to permanent monitoring, semi-permanent or mobile monitoring can be useful – for complaint assessment, for surveys, or to cover multiple positions using a single terminal.

Urban noise monitoring covers:

Road noise monitoring to assess statistic evaluation of noise annoyance created by taking into consideration different factors: number, types and speed of vehicles, road surface and weather conditions.

Railway noise monitoring to assess statistic evaluation of noise annoyance created by taking into consideration different factors: types, speed and length of trains and weather conditions.

Construction-site noise and vibration monitoring to prevent excessive vibration levels at low frequencies, to make sure that authorised working times are

respected, and to provide the right tools to identify the source creating annoyance, for example, sound and/or video recordings with noise events.

Concert, exhibition and sports arena noise monitoring to manage neighbourhood noise assessment by determining ambient noise, particular noise and residual noise, precisely evaluating noise annoyance (broadband and small band, especially low frequencies at concerts) and alerting the event manager if the remote noise level exceeds allowed limits.

Industrial plant noise monitoring to determine noise created by the different operating conditions.

Product Guide

Brüel & Kjær offers solutions to all the above-mentioned applications.

Please use this table as a guide to relevant products.

Application	Key Features	Products and their Key Features
Airport Noise Monitoring	1) L_{Aeq} , L_{max}	4198 Outdoor Microphone Unit ⁶⁾
Urban Noise Monitoring	2) Statistics L_N	4184 Weatherproof Microphone Unit ⁶⁾
Plant Noise Monitoring	3) 1/3 Octave spectra	3631 Portable Noise Monitoring Terminal ^{1) 2) 16) 17)}
	4) Event trigger	3637 Portable Noise Monitoring Terminal ^{1) 2) 3) 4) 5) 6) 7) 9) 16) 17)}
	5) Sound/Video recording	3597 Permanent Noise Monitoring Terminal ^{1) 2) 3) 4) 5) 6) 7) 9) 16)}
	6) Automatic Calibration (CIC)	7802 Noise Monitoring Software ^{4) 8) 10) 14) 15) 16)}
	7) Automatic location (GPS)	7840 Noise Monitoring Software ^{8) 10) 14) 15) 16)}
	8) Communication with NMT	7832 Reporting Module ¹¹⁾
	9) EPNL	7833 Complaints Module ¹²⁾
	10) Database management	7804 Flight Tracking Option ^{13) 14)}
	11) Reporting	7834 INM Link ¹⁵⁾
	12) Complaints handling	
	13) Correlation with flights	
	14) GIS Interface	
	15) Prediction	
	16) Weather information	
	17) Portable	

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