

# PRODUCT DATA

## Noise Monitoring Terminal — Type 3597



Brüel & Kjær Noise Monitoring Terminal Type 3597 is for external use, in all climatic environments, and is a component of an unattended environmental noise monitoring terminal system.

The Noise Monitoring Terminal is an intelligent unit built around Brüel & Kjær's Noise Level Analyzer Type 4441 and Weatherproof Microphone Unit Type 4184. With a selectable modem, the Noise Monitoring Terminal can communicate with a remote PC via public telephone lines, wireless LAN, cellular phones, ISDN or LAN. The Noise Level Analyzer and the modem are housed in a protective weatherproof cabinet fitted with a thermostatically controlled fan and heater.

Type 3597 also constitutes the outdoor part of Brüel & Kjær's Airport Noise Monitoring System, which is computer based and runs on special software (please ask for separate Product Data sheet).

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**3597**

- USES**
- Airport noise monitoring
  - City noise monitoring
  - Train noise monitoring
  - Industrial noise monitoring
  - Noise surveys

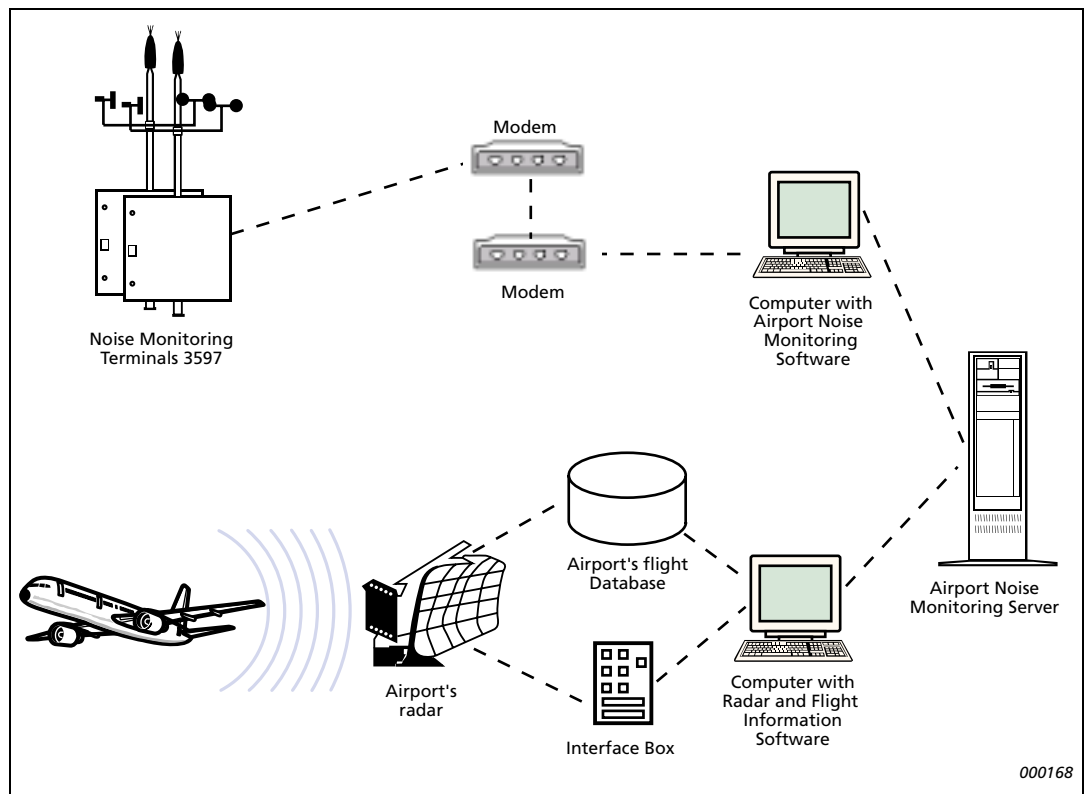
- FEATURES**
- All-weather operation
  - Designed for continuous monitoring
  - 1/2 or 1 second  $L_{eq}$  and SPL measurements
  - Dynamic range of 110 dB
  - 1/3-octave real-time analyses
  - Remote verification of the entire measurement chain using the patented Charge Injection Calibration check (CIC) or a built-in loudspeaker
  - Sound recording
  - Weather data monitoring (optional)
  - On-site operation via its RS-232 or LAN interface
  - Remote operation via public telephone lines, cellular phones, ISDN, LAN or wireless LAN
  - Windows NT<sup>®</sup> operating system

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## Description

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**Fig. 1**  
 Overview showing a complete airport noise monitoring system set-up. Noise Monitoring Terminals Type 3597 are the heart of a complete noise monitoring installation



The Noise Monitoring Terminal Type 3597 (NMT) makes remote, unmanned environmental noise measurements. It does the following:

- Checks the calibration of the weatherproof microphone unit
- Correctly gauges the signal from the weatherproof microphone unit
- Provides the necessary frequency and time weightings
- Processes noise data
- Stores the results of several months of monitoring
- Transmits data via RS-232 or LAN interface

The NMT is a component of an unattended Noise Monitoring System. The main purpose of the system is to monitor environmental noise from airports, construction sites, noisy areas and traffic areas where noise is a major concern. A typical system, e.g., for airport noise monitoring, would consist of NMTs, a central computer system and a number of work stations.

The NMT consists of Weatherproof Microphone Unit, Microphone Power Supply, Noise Level Analyzer, System Controller and a Weatherproof Cabinet.

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## **Weatherproof Microphone Unit Type 4184**

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The Weatherproof Microphone Unit is an outdoor unit that complies with the Type 1 requirements. It functions correctly under conditions of up to 96% relative humidity and in ambient temperatures ranging from -40 to + 50°C. Its precision condenser microphone is buried and fully protected within the unit's body. It has spikes placed at the top of its windscreen to deter birds.

The weatherproof microphone unit, which is powered by Microphone Power Supply ZG0418, has built-in Charge Injection Calibration (CIC) and test sound check facilities, making use of the 1000 Hz calibration signal provided by Type 4441 to perform routine electrical and acoustical calibrations and checks. Charge Injection Calibration is a patented technique used for remotely monitoring the entire measurement set-up including the microphone, preamplifier and connecting cable. The actual attenuation of the return signal relative to the calibration signal is indicated on the calibration chart.

The System Controller can initiate up to four automatic routine calibrations and probe checks per day at user-specified times. The results are stored in its database.

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## **Weatherproof Cabinet**

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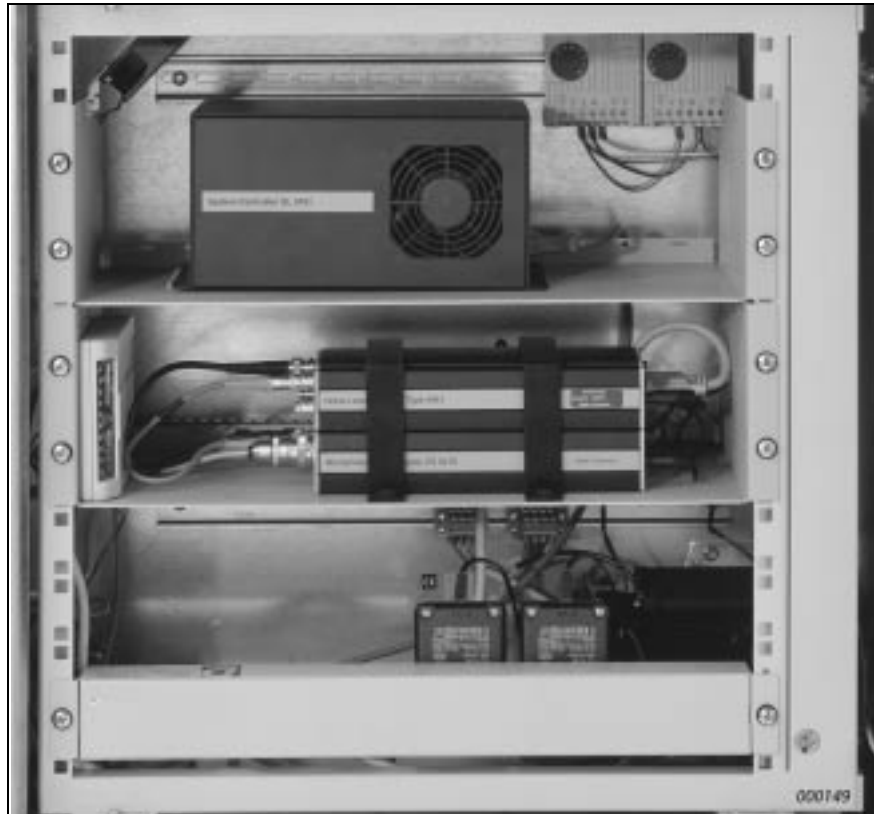
The stainless steel weatherproof cabinet is fitted with special clamps for fastening it to either a box-sectioned or tubular mast (50 – 64 mm in diameter). It has a weather-sealed door which can swing out to give access to the electrical system and climatic unit.

The climatic unit consists of a heater, a fan and two thermostats which, for a wide range of ambient conditions, maintain the internal temperature of the cabinet within the working range of the enclosed equipment.

The electrical system consists of an immunity box for EMC and a mains junction box for mains plugs.

The cabinet is well-protected with three weather-sealed locks on the door.

**Fig. 2**  
Interior view of the weatherproof cabinet showing the position of the units. System Controller UL0161 is on the upper shelf. Noise Analyzer Type 4441 and Microphone Power Supply ZG 0418 are placed on the lower shelf



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## Noise Level Analyzer Type 4441 and System Controller UL0161

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**Fig. 3**  
Noise Level Analyzer Type 4441 and System Controller UL0161



The Noise Level Analyzer analyses data coming from the weatherproof microphone. Analysed data are logged on the System Controller through the parallel interface cable. The Noise Level Analyzer complies with Type 1 and has a dynamic range of 110 dB.

### **Broadband Measurements and Frequency Analysis**

Type 4441 performs all the broadband analyses needed for environmental noise measurements  $L_{eq}$ ,  $L_{peak}$ ,  $L_{im}$ ,  $L_{inst}$ ,  $L_{max}$ ,  $L_{min}$ . All values can be calculated for different time and frequency weightings (see full list of broadband parameters in the specifications on page 7). Furthermore, the analyzer performs 1/3-octave analyses at filter center frequencies from 12.5 Hz to 16 kHz.

## Storage of Results in a Database

The Noise Level Analyzer, together with the System Controller, stores a large range of valuable information in a database. The standard capacity of the database is 10 Gigabyte. This corresponds to an average of three months of storage time. The retention can be set up for all the data sets. All results can be downloaded to a central server either in real-time or at a user-defined time interval, e.g., once per day.

The following parameters are stored:

- a) Hourly reports. Statistical information for every whole hour including Distribution, LN values, Total  $L_{eq}$ , Background  $L_{eq}$ , Noise Event  $L_{eq}$ .
- b) Noise events. Detects noise events from any user-defined trigger levels and durations, and stores the information in a database. For each event the following information is stored at  $\frac{1}{2}$  or 1 second intervals:
  - SPL and  $L_{eq}$  values
  - 1/3-octave spectrum, PNL and PNLT values
  - Sound fileFurthermore, PN dB (Perceived Noise Level) and EPN dB (Effective Perceived Noise Level) of all the events according to the ICAO Annex 16 are calculated and stored in the database.
- c) Short reports. The user can define short reports for a period of 1 to 60 minutes calculating minimum values, maximum values,  $L_{eq}$  and 5 user-defined LN values.
- d) Calibration reports. Automatically checks the calibration of the system four times a day using the patented Charge Injection Calibration check. Stores the information in the database.

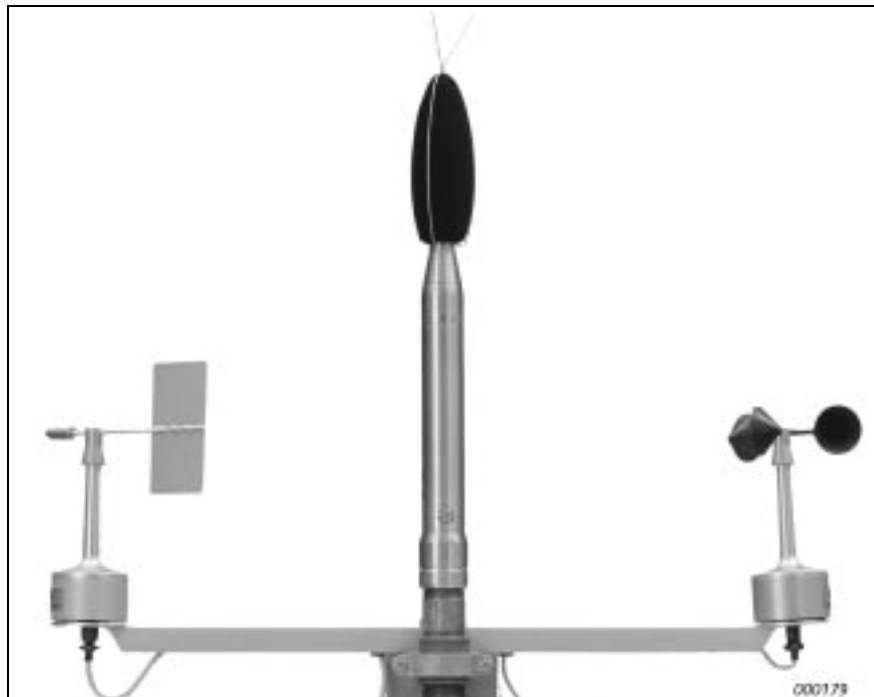
## Sound Recording

Noise events can be recorded for later analysis or source identification. The files are either stored in traditional sound file format (.wav) or as a compressed file (mp3) reducing the time spent on downloading data from the Noise Monitoring Terminal.

## Meteorological Data

Weather data can be monitored as an option. The option comprises a weather data logging module connected via a serial interface and an external Weather Station.

**Fig. 4**  
*Top of Type 3597 showing the weatherproof microphone unit and optional instruments for collection of meteorological data*



The monitored weather data is:

- Wind speed (m/s)
- Wind direction (degrees)
- Relative humidity (%)
- Temperature (°C)
- Atmospheric pressure (Pa)

The weather data is stored in the common database in the same manner as the noise measurements.

### **Communication Interfaces**

Noise Level Analyzer Type 4441 and System Controller UL0161 allow you to communicate via the RS-232. Optionally the analyzer can be configured with ISDN, LAN, wireless LAN or cellular communication. Transmission of data is done simultaneously with data logging, without loss of data.

# Specifications – Noise Monitoring Terminal Type 3597

## STANDARDS

Conforms with the following:

- IEC 60651 (1979) Type 1 plus Amendment 1
- IEC 60804 (1985) Type 1 plus Amendment 2
- IEC 1260 (1995)/EN 61260: 1995 Octave and 1/3-Octave Bands Class 1
- EN/IEC 61672 (Draft Jan. 1999)
- ANSI S1.4–1983 Type 1
- ANSI S1.43–199X Type 1 (Draft 1993)
- ANSI S1.11–1986 Octave and 1/3-Octave Bands, Order 3, Type 0–C, Optional Range

**Dynamic Range:** 110 dB

## Nominal Measuring Range:

Lower limit 35 dB; 29 dB with A-weighting  
Upper limit 140 dB (200 V Polarization)

## Broadband Values:

Frequency Weightings X=A and C or A and Linear or C and Linear (two weightings simultaneously)  
Time Weighting Y=Fast, Slow and Impulse (all simultaneously)

$L_{Xeq}$   
 $L_{Xpeak}$   
 $L_{Xim}$   
 $L_{XYinst}$   
 $L_{XYmax}/SPL$   
 $L_{XYmin}$

## Spectrum Values:

Frequency Weighting X=A, C or Linear  
Time Weighting Y=Fast and Slow (two weightings simultaneously)

$L_{XYinst}$   
 $L_{XYmax}$   
 $L_{XYmin}$   
 $L_{Xeq}$

## Equivalent Continuous Level ( $L_{eq}$ ):

"I"-weighted value also selectable ( $L_{A1eq}$ )

**1/3-octave Frequency Range:** 12.5 Hz – 16 kHz

## MEMORY CAPACITY

The capacity of the database is dependent on the size of the hard disk. Standard configuration consists of a 10 Gigabyte hard disk giving at least three months storage space

## MODEM INTERFACE

RS–232 interface using commercially available modems  
**Optional:** Configuration for LAN, wireless LAN, ISDN

## AMBIENT CONDITIONS

### Weatherproof Microphone Unit Type 4184:

**Operating Temperature Range:** –40 to +50°C (–40 to 122°F)

**Operating Relative Humidity Range:** <100%

**Maximum Relative Humidity:** 90% at +40 °C

### Weatherproof Cabinet and Contents:

**Operating Temperature Range:** –30 to +50°C (–22 to 122°F); lower limit extended down to –40°C (–40°F) with optional extra heating unit WB 1128

**Operating Relative Humidity:** max. 90% at +30°C

Contents weather protected to IP55 of IEC 529 and NEMA 3R

## DIMENSIONS AND WEIGHTS

### Weatherproof Microphone Unit Type 4184:

**Length:** 20 mm (24.4")

**Diameter:** 50 mm (2")

**Weight:** 2.1 kg (4.6 lb.)

### Weatherproof Cabinet ZH0328:

**Height:** 600 mm (23.6")

**Width:** 600 mm (23.6")



**Depth:** 350 mm (13.8")

**Weight with Contents:** 40 kg (88 lb.) (approx.)

## POWER REQUIREMENTS

110/220/240 V AC 47.5–66 Hz

## Compliance with Standards

 	CE-mark indicates compliance with: EMC Directive and Low Voltage Directive. C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand
<b>Safety</b>	EN 61010-1 and IEC 61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use. UL3111-1: Standard for Safety – Electrical measuring and test equipment
<b>EMC Emission</b>	EN 50081-1: Generic emission standard. Part 1: Residential, commercial and light industry. EN 50081-2: Generic emission standard. Part 2: Industrial environment. CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits. FCC Rules, Part 15: Complies with the limits for a Class B digital device.
<b>EMC Immunity</b>	EN 50082-1: Generic immunity standard. Part 1: Residential, commercial and light industry. EN 50082-2: Generic immunity standard. Part 2: Industrial environment. <b>Note 1:</b> The above is guaranteed only: <ul style="list-style-type: none"> <li>• If Noise Monitoring Terminal Type 3597 is correctly assembled according to the instructions given in its manual</li> <li>• When using accessories listed in this Product Data sheet</li> <li>• When the door of the cabinet is closed</li> </ul>

## Ordering Information

**Type 3597 A (230 VAC):** Noise Monitoring Terminal

**Includes the following accessories:**

Type 4184	Weatherproof Microphone Unit
ZG 0418	Microphone Power Supply
Type 4441	Noise Level Analyzer
UL 0161	System Controller
ZH 0627	Weatherproof Cabinet including Climatic Unit
BZ 5292	Communications Software for NMT
AO 0028	Microphone Cable
AO 1448	BNC to BNC Cable
AO 1446	Connecting Cable
2 x ZG 0386	Mains Power Supply

**Type 3597 B (110 VAC):** Noise Monitoring Terminal

**Includes the same accessories as Type 3597 A except:**

ZH 0626 replaces ZH 0627  
ZG 0388 replaces ZG 0386

### Optional Accessories

Type 4228	Pistonphone
Type 7802	Noise Monitoring Software
Type 7803	Weather Data Option
Type 7804	Radar Data Option
Type 4198	Outdoor Microphone Unit
WQ 0989	Weather Station

### Accessories Quoted Upon Request

Modem  
Mast  
LAN Communication Module  
Wireless LAN Communication Module  
ISDN Communication Module  
Cellular Communication Module  
Active Cooling System for Extreme Temperatures

Brüel & Kjær reserves the right to change specifications and accessories without notice