

# PRODUCT DATA

## Noise Monitoring Terminals —Types 3597 C, 3637 A/B and 3631

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

*Portable NMTs Types 3637 A and B are for semi-permanent monitoring while portable NMT Type 3631 is a low-cost solution based on Sound Level Meter Type 2238.*

*Noise Monitoring Terminals Types 3597 C and 3637 A are intelligent units built around Brüel & Kjær's Noise Level Analyzer Type 4441 and Weatherproof Microphone Unit Type 4184. With a selectable modem, these NMTs can communicate with a remote PC via public telephone lines, wireless LAN, cellular phones, ISDN or LAN. The Noise Level Analyzer in Type 3597 C is housed in a protective weatherproof cabinet fitted with a thermostatically controlled fan and heater.*

*The portable NMTs are stored in a carrying case for easy transportation.*

### FEATURES

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

### BENEFITS

- 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
- Sound recording
- Weather-data monitoring (optional)
- Remote verification of the entire measurement chain using the patented Charge Injection Calibration check (CIC) or a built-in loudspeaker
- 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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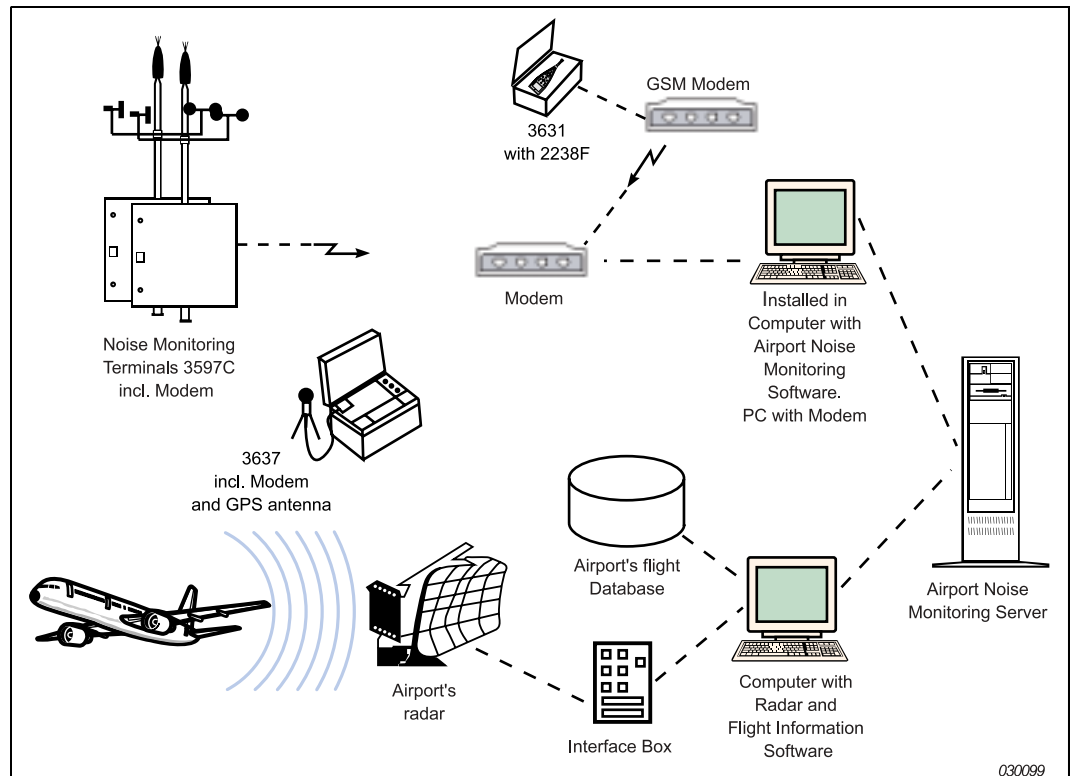
Noise Monitoring Terminals Types 3597 C and 3637 make remote, unmanned, environmental-noise measurements. They do the following:

- check the calibration of the weatherproof microphone unit
- correctly gauge the signal from the weatherproof microphone unit
- provide the necessary frequency and time weightings
- process noise data
- store the results of several months of monitoring
- transmit data via RS-232 or LAN interface

The noise monitoring terminal (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, areas generally high in noise and traffic areas where noise is a major concern. A typical system, for example, for airport-noise monitoring, would consist of NMTs, a central computer system and a number of work stations.

A NMT consists of a weatherproof microphone unit, a microphone power supply, a noise-level analyzer, a system controller and a weatherproof cabinet.

**Fig. 1**  
Overview showing a complete airport-noise monitoring system setup. Noise-monitoring terminals are the heart of a complete, noise-monitoring installation



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## Weatherproof Microphone Unit Type 4184

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The weatherproof microphone unit is an outdoor unit that complies with Type 1 requirements. It functions correctly under conditions of up to 96% relative humidity, and in ambient temperatures ranging from  $-40$  to  $+50^{\circ}\text{C}$ . 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 ZG 0418, 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. CIC is a patented technique used for remotely monitoring

the entire measurement setup 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; results are stored in its database.

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## Weatherproof Cabinet

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The stainless-steel, weatherproof cabinet can be ordered with special clamps for fastening to either a wall, or a box-sectioned or tubular mast, 50 – 64 mm in diameter. Its door seals the cabinet from the outside environment and gives access to the electrical system and climatic unit.

The climatic unit consists of a heater, 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 cabinet is well-protected with a weather-proof lock on the door.

**Fig. 2**  
*Interior view of the weatherproof cabinet showing the position of the units. The basic Type 3597 C-001 System Unit is seen in the upper half of the picture. Noise Analyzer Type 4441 and Microphone Power Supply are included with the basic unit*



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## Noise Level Analyzer Type 4441 and System Controller UL 0219

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The noise level analyzer scans data coming from the weatherproof microphone. Analysed data are logged on the system controller through the parallel-interface cable. The analyzer complies with Type 1 and has a dynamic range of 110dB.

### **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 section of this document). Furthermore, the analyzer performs 1/3-octave analyses at filter centre 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 gigabytes, corresponding to an average of three months of storage time. The retention can be set up for all data sets. All results can be downloaded to a central server, either in real-time or at a user-defined time interval, for example, once per day.

The following parameters are stored:

- **Hourly reports** – statistical information for every whole hour including Distribution, LN values, Total  $L_{eq}$ , Background  $L_{eq}$ , Noise Event  $L_{eq}$
- **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 ½ or 1 second intervals:

- SPL and  $L_{eq}$  values
- 1/3-octave spectrum, PNL and PNLT values
- Sound file

Furthermore, PNdB (Perceived Noise Level) and EPNdB (Effective Perceived Noise Level) of all the events according to the ICAO Annex 16 are calculated and stored in the database

- **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
- **Calibration reports** – automatically checks the calibration of the system four times a day using the patented CIC check and stores the information in the database

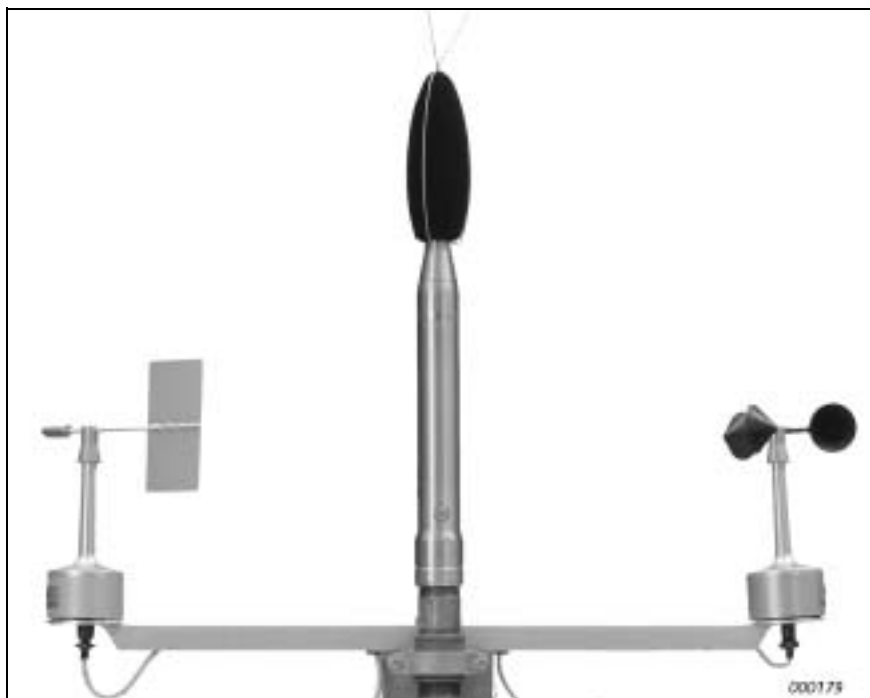
### Sound Recording

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 NMT.

### 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. 3**  
*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 performed simultaneously with data logging, without data loss.

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### **Sound Level Meter Type 2238 F**

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For monitoring over a short period of time, Type 3631 offers a NMT based on Sound Level Meter (SLM) Type 2238 F and low-cost, Weatherproof Microphone Type 4198. The system's dynamic range is 80 dB and the sound level meter complies with the Type 1 standard.

The SLM measures 1-second broadband  $L_{eq}$  and is able to store 3 days' worth of measurements. It also includes 2 auxiliary channels that can be used for recording weather information.

Normally, downloads occur 3 times a day; the system controller can be set up to calculate the 1-hour reports and detect events from the data. The SLM must be calibrated by hand.

Additionally, the SLM in Type 3631 is powered from a rechargeable battery, allowing it to run for 3 days.

## 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. UL 3111-1: Standard for Safety - Electrical measuring and test equipment
<b>EMC Emission</b>	EN/IEC 61003-6-3: Generic emission standard for residential, commercial and light industrial environments. EN/IEC 61003-6-4: Generic emission standard for industrial environments. 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/IEC 61003-6-1: Generic standards – Immunity for residential, commercial and light industrial environments. EN/IEC 61003-6-2: Generic standards – Immunity for industrial environments. <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>

## Specifications – Basic Noise Monitoring Terminal Type 3597 C-001 (part of Types 3597 C and 3637)

### STANDARDS

Conforms with the following:

- IEC 60651 (1979) Type 1 plus Amendment 1
- IEC 60804 (1985) Type 1 plus Amendment 2
- EN/IEC 61260 (1995) Octave and 1/3-Octave Bands Class 1
- EN/IEC 61672-1 (2002)
- 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 ( $L_{Aeq}$ )

**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 IP 55 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:**

**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

**Voltage:** 110/220/240 V AC

**Frequency:** 47.5-66.0 Hz

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## Specifications – Noise Monitoring Terminal Type 3631

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### STANDARDS

As for Noise Monitoring Terminal Type 3597 C-001

**Dynamic Range:** 80 dB

**Broadband Values:**  $L_{Aeq}$ ,  $L_{Ceq}$  or  $L_{Lineq}$

**Auxiliary Input:** 2 x DC-input Channels for Weather Information

**Memory Capacity:** 3 days (7 with Aux. channels Deactivated)

**Modem Interface:** RS-232

**Capacity of 12 V Rechargeable Battery:** 3 days

**Weight:** 24 kg (53 lb)

### POWER REQUIREMENTS

**Voltage:** 100 – 240 V AC

**Frequency:** 50 – 60 Hz

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## Ordering Information

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### TYPE 3597 C-001 BASIC NMT INCLUDING TYPE 4441

Includes the following accessories:

<b>Type 4441</b>	Noise Level Analyzer
<b>UL 0219</b>	Computer
<b>ZG 0418</b>	Microphone Power Supply
<b>ZM 0069</b>	Modem (Modem Cable AO 0567 included)
<b>AO 1446</b>	LEMO Cable (male – male)
<b>AO 1448</b>	BNC – BNC Cable
<b>AO 1452</b>	Shielded Parallel Port Cable
<b>AO 1453</b>	Minijack Cable
<b>ZG 0435</b>	DC/DC Galvanic Separation
<b>VU 1033</b>	LCD Display
<b>ZG 0430</b>	Power Supply for use without Battery (optional)

### TYPE 3597 C PERMANENT NMT INCLUDING TYPES 4441 AND 4184

Includes the following accessories:

<b>Type 3597 C-001</b>	Basic NMT including Type 4441
<b>Type 4184</b>	Weatherproof Microphone Unit
<b>AO 0028</b>	Microphone Cable (10 m)
<b>QB 0059</b>	12 V VRS LA Battery (1 battery included (20 kg, 24 hours), room for 2 more)
<b>AO 1473</b>	12 V Battery Cable between QB 0059 and Type 3597 C-001
<b>ZG 0437</b>	12 V Battery Charger and Power Supply
<b>AO 1475</b>	12 V Battery Cable between ZG 0437 and Type 3597 C-001
<b>UA 1635 A</b>	Temperature-controlled NMT Cabinet

and, upon request:

<b>FC 6606</b>	Wall Mounting (optional)
<b>DH 0738</b>	Mounting Round Mast (optional)
<b>DH 0742</b>	Mounting Square Mast (optional)

### TYPE 3637 A PORTABLE NMT WITH TYPE 4441 AND TYPE 4184

Includes the following accessories:

<b>KE 1008</b>	Black Suitcase Pelican 1620
<b>Type 3597 C-001</b>	Basic NMT including Type 4441
<b>Type 4184</b>	Weatherproof Microphone Unit
<b>AO 0028</b>	Microphone Cable (10 m)
<b>ZD 0871</b>	GPS Receiver
<b>3 x QB 0051</b>	12 V Battery (12 kg each)
<b>3 x AO 1473</b>	12 V Battery Cable between QB 0051 and Type 3597 C-001
<b>ZG 0440</b>	12 V/4 A Battery Charger with Neutrik® Connector

### TYPE 3637 B PORTABLE NMT WITH TYPE 4441 AND TYPE 4198

Includes the following accessories:

<b>KE 1008</b>	Black Suitcase Pelican 1620
<b>Type 3597 C-001</b>	Basic NMT including Type 4441
<b>Type 4198</b>	Outdoor Microphone Unit (10 m Cable included)
<b>AO 1474</b>	Microphone Cable Adaptor for 0 V Polarization
<b>ZD 0871</b>	GPS Receiver
<b>QB 0051</b>	12 V Battery (3-piece: 12 kg each)
<b>AO 1473</b>	12 V Battery Cable between QB 0051 and Type 3597 C-001 (3 pieces)
<b>ZG 0440</b>	12 V/4 A Battery Charger with Neutrik® Connector

### TYPE 3631 PORTABLE NMT WITH TYPE 2238 F

<b>Type 2238 F</b>	Logging Sound Level Meter
<b>AO 0567</b>	Modem Cable
<b>QB 0051</b>	12 V Battery
<b>AQ 1698</b>	12 V Battery Cable
<b>ZG 0404</b>	Battery Charger
<b>Type 3592</b>	Yellow Suitcase
<b>UA 0801</b>	Microphone Tripod
<b>UA 1404</b>	Outdoor Microphone Kit
<b>AO 0560</b>	Microphone Cable (10 m)
<b>WQ 1238</b>	GSM Modem (upon request)

### POWER SUPPLY FOR TYPE 2238 F

<b>ZG 0386</b>	EU Power Supply for 2238 F (upon request)
<b>ZG 0387</b>	UK Power Supply for 2238 F (upon request)
<b>ZG 0388</b>	US Power Supply for 2238 F (upon request)

### Optional Accessories

<b>Type 4228</b>	Pistonphone
<b>Type 7802</b>	Noise Monitoring Software
<b>Type 7804</b>	Radar Data Option
<b>WQ 0989</b>	Weather Station

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## Accessories Quoted Upon Request

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

#### TRADEMARKS

Neutrik is a registered trademark of the Neutrik Group worldwide

Windows NT is a registered trademark of Microsoft Corporation in the United States and/or other countries

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

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