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.

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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® operating system

Brüel & Kjær

Description

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
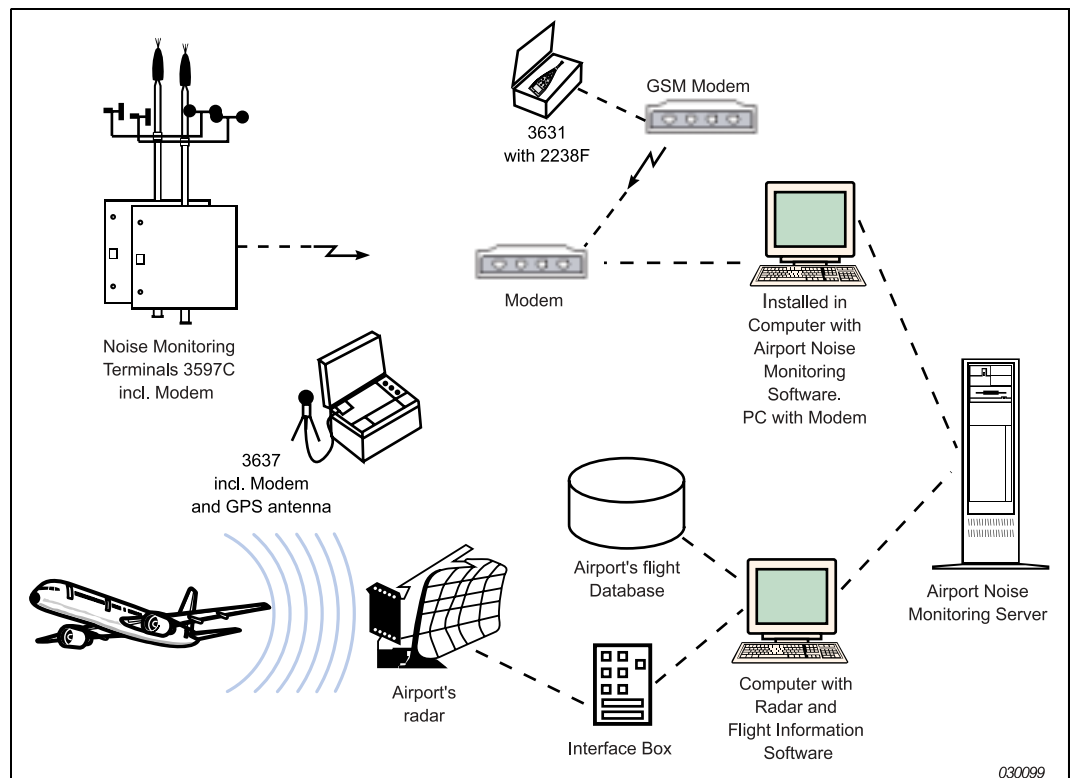
Weatherproof Microphone Unit Type 4184

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°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.

Weatherproof Cabinet

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

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 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 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, 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
- **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
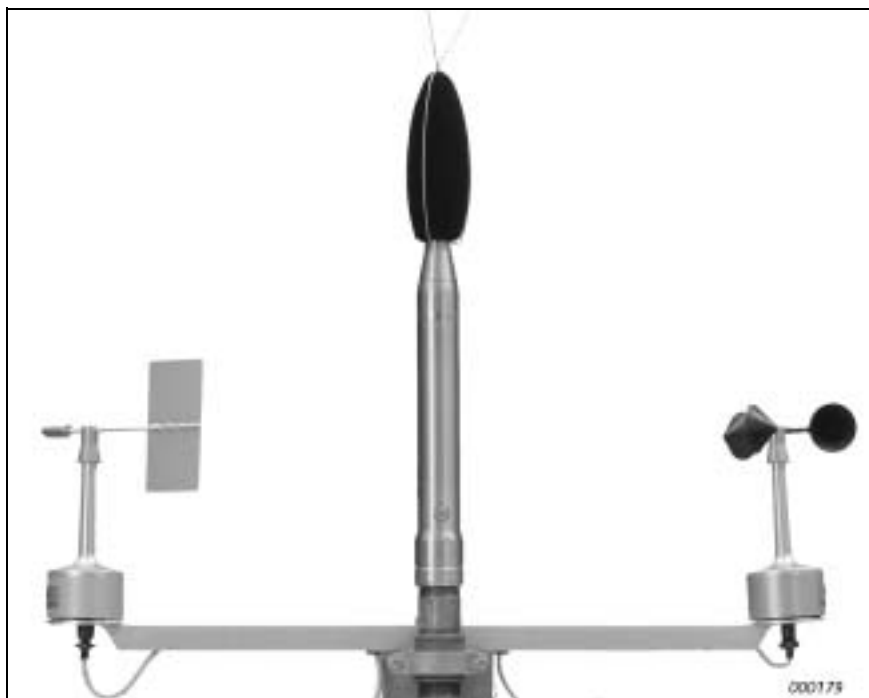
The monitored weather data is:

- 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 UL 0161 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.

Sound Level Meter Type 2238 F

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 , $\mathbf{\mathbb{C}}$	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
Safety	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
EMC Emission	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.
EMC Immunity	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. **Note 1:** The above is guaranteed only: • If Noise Monitoring Terminal Type 3597 is correctly assembled according to the instructions given in its manual • When using accessories listed in this Product Data sheet • When the door of the cabinet is closed

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 (LAIeq)
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

Specifications – Noise Monitoring Terminal Type 3631

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 × 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

Ordering Information

TYPE 3597 C-001 BASIC NMT INCLUDING TYPE 4441
Includes the following accessories:

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

TYPE 3597 C PERMANENT NMT INCLUDING TYPES 4441 AND 4184
Includes the following accessories:

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

and, upon request:

FC 6606	Wall Mounting (optional)
DH 0738	Mounting Round Mast (optional)
DH 0742	Mounting Square Mast (optional)

TYPE 3637 A PORTABLE NMT WITH TYPE 4441 AND TYPE 4184
Includes the following accessories:

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

TYPE 3637 B PORTABLE NMT WITH TYPE 4441 AND TYPE 4198
Includes the following accessories:

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

TYPE 3631 PORTABLE NMT WITH TYPE 2238 F

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

POWER SUPPLY FOR TYPE 2238 F

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

Optional Accessories

Type 4228	Pistonphone
Type 7802	Noise Monitoring Software
Type 7804	Radar Data Option
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

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