

PRODUCT INFORMATION:

PORTABLE NOISE MONITORING TERMINAL TYPE 3655-C-DMO with Noise Sentinel On Demand Weather Station Kit MM-0256-A-DMO

Portable Noise Monitoring Terminal (NMT) Type 3655-C-DMO is a complete solution delivered as part of Noise Sentinel On Demand. This enables you to monitor and manage noise through an end-to-end online experience: book and obtain instrumentation, collect and report data and maintain data indefinitely in the cloud.

Portable NMT Type 3655-C-DMO comes complete with tripod, router, SIM card and airtime contract, antenna, sound level calibrator and all accessories required for deployment. In addition, a smart phone App eases setup and configuration, including easy location based on GPS, as well as entering location notes and photographs. The NMT is delivered in two transport cases, one for deployment and one for the accessories. The NMT can operate off its own internal batteries for 32 hours (typical) with the router. In addition, it can operate off AC power or with external DC power.



Fig. 1 Portable NMT in use on a construction site

With Noise Sentinel On Demand Weather Station Kit MM-0256-A-DMO you can add a weather station that collects weather data simultaneously with your noise data. This kit is delivered in a single transport case that contains everything you need to set up the weather station.

USE AND FEATURES

Uses

- **Measurements made:**
 - Outdoors
 - Unattended
 - In workplaces and on construction sites
 - In remote locations
- **Measurements for:**
 - Area planning
 - Noise control
 - Complaint investigation
 - Venue licensing
- **Simultaneous measurement of noise and weather data**

Features

- Weather protection to IP 43
- Easy to carry and transport
- Tamper protection
- All accessories needed to deploy and use – from analyzer to router with pre-paid SIM card to sound level calibrator
- Hot swap of batteries
- Type approved to IEC 61672 Class 1 specifications; uniquely, including windscreen effects
- 120 dB dynamic range
- Built-in facilities to minimise gaps in data
- Charge Injection Calibration (CIC) for remote verification of the entire measurement chain
- Safe and reliable live data streaming
- 3G communication capabilities for remote operation
- Industry-standard Internet and security protocols for safe and reliable data transfer

INSIDE THE CASE



Fig. 2 The contents of the Portable NMT Type 3655-C-DMO

A Complete Noise Monitoring Solution

Portable Noise Monitoring Terminal Type 3655-C-DMO comes complete with tripod, router, SIM card and airtime contract, antenna and sound level calibrator and all accessories required for deployment in the field. The NMT is delivered in two transport cases, one for deployment and one containing the accessories. Type 3655-C-DMO includes everything needed to take measurements:

- NMT with microphone and cable
- Tripod with guy ropes and pegs
- 3G router, SIM card and airtime contract
- Rechargeable 32 hr battery pack
- Mains power supply
- Cable for external batteries
- Security cable and locks
- Calibrator
- Assembly toolkit
- Shipping cases
- Shipment to and from site
- Assembly and testing instructions

Protection

The cases are light and robust, and their contents are secured in the case with high-density machined foam inlays. The cases are designed for unattended noise monitoring. They protect the measurement system from the weather and unauthorised access while providing power and remote data retrieval.



Fig. 3 Protective high-density machined foam inlays

POWER

Type 3655-C-DMO comes with two powerful batteries and two chargers. Power for the system may be provided by any or all of the following:

- One of the included batteries (QB-0079)
- Both of the included batteries (QB-0079)
- One of the included chargers (ZG-0857), provided mains power is available
- Both of the included chargers (ZG -0857), provided mains power is available
- External DC power 12 – 24 V

The internal batteries can power the system for 32 hours (typical) with the router. In addition, the hand-held analyzer has an internal Li-Ion battery, that provides a further 8 hours of power for the analyzer, itself. The case's batteries use lithium-ion (Li-Ion) technology, well known from mobile phones, portable PCs and hand tools. These lightweight batteries make Type 3655-C-DMO compact and completely portable. Li-Ion batteries are renowned for their excellent charge retention, lack of 'memory', and very high energy efficiency (5 times better power to weight

ratio than traditional lead-acid batteries). For reliable long-life operation, the batteries have internal circuitry to protect against shorts and over-discharge.

The chargers are used to charge the batteries prior to measurements but may also be used to power the system during measurement if mains power is available. The NMT comes with a 1.5 m mains power cable for use with AC power (100 – 240 V AC, 0.6 A, 50 – 60 Hz). You can also use an external 12 – 24 V DC power source that includes a suitable power guard to enable correct and safe restart after external power has been lost.

All power sources are connected to the case's power panel, which always directs power from the source with the highest voltage to supply the measurement system and optional modems. You may connect or disconnect power sources at any time during measurement as long as just one power source remains in operation, including during hot-swapping of batteries.

RELIABLE UNATTENDED MEASUREMENTS

Based on Hand-held Analyzer Type 2250-L with Noise Monitoring Software BZ-7232, it functions exactly as Noise Monitoring Terminal Type 3639-A in a portable case rather than a mounted cabinet. The noise monitoring functionality includes CIC checks, optional event detection and sound recording for extended periods of monitoring. The included router enables remote viewing of real-time results and to remotely control the unit from Noise Sentinel On Demand. Data can be automatically downloaded real-time or on connection with the server.

Measurement Integrity

Measurement integrity is of primary importance in noise measurement situations, whether for inside or outside or for attended or unattended measurements. Class 1, as described in the current sound level meter standard IEC 61672 – 1:2002, is the grade of accuracy often required for hand held measurements.

In addition nothing less than Class 1 accuracy is required for outdoor measurement systems incorporating rain shields, wind shields or any other form of environmental protection used in microphone systems. Placing a small device, such as a rain guard, in close proximity to the microphone diaphragm may produce significant acoustic disturbance and thus measurement errors at mid and high frequencies.

Hand-held Analyzer Type 2250-L and Outdoor Microphone Type 4952 are a type approved system combination, independently approved to Class 1 accuracy by PTB in Germany (see type approval certificate: Fig. 2). This ensures that the measurement system complies with the minimum requirements of accuracy for unattended noise measurement, a consideration often overlooked in portable noise measurement systems. Type approval of the system to IEC 61672–1:2002 also permits the weather-protected measurement system to be laboratory calibrated in accordance with part III of this sound level meter standard.

Outdoor Microphone Type 4952

The compact and lightweight Outdoor Microphone Type 4952 is suitable for long periods of unattended outdoor operation and the ideal choice for use with the Type 3655-C-DMO system.

The microphone is protected against the effects of wind, rain and perching birds and, with the hand-held analyzer, fulfils IEC 61672 Class 1 requirements. The reference direction angle of incidence can be set to 0° or 90°, dependent on the noise monitoring application. Inside the microphone is a highly stable pre-polarized free-field 1/2nd microphone cartridge with a stainless steel diaphragm.

Type 4952 is recommended for extended use in all kinds of weather. Up to 100 m of microphone extension cable can be used while maintaining measurement accuracy. You can mount the microphone on the supplied tripod using Tripod Adaptor UA-1707 or on a 1² threaded pole.



Fig. 4 *Outdoor Microphone Type 4952 suitable for long periods of unattended monitoring*

Measuring Weather Data

Noise Sentinel On Demand Weather Station Kit MM-0256-A-DMO enables the simultaneous measurement of noise and weather data. This six-parameter station measures wind speed and direction, precipitation, temperature, humidity and pressure.

Weather conditions affect the propagation of sound and therefore any measured noise levels. Particularly, wind speed and direction must be taken into account when measuring noise outdoors. Most environmental noise measurement standards define limits for wind speed and direction. Environmental noise measurements must document weather conditions during the measurement period.


Brüel & Kjær's Weather Station Kit MM-0256-A-DMO is based on Vaisala sensors and is designed to fully meet your needs. The weather station is lightweight and connects to the instrument's USB port, eliminating the need for separate batteries.

The kit is delivered in a robust transport case that contains everything needed to set up the weather station in the field, including a tripod. Based on ultrasound, the weather stations operate silently, which allows close placement to the microphone position.



Fig. 5 Noise Sentinel On Demand Weather Station Kit MM-0256-A-DMO

COMPLIANCE WITH STANDARDS

	<p>The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EU directives RCM mark indicates compliance with applicable ACMA technical standards – that is, for telecommunications, radio communications, EMC and EME China RoHS mark indicates compliance with administrative measures on the control of pollution caused by electronic information products according to the Ministry of Information Industries of the People's Republic of China WEEE mark indicates compliance with the EU WEEE Directive</p>
<p>Safety</p>	<p>EN/IEC 61010- 1, ANSI/UL 61010-1 and CSA C22.2 No.1010.1: Safety requirements for electrical equipment for measurement, control and laboratory use</p>
<p>EMC Emission</p>	<p>EN/IEC 61000-6-3: Generic emission standard for residential, commercial and light industrial environments EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits IEC 61672-1, IEC 61260, IEC 60651 and IEC 60804: Instrumentation standards Note: The above is only guaranteed using accessories listed in this Product Data</p>
<p>EMC Immunity</p>	<p>EN/IEC 61000-6-2: Generic standard – Immunity for industrial environments EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements IEC 61672-1, IEC 61260, IEC 60651 and IEC 60804: Instrumentation standards Note: The above is only guaranteed using accessories listed in this Product Data</p>

Temperature	IEC 60068-2-1 & IEC 60068-2-2: Environmental Testing. Cold and Dry Heat. Operating Temperature: -10 to +50 °C (14 to 122 °F) Storage Temperature: -25 to +70 °C (-13 to 158 °F)
Humidity	IEC 60068-2-78: Damp Heat: 93% RH (non-condensing at +40 °C (104 °F)). Recovery time 2 ~ 4 hours
Mechanical	Non-operating: IEC 60068-2-6: Vibration: 0.3 mm, 20 m/s ² , 10 – 500 Hz IEC 60068-2-27: Bump: 1000 bumps at 400 m/s ² IEC 60068-2-27: Shock: 1000 m/s ² , 6 directions
Enclosure	IEC 60529 (1989): Protection provided by enclosures: IP43

Additional Standards for Charger ZG-0857-001*

Safety	EN 60335-1 (EN 60335-1:1994 +A11:1995, A1:1996, A12:1996) EN 60335-2-29 (EN 60335-2-29:1996 +A11:1997) EN 60601-1 (EN 60601-1:1990 +A1:1993, A2:1995, A12:1993, A13:1996 +Corr.:1994) UL 2601-1, 2.ed:1997 and CAN/CSA C22.2 No.601.1-M90
EMC Emission	EN 50081-1:1992 (EN 55022B:1998 +A1:2000, EN 61000-3-2:1995 +A1:1998, A2:1998, A14:2000) EN 50082-1:1997 (EN 61000-4-2:1995 +A1:1998, -4-3:1996, A1:1998, -4-4:1995, -4-5:1995, -4-6:1996, -4-8:1993, -4-11:1994, ENV 50204:1995) EN 60601-1-2:1993 (EN 55011B:1991, IEC 801-2:1991, -3:1988, -4:1988, -5:1994)

Additional Standards for Router UL-1041*

Safety	EN 62311 EN 60950-1
EMC Emission	EN 301 511 EN 301 908-1 EN 301 908-2 EN 301 489-1 EN 301 489-7 EN 301 489-24

Additional Standards for Noise Sentinel On Demand Weather Station Kits MM-0256-A and MM-0316-A

EMC Emission	EN61326-1 IEC 60945/61000-4-2, -4-3, -4-4, -4-5, -4-6
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* From the Mascot declaration of conformance

SPECIFICATIONS – PORTABLE NOISE MONITORING TERMINAL TYPE 3655-C-DMO

All specifications are valid with Noise Monitoring Software BZ-7232 version 4.3.1

Portable Noise Monitoring Terminal Type 3655-C-DMO is supplied with Outdoor Microphone Type 4952, which includes Microphone Preamplifier ZC-0034. The microphone can only be connected to the analyzer through a microphone extension cable

MICROPHONE

Type: Prepolarized Outdoor Microphone
Nominal Open Circuit Sensitivity: 31.6 mV/Pa, (corresponding to -30 dB re 1 V/Pa) ±2 dB
Capacitance: 12 pF (at 250 Hz)
Reference Direction: Selectable between 0° (Top) and 90° (Side)

MICROPHONE PREAMPLIFIER ZC-0034

Nominal Preamplifier Attenuation: 0.3 dB
Extension Cable between Microphone Preamplifier ZC-0034 and Analyzer: Up to 100 m without degradation of the specifications

MEASURING RANGES (BROADBAND)

Dynamic Range: From typical noise floor to max. level for a 1 kHz pure tone signal, A-weighted: 20.0 – 141 dB
Linear Operating Range: In accordance with IEC 61672, A-weighted: 1 kHz: 31.1 – 141 dB
Primary Indicator Range: In accordance with IEC 60651, A-weighted: 29.8 – 124 dB
Linearity Range: In accordance with IEC 60804, A-weighted: 27.7 – 141dB

MEASURING RANGES (1/3 OCTAVE)

Dynamic Range: From typical noise floor to max. level for a pure tone signal at 1 kHz 1/3-octave: 2.9 – 141 dB
Linear Operating Range: In accordance with IEC 61260: £29.5 – 139.3 dB

SELF-GENERATED NOISE LEVEL

Typical values at 23°C for nominal microphone open-circuit sensitivity:

Weighting	Microphone	Electrical	Total
A	14.0 dB	18.7 dB	20.0 dB
B	12.9 dB	17.5 dB	18.8 dB
C	13.0 dB	18.7 dB	19.7 dB
Z (5Hz – 20 kHz)	14.4 dB	24.8 dB	25.2 dB

CORRECTION FILTERS

Noise Monitoring Software BZ-7232 is able to correct the frequency response to compensate for sound field and accessories
Sound Field: Free field or Diffuse field. Two Free-field reference directions: 0° (Top) and 90° (Side)

MICROPHONE POLARIZATION VOLTAGE

Selectable between 0 V and 200 V

CALIBRATION

Initial calibration is stored for comparison with later calibrations
Acoustic Calibration: Using Sound Calibrator Type 4231, the calibration process automatically detects the calibration level
Automatic checks: Up to 4 times per day with CIC

FREQUENCY ANALYSIS

1/1- or 1/3-octave band analysis
1/1-oct. Band Centre Frequencies: 16 Hz – 16 kHz
1/3-oct. Band Centre Frequencies: 12.5 Hz – 20 kHz
POWER PANEL ZH-0685
 Please refer to the Power Panel schematic diagram in Chapter 3 of the Type 3535-A user manual
Mains Input: 100 – 240 VAC, 0.6 A, 50 – 60 Hz
Mains Outputs: AC Out 1, AC Out 2, max. 0.3 A. For Chargers ZG-0857-001
Mains Only Operation: Without batteries the charger(s) will supply the DC Outputs

Mains Only DC Outputs: 16.8 V, max. 0.9 A DC In: External supply, 12 – 24 V DC, 1 A. Cable AQ-0175 supplied

Charger 1, Charger 2: For Chargers ZG-0857-001

Bat. 1, Bat. 2: For Batteries QB-0079

DC Outputs:

- DC Out 1: For Type 2250-L Ext. Power
- DC Out 3, DC Out 4, DC Out 5: Power for auxiliary devices. Cables AQ-1782 and AQ-1783 supplied

DC Output Voltage: Whichever is higher of the DC In, Bat.1/Charger 1 and Bat.2/Charger 2

DC Output Switch: Switches all DC Outputs on or off

CLOCK

Back-up battery powered clock. Drift <0.45 seconds per 24-hour period

WARM-UP TIME

From Power Off: <2 minutes

From Standby: <10 seconds

TEMPERATURE

Operating Temperature:

- Battery powered: –10 to +50 °C (+14 to 122 °F)
- Charger powered: –10 to +40 °C (+14 to 104 °F)

Charge Temperature: 0 to +40 °C (+32 to 104 °F) with case lid open

Storage Temperature: –10 to +60 °C (+14 to 140 °F)

BATTERY QB-0079

Weight: 560 g (1.23 lb)

Nominal Voltage: 14.8 V

Rated Capacity: 6.3 Ah minimum, 6.6 Ah typical

Rated Energy: 89 Wh

Expected Life Cycles: >300 cycles at >70% of initial capacity

Charge Retention in Storage:

- 1 year at –20 to +20 °C (–4 to +68 °F): >80%
- 1 month at –20 to +60 °C (–4 to +140 °F): > 80%

CHARGERS ZG-0857-001

Input Voltage: 90 – 264 V AC

Output Current Max.: 0.9 A

Output Voltage Max.: 16.8 V

Charge Start: <16.4 V

- Step 1: Constant current 0.9 A, Lamp: orange
- Step 2: Constant voltage 16.8 V, Lamp: orange
- Step 3: Charge Termination <100 mA, Lamp: green

Charging Time for QB-0079: 9 hours (typical)

TYPE 2250-L OPERATING TIME (BACKLIGHT OFF, 2 BATTERIES)

Offline: Approx. 72 hours (typical)

With router: Approx. 32 hours (typical)

MECHANICAL

Environmental Protection: IP 43

WEIGHT AND DIMENSIONS

NMT:

- Weight: 7.5 kg (16.5 lb) including hand-held analyzer, router and packing material for transport
- Dimensions: 500 × 400 × 250 mm (19.69 × 15.75 × 9.84²)

Accessory Case:

- Weight: 8.5 kg (18.7 lb)
- Dimensions: 650 × 450 × 250 mm (25.59 × 17.72 × 9.84²)

Weather Station Case:

- Weight: 8 kg
- Dimensions: 650 × 450 × 250 mm (25.59 × 17.72 × 9.84²)

WEATHER DATA (REQUIRES WEATHER STATION):

- Wind Direction
- Wind Speed
- Ambient Temperature
- Ambient Humidity
- Ambient Pressure
- Rainfall

SPECIFICATIONS FOR SOFTWARE CONTROLLED VIA REMOTE PC

All specifications are valid with Noise Monitoring Software BZ-7232 version 4.3.1.

Noise Monitoring Terminal Type 3639-A/C can be remote controlled from a PC running Environmental Noise Management System Software Type 7843, ANOMS or Noise Sentinel Type 7871. The specifications that can be fulfilled is dependent on the system software used. In some cases, the relevant system software is specified

BASIC MEASUREMENTS

Logging Rate: ½ or 1 s

Detectors: Parallel detectors on every measurement:

A- or B-weighted (switchable): Broadband detector channel with one exponential time weighting (Fast, Slow, Impulse), one linearly averaging detector and one peak detector

C- or Z-weighted (switchable): As for A- or B-weighted

Overload Detector: Monitors the overload outputs of all the frequency weighted channels

Measurements:

X = frequency weightings A or B

Y = frequency weightings C or Z

V = frequency weightings A, B, C or Z

U = time weightings F,S or I

LXeq	LYeq	LXE	LYE	LCeq – LAeqk
LXUmax	LYUmax			
LXUmin	LYUmin			
LXleq	LYleq	LAleq – LAeq		
Lvpeak				

REPORTS*

Short Reports:

- Period: User-defined 1 to 30 minutes, whole number of reports each hour
- Data: Start time; Stop time; Minimum of L(SPL) over the period; Maximum of L(SPL) over the period; Total Leq over the period; Total Lleq over the period; 5 LN Values with user-defined percentile levels; Standard deviation; Wind speed and wind direction (Noise Sentinel only)

One Hour Reports:

- Data: Start time; Stop time; Level distribution (per mil % for L (instantaneous)) in 110 1 dB classes, plus an Overload class and a Below class; One hour minimum of L(SPL); One hour maximum of L(SPL); One hour total Leq; One hour minimum of Leq; One hour maximum of Leq; Leq Event value (total Leq for all the events during the one-hour period); Leq Background value (total Leq for all the periods between events during the one-hour period); Persistent overload for the one-hour period; Standard deviation

System Check Reports: CIC or actuator (depending on configuration). Start time; Leq during check; Leq before check; Leq after check

NMT Health Reports: One hour reports with Start time and 60 minute values of Internal temperature, Battery voltage, Mains voltage, External voltage (connection to Utility Unit ZH-0689 required), Internal/Storage disk capacity, Internal/Storage disk free space, Available physical memory, and Idle CPU

SOUND RECORDING

Triggered By: Events or Short Reports

Duration: User-defined up to 3 min

Format: WAV

Sound Quality	Sampling Rate (kHz)	Memory (kbyte/s)
Low	8	16
High	48	96

CALIBRATION CHECK

The calibration can be checked and reported using CIC

Interval: Up to 4 times per 24 hour period

Report: Start Time, Leq before check, Leq during check, Leq after check

INTERNAL STORAGE

Logged data are stored on an 8 Gbyte Secure Digital memory card (SD card)

Capacity: Up to 30 days. After this time the oldest data are overwritten

AUDIO STORAGE

The NMT continuously records the audio in listening quality. The last 2 days of audio are stored kept in NMT for retrieval of audio by Noise Sentinel On Demand alert functionality. After this time the oldest data are overwritten.

INTERFACE

LAN or Cellular Router

READOUTS

Data Status: Overview of the number of reports generated and sent **Streamer:** Readout parameters displaying the status of the streamer engine and network connection

ORDERING INFORMATION

Type 3655-C-DMO General-purpose Portable Noise Monitoring Terminal

Included with Type 3655-C-DMO:

Type 2250-N-D00	Hand-held Analyzer Type 2250-L (G4) with Noise Monitoring Software BZ-7232 and selected accessories (no microphone or preamplifier)
Type 4231	Sound Calibrator
Type 4952-A	Outdoor Microphone
Type 3535-A	All-weather Case
AF-0004	Guy Rope
AN-0041	Mains Cable EU, CEE 7 (M) to C13 (F), 2.5 m (8.2 ft)
AN-0042	Mains Cable GB, BS 1363A (M) to C13 (F), 2.5 m (8.2 ft)
AN-0041	Mains Cable, US NEMA 5-15 (M) to C13 (F), 2.5 m (8.2 ft)
AO-0645-D-100	Microphone Extension Cable, 3 m (9.8 ft)
AO-1449-D-005	LAN Cable
AO-1494	USB-A (M) to Micro-B (M) Cable, 1.8 m (5.9 ft)
AQ-0696	Power Cable for Router
AQ-1785	DC Power Cable
DH-0800	Guy Rope Fasteners (set of 10)
DH-0801	Tent Pegs (set of 10)
DK-1763	Padlock (× 2) with Keys (× 4)
DK-1769	Steel Wire Padlock, 1.5 m (4.9 ft)
DS-1195	Transport Protection for Antenna
KE-4339	Accessory Case
QB-0079	Li-Ion Battery × 2
UA-0803	Tripod

UA-1707	Tripod Adaptor for Type 4952
UL-1017	Secure Digital Memory Card
UL-1036	Antenna for Digi Router
UL-1041	Airlink™ GX400 Router with SIM card
ZG-0426	Mains Power Supply for Hand-held Analyzer

Post-Processing

Type 7872	Noise Sentinel On Demand – Web-based subscription service providing long-term unattended outdoor noise management and monitoring
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MM-0256-A-DMO Noise Sentinel On Demand Weather Station Kit (Optional Accessory)

Included with MM-0256-A-DMO:

MM-0256-002	Six-parameter Weather Station (and mounting kit)
AF-0004	Guy Rope
AO-0657	USB Cable
AO-0659	Cable M12 8-pin (F) to Lemo 1-B 8-pin (M), 10 m (33.3 ft)
BR 1779	Weather Station Field Guide
DB-4364	Weather Station Pole Adapter
DH-0800	Guy Rope Fasteners (set of 10)
DH-0801	Tent Pegs (set of 10)
KE-4340	Weather Station Carrying Case
QX-0016	Screwdriver
QX-1171	2.5mm Hex Wrench
UA-0803	Tripod
UA-1707-A	Weather Station Tripod Adaptor
ZH-0689	Weather Station USB Adaptor
	Cardboard packaging (re-used for returns)

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