BRÜEL & KJÆR® Sound Level Meters

All-weather Case Type 3535-A

Protect your noise measurement system from the weather and prevent unauthorised access with All-weather Case Type 3535-A.

The case, which houses Hand-held Analyzer Type 2250, 2250-L or 2270, is light, robust and portable with the contents protected by high-density machined foam inlays. It is designed for unattended noise measurements for typically up to three days.

Battery power is provided by two lightweight Li-Ion batteries with a charger included for each battery. Alternatively, the system can be powered externally, either via mains power connected to an integrated power panel, or via DC power by connecting solar panels.

The hand-held analyzer can be controlled remotely when a router is mounted in the case, facilitating useful remote notifications and data download from the comfort of your office.

A wide variety of application software and optional accessories are available for the hand-held analyzers, so the system can be configured to meet your specific measurement needs. In most instances enhanced logging software will be used. A weather station can be connected to the system for simultaneous acquisition of weather data (see photo).

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Uses 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 licencing

Features
- Weather protection to IP 43
- Tamper protection
- Hot swap of batteries
- Simultaneous noise and weather data measurement (when weather station connected)
- Sound recording of events (with Signal Recording Option BZ-7226)
- Type approved to class 1
- Level trigger
- Auto charge injection calibration (CIC) check
- Remote 3G broadband operation
- Automatic status SMS text messages
- Automatic status email messages
- External trigger[*]
- Supply voltage check[*]
- Timer controlled measurement
- Periodic reports[†]
- Up to 8 GB data storage on SDHC memory card (UL-1017)

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[*] Type 2250 or 2270 software only
[†] Type 2250 or 2270 Enhanced Logging software only

What's in the Case?

Fig. 1
Contents of Type 3535-A

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1. Rain shield
2. Router (not included) with velcro strap
3. Cable strain relief posts
4. Cable entry exit (ext. microphone)
5. Two batteries
6. Hand-held analyzer, shown Type 2250-L (not included)
7. Warning label
8. Power panel
9. DC out on/off switch
10. Two eyes for chain and lock
11. Two chargers with straps
12. Eye for lock (1 of 4)

Type 3535–A System Solution

Fig. 2
The rugged case of Type 3535-A protects your equipment during transportation

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Type 3535-A's rugged all-weather case is compact, lightweight, and easy to transport. During transportation the hand-held analyzer and batteries are held safely in place by the lid inlay, and the chargers and router/modem are secured using velcro straps.
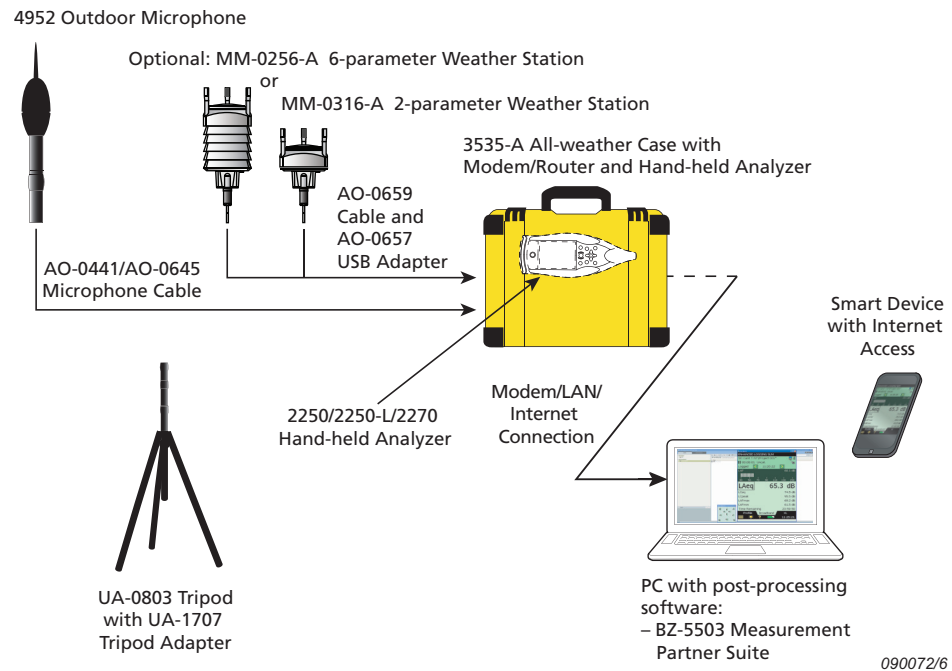
Fig. 3
Setting up Type 3535-A for a measurement job

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Once on site, use the Tripod Adaptor when mounting Outdoor Microphone Type 4952 onto the Lightweight Tripod, see Fig. 4.

Any cables exiting the case (such as the microphone extension cable) are strain-relieved inside the case and protected by a rain shield mounted on the case lid.
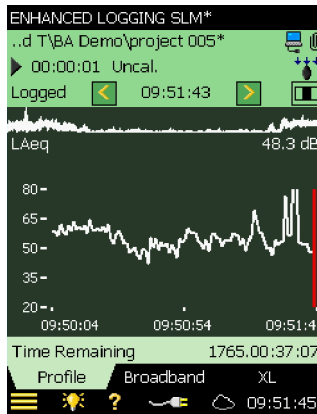
4952 Outdoor Microphone

Optional: MM-0256-A 6-parameter Weather Station
or
MM-0316-A 2-parameter Weather Station

3535-A All-weather Case with
Modem/Router and Hand-held Analyzer

AO-0659
Cable and
AO-0657
USB Adapter

AO-0441/AO-0645
Microphone Cable

Smart Device
with Internet
Access

2250/2250-L/2270
Hand-held Analyzer

Modem/LAN/
Internet
Connection

UA-0803 Tripod
with UA-1707
Tripod Adapter

PC with post-processing
software:
– BZ-5503 Measurement
   Partner Suite

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Hand-held Analyzer Application Software

The hand-held analyzer that is used in Type 3535-A can run any of the available application software modules. However, for most outdoor environmental measurement assessments, the logging software, frequency analysis and signal recording licences are sufficient.

Fig. 5
Enhanced Logging with
Type 2250/2270

Logging Software BZ-7224 will log data down to 1-second resolution and log L_{AF} and L_{Aeq} down to 10 ms resolution if necessary. Broadband data, statistics and frequency spectra may be logged and markers may be set by level triggers. Graphical displays include an overview profile of the entire measurement, and a detailed profile for a selected period.

Enhanced Logging Software BZ-7225 (Fig. 5) adds L_{dn}, L_{den}, $L_{evening}$ and L_{night} calculations as well as two concurrent L_{eq} periods. With long-duration measurements, it provides periodic reports, continuous measurement, automatic reboot and resumption of operations in case of power failure.

With Signal Recording Option BZ-7226, you can initiate a sound recording manually, automatically using level triggers or at set time intervals. Pre-recording lets you record sound occurring before sound recording is triggered, and memory space is saved by setting a suitable recording quality and maximum duration.

For details, see the Brüel & Kjær web page for Types 2250, 2250-L and 2270 applications.

Charge Injection Calibration

The Brüel & Kjær patented charge injection calibration (CIC) is available in the Logging and Enhanced Logging applications. For 10 seconds, CIC injects an electrical signal into the microphone diaphragm, checks the entire measurement chain and delivers a pass result to show that all is in order. CIC may be activated manually or automatically at preset time intervals.

Fig. 6
*Router UL-0075.
(Antenna UL-1035 not
included with routers)*

Remote Communication via Router

When your measurement equipment is unattended out in the field, it can be a good idea to establish a wireless connection, so the status of the measurement can be monitored remotely. The interior foam inlay of Type 3535-A is, therefore, designed to accommodate a router (see Fig. 6 and ordering information).

When the router is properly configured, you can then receive status updates from the hand-held analyzer via SMS and email.

The following status/warning messages are available:
• Battery and measurement status updates
• Memory card approaching capacity warning
• Warning of errors in the calibration procedure
• Warnings when preset noise limits have been exceeded
• Warning if the power supply voltage drops below a preset limit

Sending an '*info*' text string to a Type 3535-A system will initiate an instant status message reply to your mobile phone or email address.

In addition, using your mobile phone, or PC with Internet access, you can access the live screen of the hand-held analyzer by linking up through the hand-held analyzer's unique IP address, keeping you in touch with your measurements at all times.

If you need help configuring your router, please contact HBK support.

Powering the System

Type 3535-A comes with two powerful batteries (QB-0085) and two chargers (ZG-0857) used to charge the batteries prior to measurements. Whilst in measurement mode, power for the system is typically provided by either one or both batteries. Alternatively, should mains power be available, the system can be powered directly from the system's power panel (ZH-0685). You may connect or disconnect power sources at any time without disturbing the measurement, as long as just one power source remains in operation. This allows for hot-swapping of batteries.

All power sources are connected to the case's power panel, which directs power from the source with the highest voltage to supply the measurement system. The power panel output voltage can be measured and logged by Types 2250 and 2270. If you are connected to the measuring system via an Internet, LAN, GSM or 3G/4G network, you can check the voltage remotely and automatically receive an SMS text or email warning message if it drops below a preset limit.
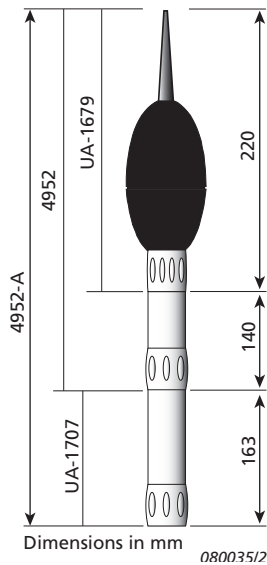
Timers

The hand-held analyzer timer function allows for intelligent power consumption management. This powerful facility controls precisely when the system is actively measuring and when it is in the more energy-efficient standby mode, awaiting the next programmed measurement period.

Outdoor Microphone Type 4952

The compact and lightweight Outdoor Microphone Type 4952 is suitable for unattended outdoor operation and the ideal choice for use with the Type 3535-A system, see Fig. 7.

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 application.

Dimensions in mm
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Inside the microphone is a highly stable pre-polarized free-field 1/2″ microphone cartridge with a stainless steel diaphragm.

Type 4952 is recommended for extended use in all kinds of weather, while for less demanding environments, the hand-held analyzer's standard microphone is adequate.

You can mount the microphone on a tripod (UA-0803 is recommended) using Tripod Adaptor UA-1707, or on a 1″ thread pole, and up to 100 m of microphone extension cable can be used while maintaining measurement accuracy.

Outdoor Microphone Type 4952-A comes with the Tripod Adapter included.

Type Approval

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 61672-1:2013, is the grade of accuracy often required for environmental noise 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.

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Hand-held Analyzers Types 2250, 2250-L and 2270 (with a variety of microphones) are type approved system combinations, independently approved to class 1 accuracy by PTB in Germany (see type approval certificate, Fig. 8).

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 61672-1:2013 also permits the weather-protected measurement system to be laboratory calibrated in accordance with part III of this sound level meter standard.

Measuring Weather Data

With a suitable weather station, weather data can be measured simultaneously with noise data. The two-parameter station measures wind speed and direction, and the six-parameter station adds precipitation, temperature, humidity and pressure.

Fig. 9
Two-parameter Weather
Station Kit MM-0316-A

Weather conditions affect the propagation of sound and 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 and very often must identify the valid portions of their logging profile.

Brüel & Kjær Weather Station Kits MM-0256-A and MM-0316-A (6 and 2 parameters, respectively), based on Vaisala® sensors, are designed to fully meet users' needs. Both weather stations are lightweight and connect to the hand-held analyzer's USB port, eliminating the need for separate batteries. The kits include all accessories needed to connect a weather station and mount it on a tripod or pole. Based on ultrasound, the weather stations operate silently, which allows close placement to the microphone position.
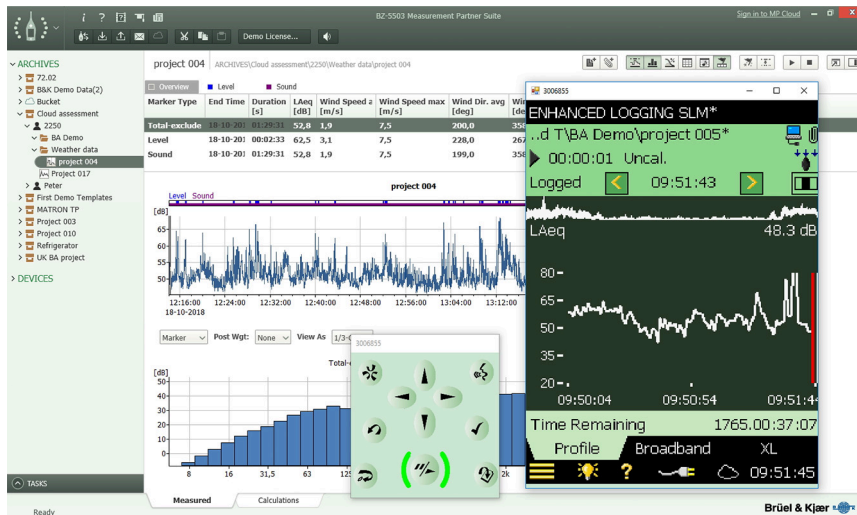
Post-processing

For data management and post-processing, Measurement Partner Suite is the recommended solution.

Measurement Partner Suite BZ-5503 is an all-purpose post-processing platform that forms the information link to (and from) your hand-held analyzer, see Fig. 10. Its primary functions are to manage and archive measurement data, manage the data transfer from a remote hand-held analyzer and handle application software updates, upgrades and licencing.
It includes:
- Maintenance of hand-held analyzer software
- Archiving and sharing of data
- Post-processing of measurement data
- WAV file playback and analysis, such as tone assessment

Fig. 10
Measurement Partner
Suite BZ-5503
online display

A one-year Measurement Partner Suite licence opening up for full functionality is included with all new hand-held analyzers.

Compliance with Standards

CE ⚠ ⊖ ⊠	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
Safety	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
EMC Emission	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 document
EMC Immunity	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 document
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: Protection provided by enclosures: IP 43

ADDITIONAL STANDARDS FOR CHARGER ZG-0857-001*

Safety	EN 60335-1, EN 60335-2-29, EN 60601-1, UL 2601-1
EMC Emission	EN 50081-1:1992, EN 50082-1:1997, EN 60601-1-2:1993

ADDITIONAL STANDARDS FOR BATTERY QB-0085†

Safety	EN 60950:2006, UL 2054:2054:1999
EMC Emission	EN 55022:2006 − ITE: Class B, EN 61000-3-2:2006, EN 61000-3-3:2008, EN 55024:1998 +A1:2001, ITE/A2:2003, FCC Title 47 CFR, Part 15 Class B, ICES-003, Issue 4

* From the Mascot declaration of conformance
† From the Inspired Energy® declaration of conformance

ADDITIONAL STANDARDS FOR 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

Specifications – All-weather Case Type 3535-A

POWER PANEL ZH-0685
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 VDC, 1 A. (Cable AQ-1785 supplied)
Charger 1, Charger 2: For Chargers ZG-0857-001
Bat. 1, Bat. 2: For Batteries QB-0085
DC Outputs:
• DC Out 1: For hand-held analyzer Ext. Power
• DC Out 2: For hand-held analyzer Trigger Input
• DC Out 3, DC Out4, DC Out 5: Power for auxiliary devices
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

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-0085
Weight: 435 g (0.79 lb)
Nominal Voltage: 14.4 V
Initial Capacity: 6.46 Ah (based on a CV charge of 16.8 V ± 50 mV with a current limit of 3.0 A and a 1.36 A discharge to 10.00 V @ 25 °C, within 1 hour of charge)

CHARGERS ZG-0857, 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-0085: 9 hours (typical)

OPERATING TIME FOR TYPE 3535-A WITH HAND-HELD ANALYZER IN MEASUREMENT MODE (BACKLIGHT OFF, 2 BATTERIES)
• Offline: Approximately 72 hours (typical)
• With router: Approximately 32 hours (typical)
• Offline with weather station: 60 hours (typical)

MECHANICAL
Environmental Protection: IP 43

WEIGHT AND DIMENSIONS OF TYPE 3535-A
Weight: 6.8 kg (14.99 lb) including hand-held analyzer
Dimensions: 390 × 530 × 190 mm (15.35 × 20.87 × 7.48″)

Max. Allowable Dimensions of Modem/Router: 133 × 85 × 25 mm
(5.24 × 3.35 × .98″)

Ordering Information

Type 3535-A   All-weather Case
which includes the following:
- ZH-0685: Power Panel
- Mains Cable for Power Panel
- 2 × QB-0085: Batteries
- 2 × ZG-0857-001: Chargers
- AQ-1785: Cable for DC In
- AQ-1782: Power Cable for router
- AQ-1783: Power Cable for modem

Bundles

Type 2250-E-S   Environmental Noise Kit
which includes the following:
- Type 3535-A: All-weather Case
- Type 2250-S: Hand-held Analyzer

Type 2250-E-SC   Environmental Noise Kit with calibrator
which includes the following:
- Type 3535-A: All-weather Case
- Type 2250-S: Hand-held Analyzer
- Type 4231: Sound Calibrator

INCLUDED SOFTWARE
- BZ-7222: Sound Level Meter Software
- BZ-7223: Frequency Analysis Software
- BZ-7225: Enhanced Logging Software
- BZ-7226: Signal Recording Option
- BZ-7231: Tone Assessment Option
- BZ-7232: Noise Monitoring Software

INCLUDED MICROPHONE AND PREAMPLIFIER
- Type 4189: ½″ Prepolarized Free-field Microphone
- Type 4952-A: Outdoor Microphone incl. Tripod Adaptor UA-1707
- ZC-0032: Microphone Preamplifier

INCLUDED ACCESSORIES
- AO-0645-D-100: Microphone Extension Cable for Type 4952: 7-pin LEMO to 10-pin LEMO, 10 m (33 ft)
- FB-0679: Hinged Cover for Type 2250
- KE-0440: Travel Bag
- QB-0061: Battery Pack
- UA-0750: Tripod
- UA-1650: 90 mm dia. Windscreen with AutoDetect
- ZG-0426: Mains Power Supply
- Compulsory Accessory Kit UA-1710-D01 including:
  – KE-0441: Protective Cover, for hand-held analyzer
  – UL-1050: Wireless USB-A (M) Adaptor
  – UA-1651: Tripod Extension, for hand-held analyzer
  – UA-1654: 5 Extra Styli
  – UA-1673: Adaptor for Standard Tripod Mount
  – DH-0696: Wrist Strap
  – DD-0594: Protection Plug, for hand-held analyzer without preamplifier
  – AO-1494: Cable, USB 2.0, USB-A (M) to USB-micro-B (M) 1.8 m (5.9′), max. +70 °C (158 °F)
  – BZ-5298: Environmental Software USB

NOTE: These accessories are also available separately

Type 2250/2250-L/2270 Application Software
Please refer to the product data for Type 2250/2270 and Type 2250-L

Products and Accessories Available Separately

TYPE 3535-A
QB-0085	Battery
ZG-0857	Charger including mains cable
UL-1035	Antenna (right angle), for router

ROUTER
Please note that the router you choose should be the correct one for your region
UL-0075	Router, Industrial LTE Gateway, North America and EMEA, Type RV50X, Cat. 6, rugged
UL-0076	Router, Industrial LTE Gateway, APAC, Type RV50X, Cat. 6, rugged

FIELD CALIBRATION
Type 4231	Sound Calibrator

ACCESSORIES
Type 4952	Outdoor Microphone for 1″ thread pole mounting
Type 4952-A	Outdoor Microphone incl. Tripod Adaptor UA-1707
AO-0645-D-100	Mic. Extension Cable for Type 4952: 7-pin LEMO to 10-pin LEMO, 10 m (33 ft)
AO-0441-D-030	Mic. Extension Cable, 10-pin LEMO, 3 m (10 ft)
AO-0441-D-100	Mic. Extension Cable, 10-pin LEMO, 10 m (33 ft)
UA-0587	Tripod
UA-0588	Microphone Holder
UA-0750	Tripod
UA-0803	Tripod, for use with UA-1707
UA-1707	Tripod Adaptor for Type 4952
UL-1009	2 GB SD Memory Card for hand-held analyzer
UL-1017	8 GB SDHC Memory Card for hand-held analyzer
MM-0256-A	Six-parameter Weather Station Kit
MM-0316-A	Two-parameter Weather Station Kit

POST-PROCESSING
BZ-5503-012	Post-processing Module, 1-year subscription for one hand-held analyzer
BZ-5503-ND	Post-processing Module, permanent license for any instrument (dongle)
BZ-5503-NI	Post-processing Module, permanent license for one instrument

Accredited Calibration
SLM-ADV-CAF	SLM Advanced, Accredited Calibration incl. mic.
SLM-ADV-CAI	SLM Advanced, Initial Accredited Calibration incl. mic.
SLM-ADV-CTF	SLM Advanced, Traceable Calibration incl. mic.

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