

# Product Data

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## Outdoor Microphone Unit — Type 4198 Outdoor Microphone Kit — UA1404

### USES:

- IEC 651 Type 1 compliant outdoor sound measurements in all weather conditions
- Unattended, semi-permanent outdoor installations
- Noise Control
- Complaint Investigations
- Research

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### FEATURES:

- Protected against the effects of wind, rain, and perching birds
- Easy acoustic calibration

- Detailed free-field corrections on diskette to obtain flat response in all sound fields
- Falcon™ range product with a 3-year guarantee
- UA 1404 usable with existing Falcon™ range microphones and preamplifiers

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### TYPE 4198 ALSO FEATURES:

- Built-in Type 1 microphone and preamplifier
- Wide dynamic range: 15.2 dB(A) to 146 dB
- Remote calibration monitoring using CIC
- Individual microphone calibration charts
- Easy connection to standard measurement microphone equipment

## Introduction

The Type 4198 is a weather-proof microphone and preamplifier assembly that meets IEC 651 Type 1 and ANSI S1.4 Type 2 specifications. Use it in any situation where you must make precise outdoor sound measurements.

The Type 4198 is even suitable for semi-permanent, unsupervised outdoor installation.

Outdoor Microphone Kit UA 1404 includes all of the protective features of the Type 4198, but without the microphone and preamplifier. It enables you to weather-proof your Falcon™ range microphones and preamplifiers. It can also protect the microphones and preamplifiers for the Types 2236 and 2260 sound level meters. All recommended combinations fulfil IEC 651 Type 1 and ANSI S1.4 Type 2 specifications (see configuration diagram, [Fig. 7](#)).

Both the unit and the kit enable you to take measurements that are protected against the effects of wind, rain, and perching birds.



## Effective Protection in Outdoor Environments

Both Outdoor Microphone Unit Type 4198 and Outdoor Microphone Kit UA1404 use the same protective assembly.

### Effective Wind Protection

The windscreen reduces wind noise by approximately 15 dB for wind speeds up to 120 km/h. It is made of a specially prepared porous polyurethane foam, which is resistant to corrosive atmospheres and immune to moisture.

### Effective Rain Protection

A rain cover protects the microphone from moisture. The cover surrounds the microphone cartridge inside the wind screen (see Fig. 5). It is specially designed to minimise its effect on the frequency and directional characteristics of the assembly.

### Chemical resistant

All essential components are made of stainless steel to withstand tough environments.

### Support and Protection

The windscreen is supported by three stainless steel rods that also protrude as rubber-capped spikes, which prevent birds from perching on the microphone.

Each of the bird spikes is capped with a piece of soft rubber to make them easier to see and to help prevent eye injuries (see Fig. 5).

### Long Lasting

The unit provides excellent long-term mechanical stability. Should the frame become bent or the foam worn-out, replacements are available.

## Easy Acoustic Calibration

Many all-weather microphone systems provide durability at the expense of microphone accessibility, which makes acoustical calibration difficult. With the Type 4198 and UA1404, the windscreen and rain cover assembly can easily be removed, thus exposing the microphone for easy acoustical calibration (see Fig. 1).

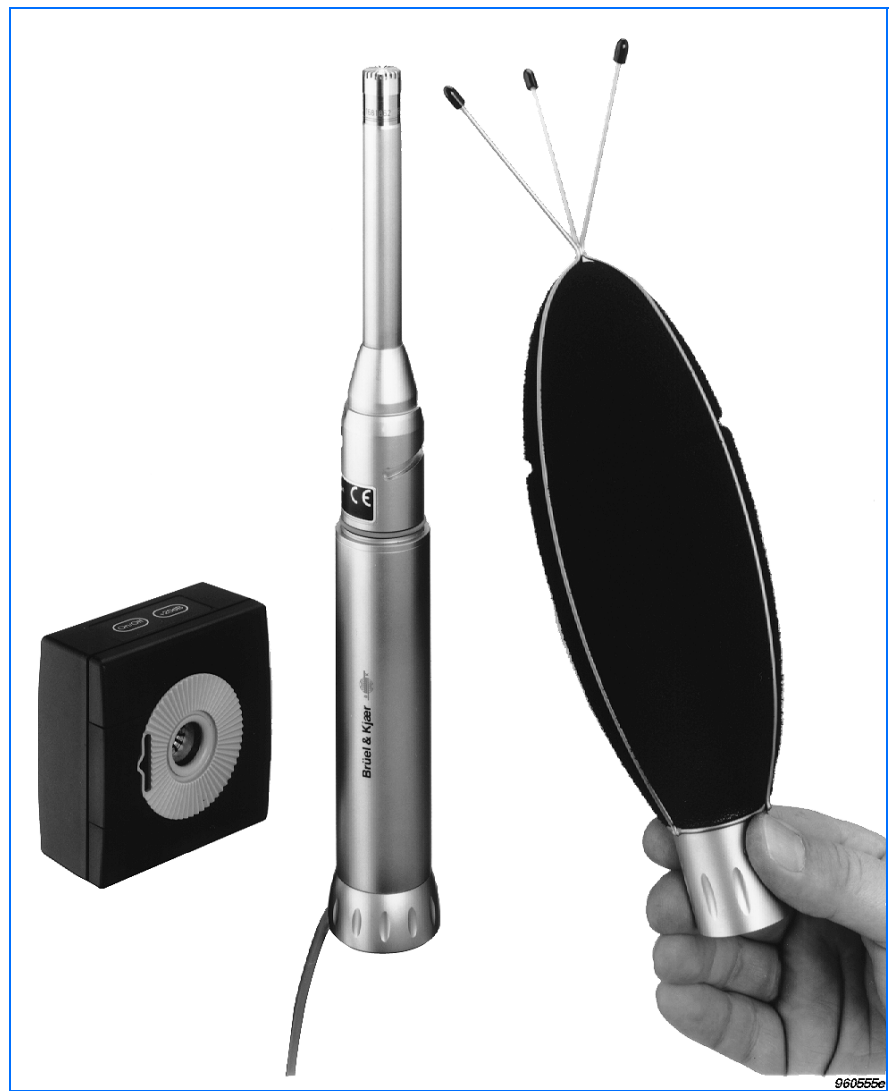


Fig.1 The wind and rain cover can be removed easily, but not accidentally. This exposes the microphone for easy calibration

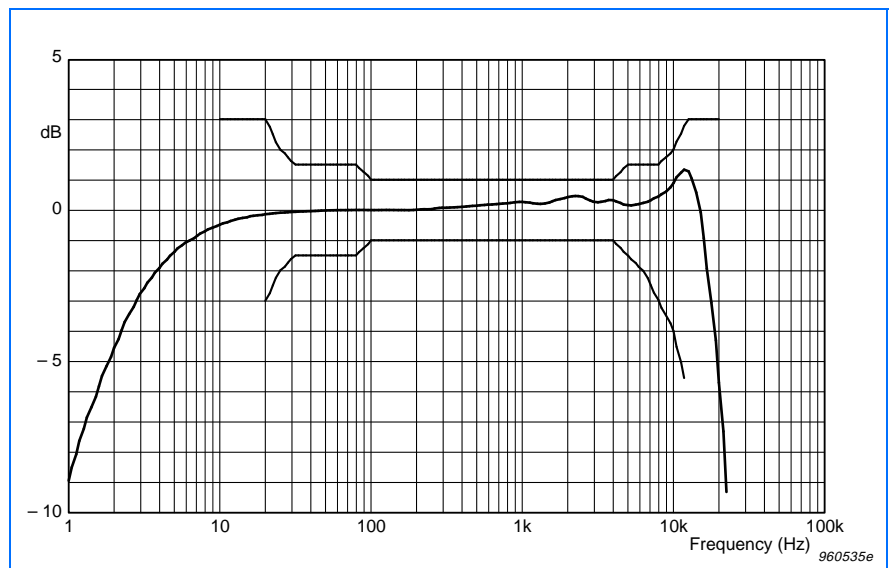


Fig.2 Frequency response of Outdoor Microphone Unit Type 4198. IEC 651 Type 1 tolerances are shown above and below the response curve

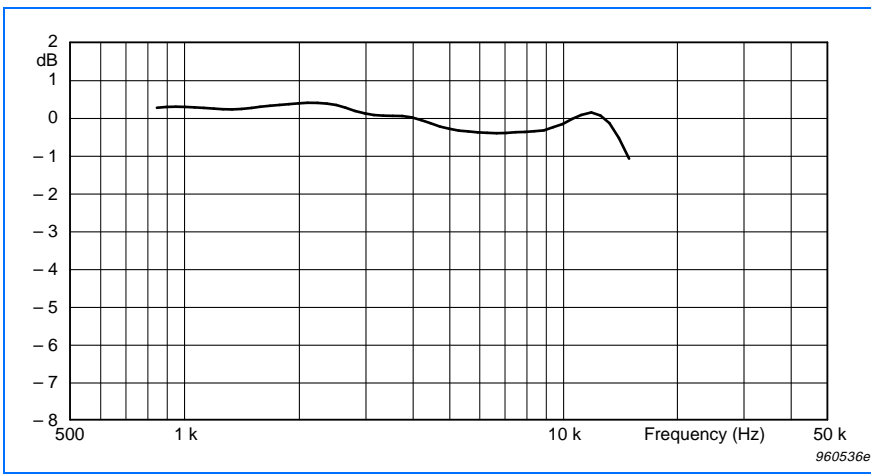


Fig.3 Change in frequency response of the Type 4188 microphone with the UA 1404 Outdoor Microphone Kit (including the effect of the replacement grid)

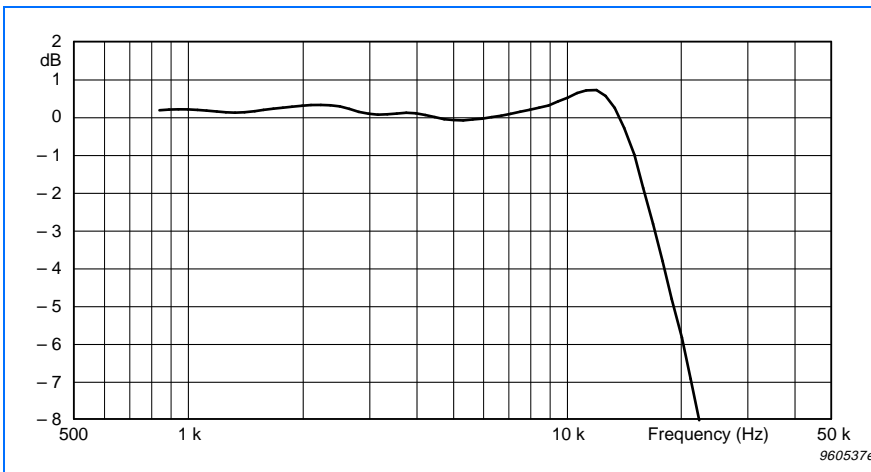


Fig.4 Change in frequency response of the Type 4189 and Type 4190 microphones with the UA 1404 Outdoor Microphone Kit (including the effect of the replacement grid)

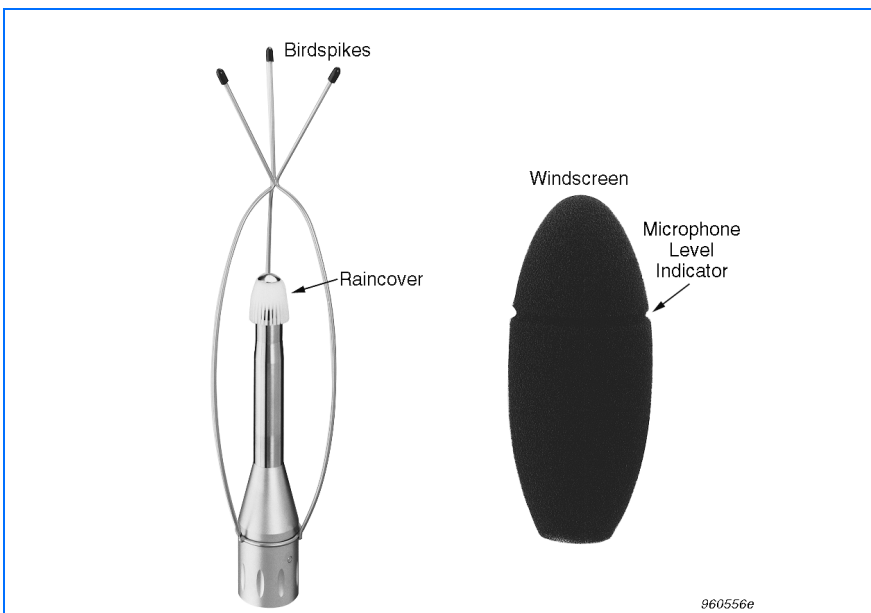


Fig.5 The weather protection components of the Type 4198 and UA 1404

## Unattended Outdoor Monitoring

All of the features of the Type 4198 and UA 1404 combine to create an assembly that can safely be installed for semi-permanent outdoor sound measurement. The assembly will maintain consistent performance even when left unattended in bad weather for several weeks.

## Precise Microphone Placement

The height of the microphone inside the wind screen is clearly marked by the groove moulded into the screen (see Fig.5).

## Type 4198 — The Complete Outdoor Microphone

### Precision Components

Outdoor Microphone Type 4198 includes the following components:

- Falcon Range Prepolarized Free-field 1/2" Microphone Type 4189
- Falcon Range 1/2" Microphone Preamplifier Type 2669C
- Outdoor Microphone Kit UA 1404
- 10 meter extension cable AO 0415

### Type 1 Microphone Cartridge

The Type 4198 includes a Falcon Range Prepolarized Free-field 1/2" Microphone Type 4189. Type 4189 is a rugged microphone that ensures high stability under a variety of conditions. Its stainless steel alloy diaphragm withstands even polluted industrial environments.

During manufacturer, each microphone is artificially aged at a high temperature to ensure good long-term stability.

### Type 1 Preamplifier

Falcon Range preamplifier Type 2669 operates over a wide range of temperatures, humidity levels and other environmental conditions. The Type 2669 is especially well suited for outdoor monitoring because of its ability to work with very long cables. It provides an extremely wide frequency and dynamic range with low noise.

### Save Time and Expense with CIC

Brüel & Kjær's patented Charge In-jection Calibration (CIC) facility is built into the preamplifier. It enables you to remotely monitor the microphone system for impedance changes, which can indicate a need for recalibration or repair. This will extend the period between acoustical calibrations, thus saving you time and expense. For more information about CIC, see the Brüel & Kjær Microphone Handbook (BA 5105).

### Individual Calibration

Each unit comes with individual calibration charts and a diskette containing detailed free-field corrections to the actuator response. The corrections are supplied as comma separated ASCII text files on a 3.5" 1.44 MB PC-compatible diskette.

### Obtain Flat Response in All Fields

The information contained on the included diskette enables you to make extremely precise free-field measurements. When you are performing detailed frequency analysis, this information will enable you to adjust your readings to obtain a flat microphone response in any sound field.

## Use Your Existing Equipment Outdoors with the UA 1404 Kit

Outdoor Microphone Kit UA 1404 includes all of the weather protection equipment of Outdoor Microphone Type 4198 (windscreen, rain cover, bird spikes, and stainless steel enclosure). The kit is compatible with the following Brüel & Kjær equipment:

- Falcon Range Microphone Types 4188, 4189, and 4190
- Falcon Range Preamplifier Types 2671 and 2669 B/L/C
- Microphone and preamplifier from Sound Level Meter Type 2260
- Microphone and preamplifier from Sound Level Meter Type 2236 (see important note below)

The kit will enable you to use your existing equipment to make outdoor measurements, even unattended or in bad weather.

The kit includes two stainless steel 1/2" replacement microphone grids, which are required to obtain the correct frequency response. One is for use with microphone Type 4188 and

the other for Types 4189 and 4190. They also help protect your microphone cartridge from corrosion.

### Obtain Flat Response in All Fields

Like the Type 4198, the UA 1404 includes a diskette containing detailed free-field corrections for each microphone recommended for use with the kit. See the Type 4198 section above for more information.

### Type 2236 Considerations

The UA 1404 kit extends the distance between the microphone and the preamplifier. This causes a 2 dB loss in the sound signal, which may invalidate your instrument's calibration. You must therefore check the chart that came with your Type 4188 microphone. Make sure the sensitivity is between -30.5 dB and -28dB before using a UA 1404 with your instrument. If the sensitivity lies below -30.5 dB, then you must purchase a more sensitive Type 4188 microphone to use with the UA 1404.

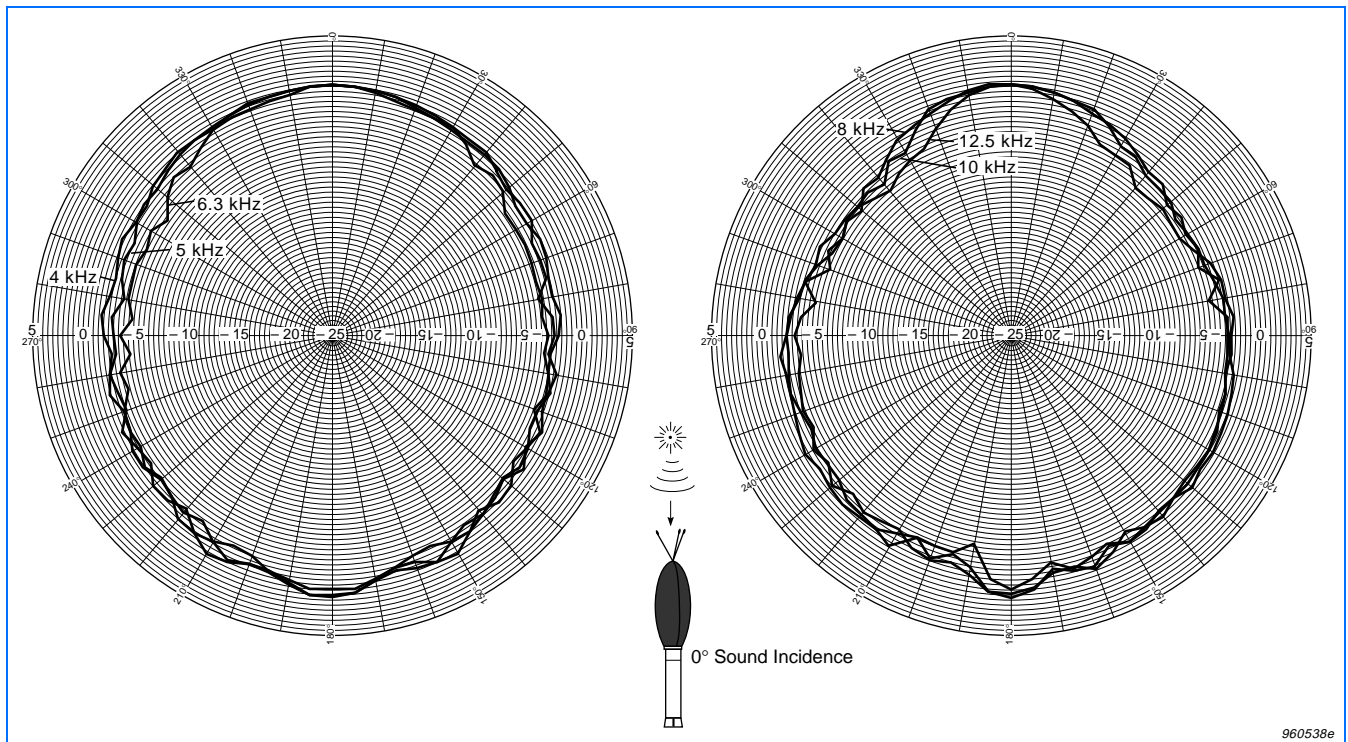


Fig 6 Directional characteristics for both Type 4198 and UA 1404



# Specifications 4198

## Microphone and Preamplifier:

### COMPLIANCE WITH STANDARDS:

The unit meets IEC 651 Type 1 and ANSI S1.4 Type 2. It also complies with the EMC Directive and Low Voltage Directive (see CE box, below).

### MICROPHONE CARTRIDGE:

Falcon Range Repolarized Free-field 1/2" Microphone Type 4189\*

### PREAMPLIFIER:

Falcon Range 1/2" Microphone Preamplifier Type 2669C†

### SENSITIVITY (250 Hz):

-26 ±2 dB re 1V/Pa, 50 mV/Pa  
(individually calibrated)

### FREQUENCY RESPONSE:

0° incidence free-field response:  
±1dB 10 Hz to 8 kHz  
±2dB 6.3 Hz to 16 kHz

In accordance with IEC 651, Type 1

### LOWER LIMITING FREQUENCY (-3 dB):

2 Hz to 4 Hz

### DIAPHRAGM RESONANCE FREQUENCY:

14 kHz (90° phase shift)

### EQUIVALENT AIR VOLUME (101.3 kPa):

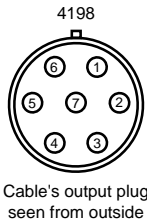
45 mm<sup>3</sup>

### CALIBRATOR LOAD VOLUME (250 Hz):

260 mm<sup>3</sup>

### PIN CONNECTIONS:

Pin	LEMO
1	Calibration input
2	Signal ground
3	Pol. voltage
4	Signal output
5	Not connected
6	Power supply negative & ground
7	Power supply negative & ground
Casing	Connected to instrument chassis



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### PISTONPHONE TYPE 4228 CORRECTION

(with DP 0776): 0.00 dB

### NOISE LEVEL:

15.2 dB (A), 17.4 dB (Lin.)

\* See separate product data sheet (BP 1380) or Microphone Handbook (BA 5105) for complete specifications for this microphone

† See separate product data sheet (BP 1422) for complete specifications for this preamplifier.

### UPPER LIMIT OF DYNAMIC RANGE:

3% distortion: >146 dB SPL

### MAXIMUM SOUND PRESSURE LEVEL:

158 dB (Peak)

### POWER SUPPLY, DUAL:

±14 V to ±60 V

### POWER SUPPLY, SINGLE:

23 V to 120 V

### OUTPUT DC OFFSET:

≈ 1 V for dual supply, or  
≈ 1/2 the voltage of a single supply

### POLARIZATION VOLTAGE (EXTERNAL):

0 V

## Environmental Specifications:

### INFLUENCE OF HUMIDITY:

< 0.1 dB at up to 95% RH (non-condensing) and 40°C

### WIND NOISE ATTENUATION:

>15 dB (for wind speed up to 120 km/h)

### TEMPERATURE COEFFICIENT (250 Hz):

-0.001 dB/°C, typical (for the range -10° to +50° C (14 to 122° F))

### PRESSURE COEFFICIENT (250 Hz):

-0.010 dB/kPa

### VIBRATION SENSITIVITY (<1000 Hz):

62.5 dB equivalent SPL for 1 m/s<sup>2</sup> axial acceleration

### MAGNETIC FIELD SENSITIVITY:

6 dB SPL for 80 A/m, 50 Hz field

### ESTIMATE LONG-TERM STABILITY:

>1000 years/dB (dry air at 20°C (68°F))

>40 years/dB (air at 20°C (68°F), 90% RH)

>1 year/dB (air at 50°C (122°F), 90% RH)

### RAIN:

Rainproof to IP 44

### DURABILITY:

Measurement in large city environment before cleaning and drying: >4 weeks

Measurement in large city environment before microphone system overhaul: >4 months


## Physical Characteristics:

### DIMENSIONS:

Height: 412 mm (16.2")

Diameter (at widest point): 72 mm (2.8")

Weight: 580 grams (1.3 lb.)

	CE-mark indicates compliance with: EMC Directive and Low Voltage Directive.
<b>Safety</b>	EN 61010-1 and IEC 1010-1: Safety requirements for electrical equipment for measurement, control and laboratory use.
<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:</b> The above is guaranteed only with extension cables AO 0414, AO 0415 and AO 0416.
<b>Temperature</b>	IEC 68-2-1 & IEC 68-2-2: Environmental Testing. Cold and Dry Heat. Operating Temperature: -20 to +60°C (-4 to +140°F), (150°C (302°F) with increase in noise) Storage Temperature: -25 to +70°C (-13 to +158°F)
<b>Humidity</b>	IEC 68-2-3: 95% RH (non-condensing at 40°C (104°F))
<b>Mechanical</b>	Non-operating: IEC 68-2-6: Vibration: 0.3 mm, 20 m/s <sup>2</sup> , 10-500 Hz IEC 68-2-27: Shock: 1000 m/s <sup>2</sup> IEC 68-2-29: Bump: 4000 bumps at 400 m/s <sup>2</sup>
<b>Reliability</b>	MI-HDBK 217F, GB (Part-Stress): MTBF >40000 hours (max. 2.5% errors/1000 h)

# Specifications UA 1404

## Compatible Sound Meters:

### TYPE 2236 SOUND LEVEL METER:

The Type 4188 microphone (included with Type 2236) must have a sensitivity between -30.5 dB and -28 dB (see "Type 2236 Considerations," above). Preamplifier ZC0027 (included with Type 2236) is compatible as shipped.

### TYPE 2260 SOUND ANALYZER:

Preamplifier ZC 0026 and Microphone Type 4189 (both included with the Type 2260) are compatible as shipped.

## Compatible Microphones:

### TYPES 4188, 4189 AND 4190:

All microphones require a stainless steel replacement grid to meet the specified frequency characteristics. The grid also provides extra protection from corrosion. Two replacement grids are included with UA 1404: one for Microphone Type 4188, the other for Types 4189 and 4190.

## Compatible Preamplifiers:

### TYPE 2669 B/L/C:

Compatible as shipped

### TYPE 2671:

Compatible as shipped

## Standards:

### ALL RECOMMENDED CONFIGURATIONS:

IEC 651 Type 1 and ANSI S1.4 Type 2

(See configuration chart, Fig. 7)

## Windscreen:

### WIND NOISE ATTENUATION:

>15 dB (for wind speed up to 120 km/h)

### MATERIAL:

Windscreen: Open-pored polyurethane foam

Spikes: Stainless steel

## Environmental Specifications:

### OPERATING TEMPERATURE RANGE:

-30 to +150°C (-22 to +302°F)

The actual range will be determined by the preamplifier used.

### RAIN:

Rainproof to IP 44

### DURABILITY:

Measurement in large city environment before cleaning and drying: >4 weeks

Measurement in large city environment before microphone system overhaul: >4 months

## Physical Characteristics:

### DIMENSIONS:

Height: 412 mm (16.2")

Diameter (at widest point): 72 mm (2.8")

Weight: 540 grams (1.3 lb.) (empty)

# Ordering Information

## Type 4198 Includes the following accessories:

<b>Type 4189</b>	Falcon Range Prepolarized Free-field 1/2" Microphone
<b>Type 2669C</b>	Falcon Range 1/2" Microphone Preamplifier
<b>UA 1404</b>	Outdoor Microphone Kit
<b>AO 0415</b>	10 m (32.8 ft.) LEMO 1B to LEMO 1B Cable

## Spare Parts:

<b>DS 0934</b>	Replacement windscreen
<b>UC 5360</b>	Replacement Bird Spikes

## Optional Accessories:

<b>ZG 0350</b>	LEMO 1B to 7-pin Brüel & Kjær adaptor
<b>UA 0587</b>	Tripod

## BNC TO BNC COAXIAL CABLES:

For UA 1404 with Type 2671 Preamplifiers	
<b>AO 0430</b>	10 m Single Screened (32.8 ft.)
<b>AO 0427</b>	10 m Double Screened (32.8 ft.)
Other cable lengths on request.	

## LEMO 1B TO LEMO 1B CABLES:

For Type 4198 and UA 1404 with Preamplifier Type 2669C	
<b>AO 0414</b>	3 m (9.8 ft.)
<b>AO 0415</b>	10 m (32.8 ft.)
<b>AO 0416</b>	30 m (98.4 ft.)
<b>AR 0014</b>	Flat Cable
<b>EL 4004-AC 0079-X</b>	Extension cable (X = length in meters, specified by customer)

## LEMO 0B TO LEMO 1B:

For UA 1404 with Preamplifiers Type 2669B/L without the included cable.	
<b>AO 0419</b>	3 m (9.8 ft.) (included with Preamplifier Type 2669L)
<b>EL 4006-AC 0219-X</b>	Extension cable (X = length in meters, specified by customer)

## LEMO 0B TO BRÜEL & KJÆR CONNECTER:

For UA 1404 with Preamplifiers Type 2669B/L without the included cable.	
<b>AO 0428</b>	3 m (9.8 ft.) (included with Preamplifier Type 2669B)
<b>EL 4005-AC 0219-X</b>	Extension cable (X = length in meters, specified by customer)

## BRÜEL & KJÆR EXTENSION CABLES:

For UA 1404 with Preamplifier Type 2669B with the included cable (AO 0428).	
<b>AO 0027</b>	3 m (9.8 ft.) Extension Cable
<b>AO 0028</b>	10 m (32.8 ft.) Extension Cable
<b>AO 0029</b>	30 m (98.4 ft.) Extension Cable

## FOR TYPE 2236 SOUND LEVEL METER:

<b>AO 0408</b>	3 m (9.8 ft.) Extension Cable
<b>AO 0409</b>	10 m (32.8 ft.) Extension Cable

## FOR TYPE 2260 SOUND ANALYZER:

<b>AO 0441</b>	3 m Extension Cable (9.8 ft.)
<b>AO 0442</b>	10 m Extension Cable (32.8 ft.)

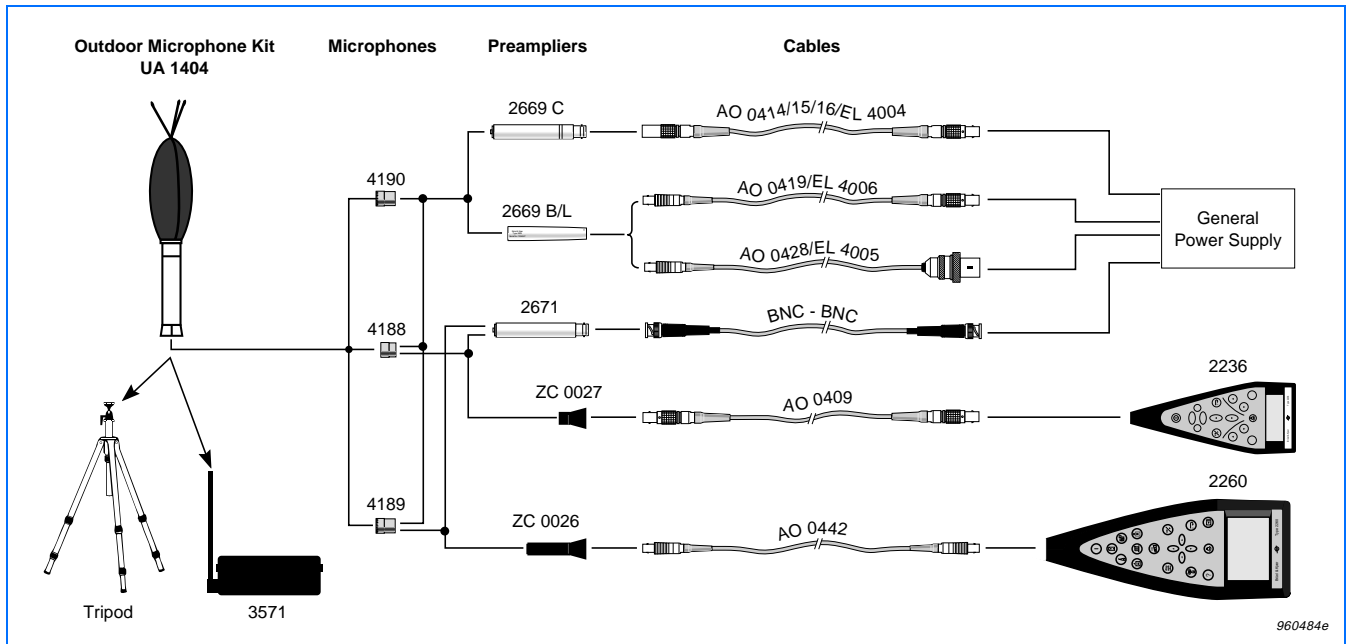


Fig. 7 Outdoor Microphone Kit UA 1404 schematic diagram including connections and cables required for use with compatible microphones and preamplifiers

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



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