

# ***Instruction Manual***

*G.R.A.S. 41AC-4 LEMO Outdoor Microphone for  
Community and Airport Noise (0 V pol.)*



## Revision History

Any feedback or questions about this document are welcome at [gras@gras.dk](mailto:gras@gras.dk).

Revision	Date	Description
1	18 February 2015	First edition
2	4 July 2017	42AG substituted for the obsolete 42AB

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## Introduction

The G.R.A.S. 41AC-4 Outdoor Microphone for Community & Airport Noise is a precision microphone set (IEC 61672-1) for monitoring community noise and the noise of overhead aircraft. It can be used for monitoring of noise with 90 degrees of incidence, typically community noise. With the proper correction data, it can be used for 0 degrees of incidence, typically noise from overhead aircraft. A USB flash drive with correction data is part of the delivery.

It is waterproof, rated at IP-55, and can operate unattended over a wide range of weather conditions and temperatures for a very long period, i.e. a year or longer.

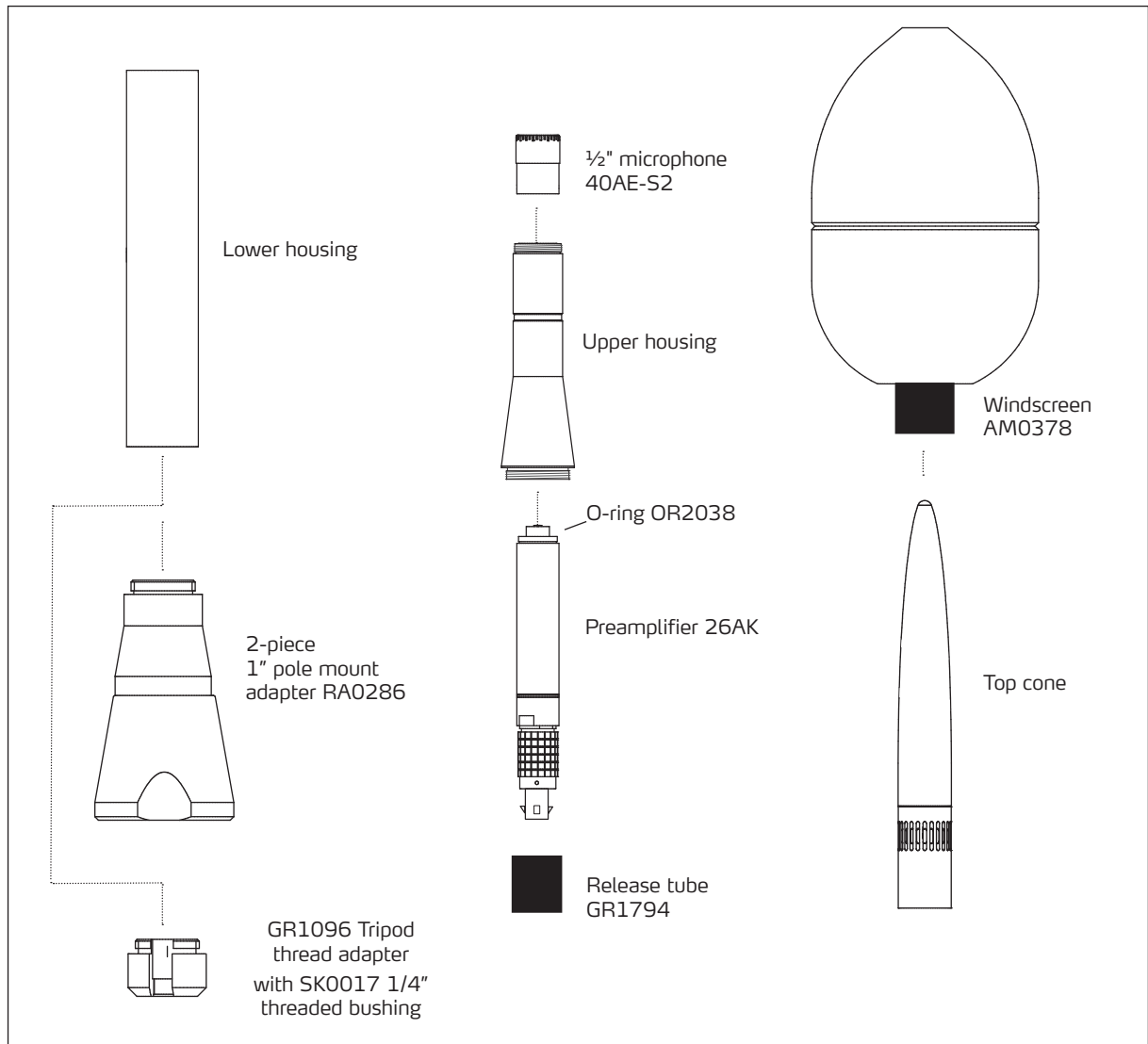
It uses a G.R.A.S. 40AE-S2 1/2" Prepolarized Free-field Microphone, High Sensitivity and a G.R.A.S. 26AK 1/2" Standard Preamplifier with LEMO Connector. It is designed for use with a Sound Level Meter with LEMO connector and power supply, and 0 V polarization voltage.

**Important.** The 40AE-S2 microphone and its protective grid have been modified for the 41AC-4. Therefore, microphone and grid cannot be replaced by standard items.

## Delivered Items

1/2" Prepolarized Free-Field Microphone, High Sensitivity	40AE-S2
1/2" Standard Preamplifier with Integrated LEMO Connector	26AK
O-ring for preamplifier	OR2038
USB flash drive with correction data for 0° (resolution: 1/12 octave)	
Wind Screen	AM0378
Release Tube (for LEMO connector)	GR1794
Top cone	-
Upper housing	-
Lower housing	-
1" pole mount adapter	RA0286
Tripod Adapter	GR1096
Tripod thread adapter	SK0017

41AC-4 is delivered pre-assembled except for the windscreen and thread adapter.

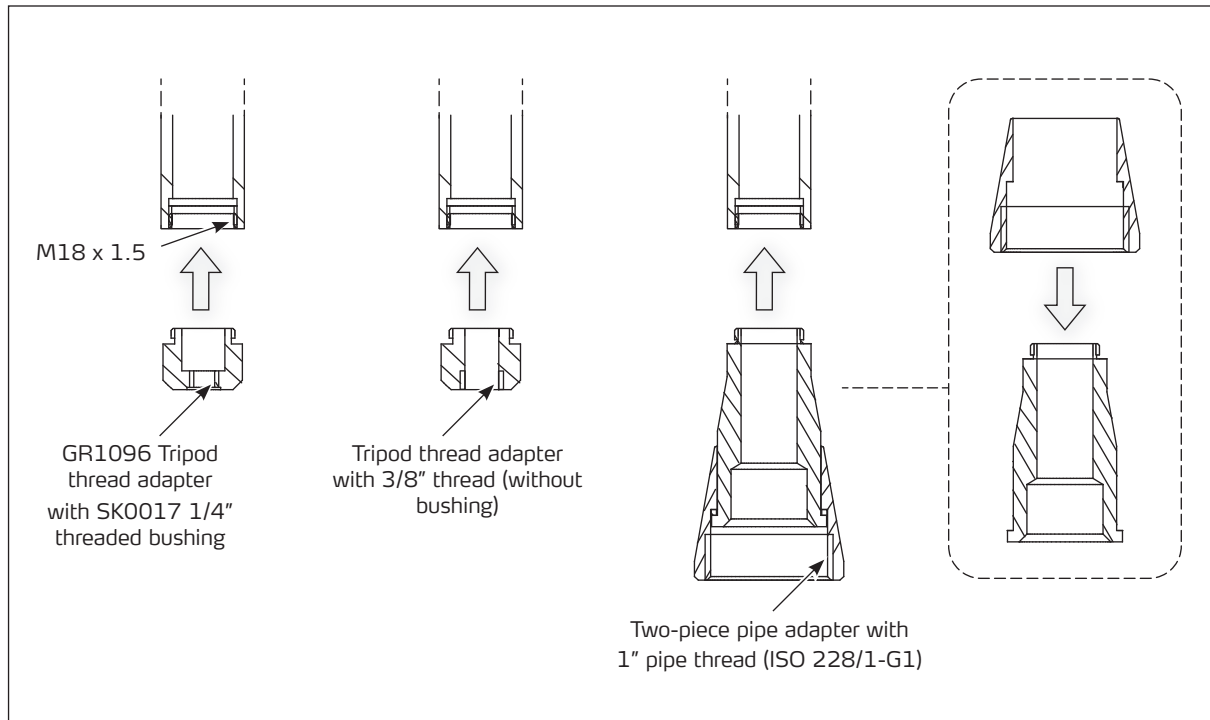


**Fig. 1.** The parts of 42AC-4.

## Installation

### Mounting 41AC-4 on Tripod or Pole Mount Adapter

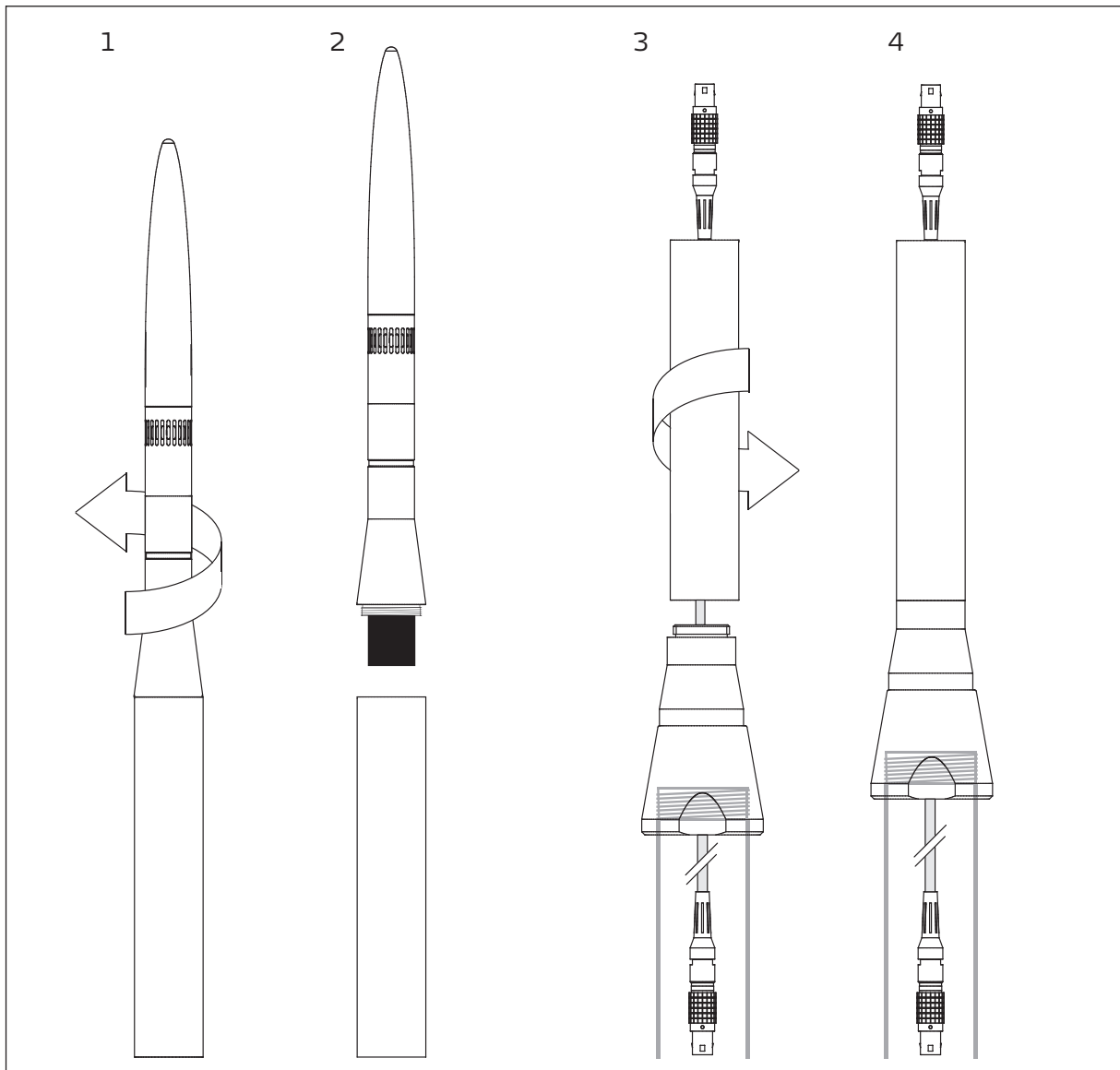
The 41AC-4 is designed for permanent installation and therefore comes with an adapter for mounting on a 1" pole. See Fig. 2 and Fig. 3, 3. The 41AC-4's housing is attached to the mounting fittings with a M18 x 1.5 thread.



**Fig. 2.** The 41AC-4 lower housing's thread and adaptors for tripod and pole mounting.

### Attaching the Lower Housing

1. Unscrew the upper part from the lower body.
2. Set the upper part aside and ensure that it is protected from dirt and moisture.
3. Slide the microphone cable through the adapter and through the lower housing, and screw the housing onto the pole mount adapter.
4. Ensure that the lower housing is properly fastened to the pole mount adapter.



**Fig. 3.** Attaching the lower part of the housing to the pole mount adapter.

### Connecting the Cable to the Preamp

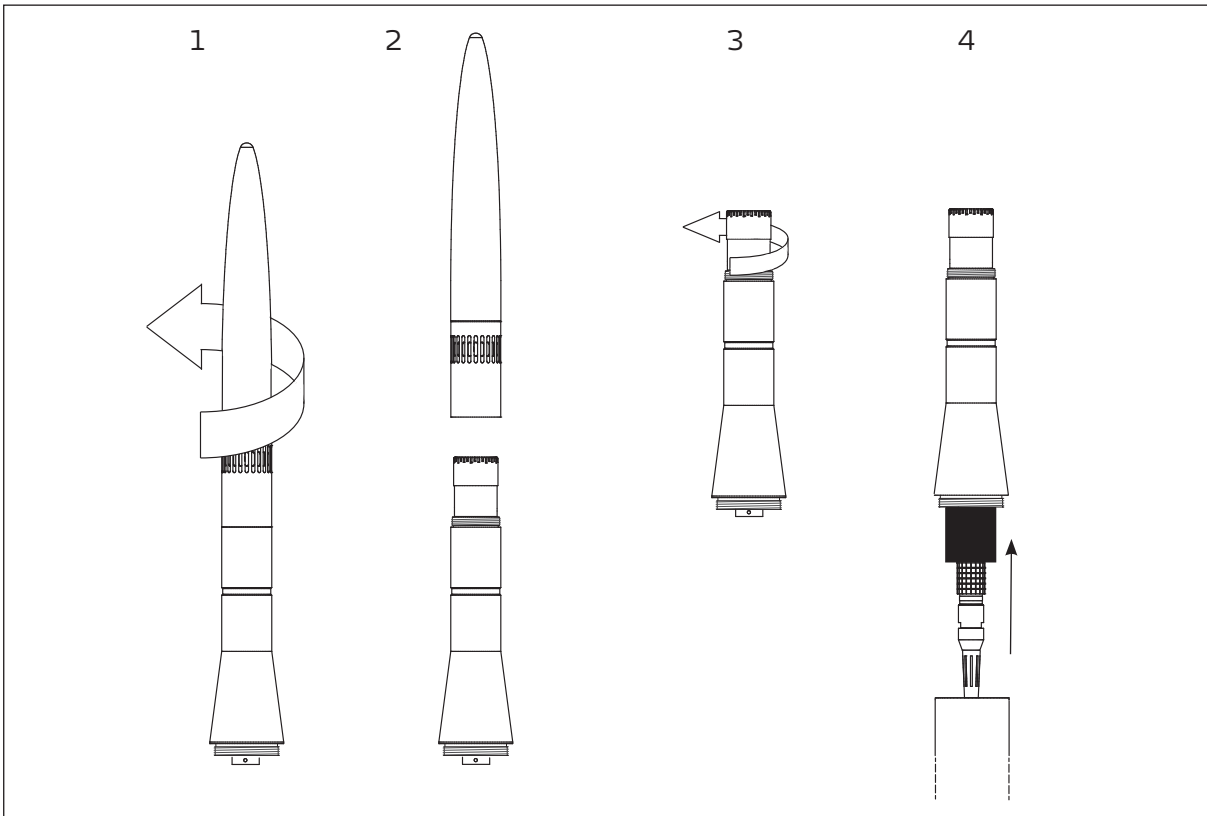
**Important.** Before connecting cable and preamplifier, you must ensure that the upper housing can turn independently of microphone, preamplifier and cable. This is done by loosening the microphone from the preamplifier by approximately half a turn.

Doing this ensures that the microphone-preamplifier and the preamplifier-cable connections are not subjected to strain when the upper housing is screwed onto the lower housing. Also it makes attachment of the cable to the preamplifier safe.

1. Unscrew the top cone.
2. Set it aside. Make sure it is protected from dirt and moisture.
3. Loosen the microphone housing by half a turn. Hold at the preamplifier connector and the lower part of the microphone body while turning.

**Important.** Make sure to loosen the microphone housing and not only the protective grid!

4. Connect the cable to the preamplifier.



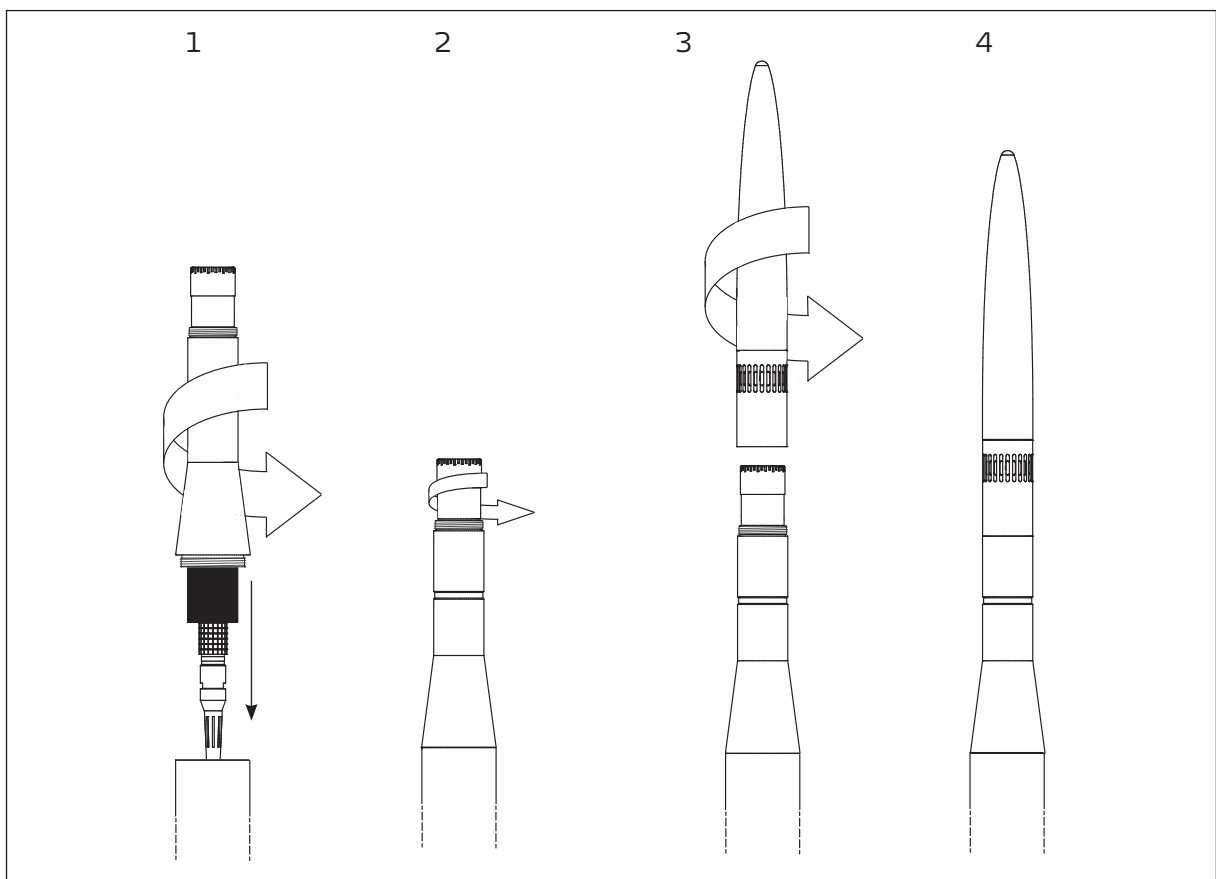
**Fig. 4.** Loosening the microphone-preamplifier: This must be done to avoid strain to the microphone-preamplifier assembly when connecting the cable and mounting the upper part.



### Mounting the Upper Housing and the Top Cone

When the microphone has been loosened from the preamplifier, you can safely mount the upper housing onto the lower housing and subsequently mount the top cone.

1. Screw the upper part of the housing onto the lower part.
2. Fasten the microphone by turning it clockwise.
3. Screw on the top cone.
4. Ensure that the top cone is properly fastened.



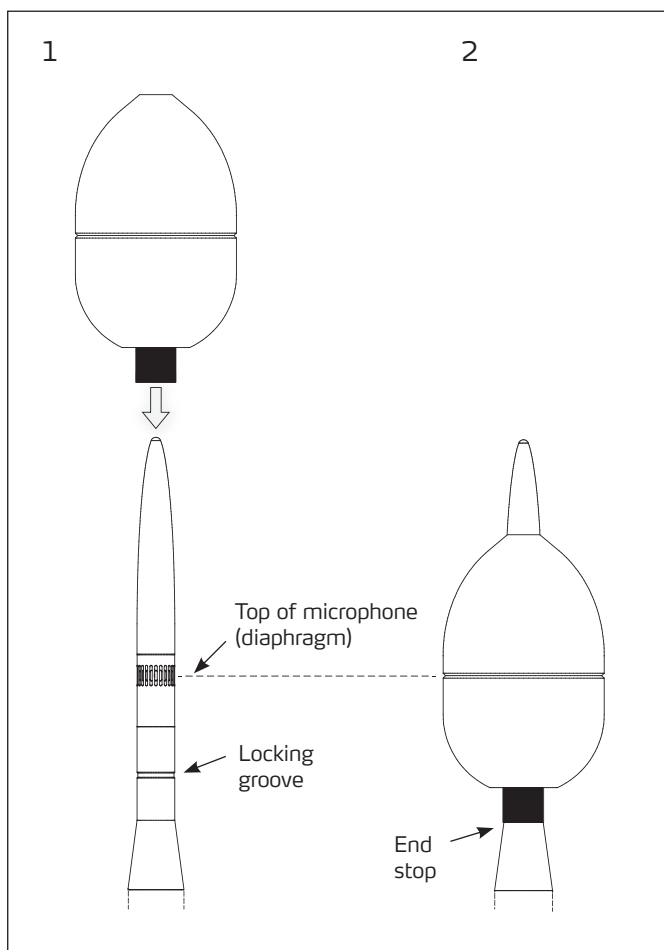
**Fig. 5.** Mounting the upper housing and the top cone.

### Mounting the Windscreen

The windscreen is lined with a plastic tube that ensures that it can be positioned correctly in relation to the microphone's diaphragm.

- When pushed down, the windscreen tube is prevented from going too far by the upper housing's conical shape.
- When the windscreen is pushed as far down as it will go, it will be kept in place by a locking groove. Because of this, it cannot be dislocated unintentionally, and incorrect measurements due to an incorrectly positioned windscreen are avoided.

1. Slide the tube down over the top cone.
2. Ensure that the tube is pushed as far down as it will go.



**Fig. 6.** Mounting the windscreen. When locked in the groove, the center plane of the windscreen will be flush with the microphone diaphragm.

### Disassembly

You can disassemble the 41AC-4 by reversing the procedure described on the preceding pages.

Two points need special attention:

#### Removing the Windscreen

The windscreen tube is held in place by a locking mechanism. Therefore, some force must be applied to slide the tube back up. See Fig. 7a.

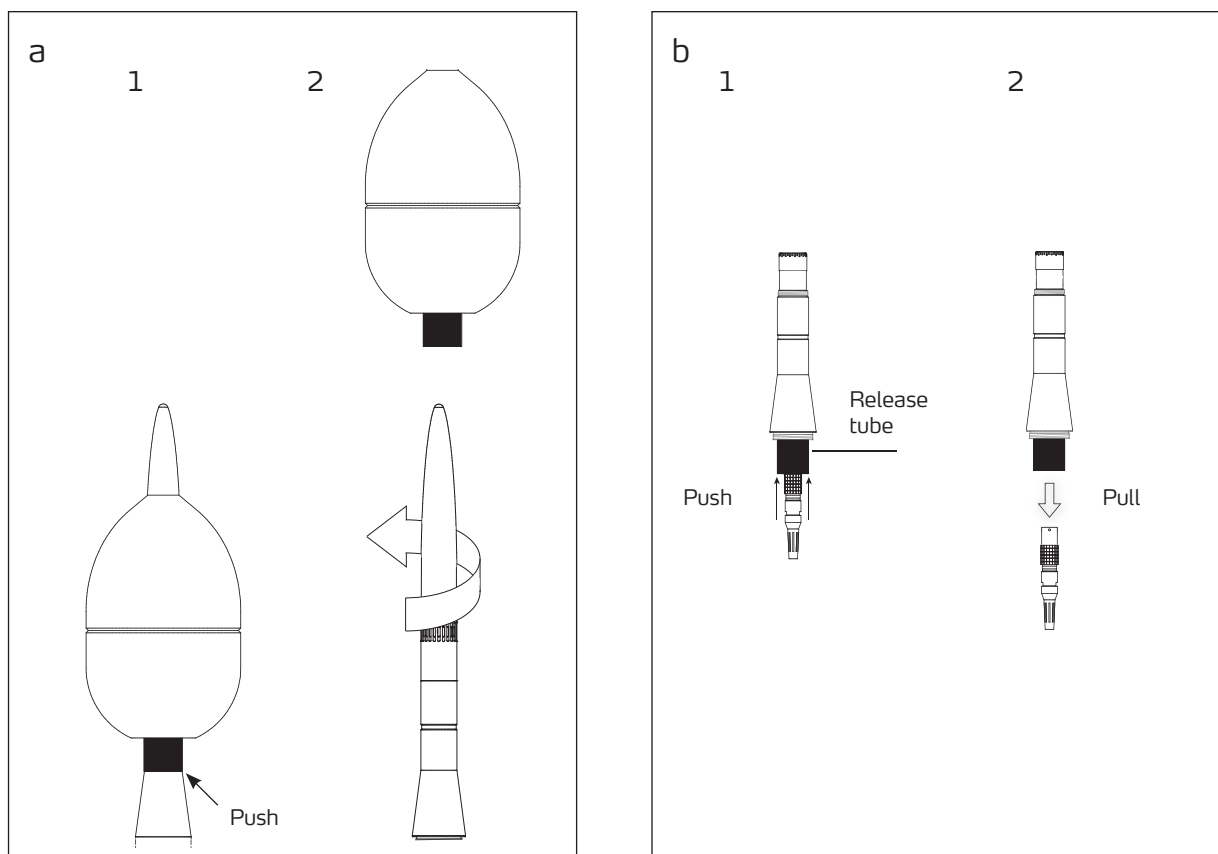
1. Push at the end of the tube with a finger nail or a piece of hard plastic.

**Caution.** Do NOT pull at the foam as this could cause it to deform or loosen it from the tube.

#### Disconnecting Pre-amplifier and Cable

When disconnecting the cable from the pre-amplifier, you must push the black release tube upwards. This will cause the LEMO connector's locks to release.

1. Unscrew the top cone (see Fig. 7, a2).
2. Push the black release tube upwards. See Fig. 7b, 1.
3. Pull the cable downwards to disconnect it from the pre-amplifier. Fig. 7b, 2.



**Fig. 7.** Removing the wind screen and disconnecting the cable.

## System Integration

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### Setting the 41AC-4 for 90 or 0 Degrees of Incidence

The 41AC-4 is designed to be mounted vertically, as described in the previous sections. Mounted in this way, it can be set up for measurement at either 90 degrees or 0 degrees of incidence.

The correction data contained on the USB flash drive that is part of the delivery must be used if the 41AC-4 is used for 0 degrees of incidence. The correction data are measured with a resolution of 1/12 octave.

### Polarization Voltage

41AC-4 uses a prepolarized microphone with a 26AK 1/2" Preamplifier with integrated connector and must be connected to a LEMO input of an analyzer/sound level meter. Polarization voltage must be disabled/set to 0 V.

### Distance to the Ground

When mounted on a pipe or tripod, the distance from the bottom of the microphone to the ground reflecting surface must be at least 20 cm/7.9" to minimize the influence of ground reflections on the sound field.

### Replacing Microphone and/or its Protective Grid

The 40AE-S2 microphone and its protective grid are designed specifically for the 41AC-4. Only the 40AE-S2 will ensure the stated measurement results and water protection. Therefore neither microphone nor its protective grid can be replaced with standard items.

### Verification and Calibration

An acoustic in-situ verification or a calibration in a laboratory with a pistonphone or a sound calibrator requires that windscreen and top cone are dismantled. How to do this is shown in Fig. 7. Calibration can be performed using a Sound Calibrator or a Pistonphone. The G.R.A.S. 42AP Intelligent Pistonphone is recommended because of its built-in thermometer and barometer. The Sound Calibrator/Pistonphone must be fitted with a coupler for 1/2-inch microphones.

Refer to the manual for your sound calibrator or pistonphone for further information.

## Maintenance

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Depending on local conditions, the windscreen must be cleaned or replaced. How often must be determined by visual inspection and knowledge of local weather conditions.

O-ring OR2038 (see page 5) must be lubricated with silicon grease at regular intervals. Without lubrication it must be replaced once a year.

When under power, the preamplifier emits heat. This heat is part of the 41AC's protection against moisture, and therefore the power to the 41AC should be turned on permanently.



## Accessories

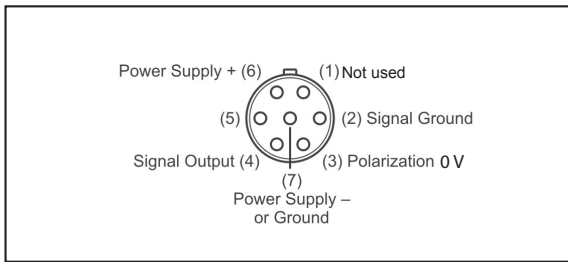
These accessories must be ordered separately:

Intelligent Pistonphone	42AP
Pistonphone	42AA
Multifunction Sound Calibrator	42AG
3 m LEMO 7-pin - LEMO 7-pin Cable	AA0008
10 m LEMO 7-pin - LEMO 7-pin Cable	AA0009
30 m LEMO 7-pin - LEMO 7-pin Cable	AA0012
100 m LEMO 7-pin - LEMO 7-pin Cable	AA0014
Customized length LEMO 7-pin - LEMO 7-pin Cable, length in cm.	AA0020-CLXXXX

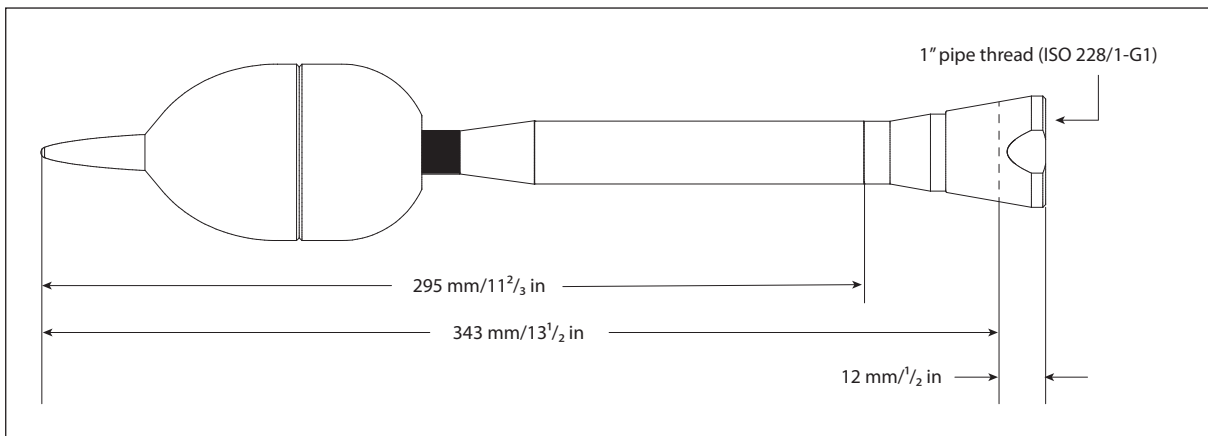
## Specifications

### 41AC-4

Dynamic range lower limit (microphone thermal noise)	17 dB(A)
Dynamic range upper limit (with 28 V / $\pm$ 14 V supply)	138 dB
Dynamic range upper limit (with 120 V / $\pm$ 60 V supply)	144 dB
Set sensitivity @ 250 Hz ( $\pm$ 2 dB)	50 mV/Pa
Compliance	IEC 61672-1
Polarization voltage	0 V
Power supply	28 V to 120 V / $\pm$ 14 V to $\pm$ 60 V
Power consumption	0.7 mA ( $\pm$ 14 V) / 2.3 mA ( $\pm$ 60 V)
Temperature range, operation	-30 to 70 °C / -22 to 158 °F
Connector type	7-pin LEMO
CE/RoHS compliant/WEEE registered	Yes/Yes/Yes
Water Resistance	IP55



**Fig. 8.** 7-pin LEMO 1B male connector (external view) on the 41AC-4s preamplifier and output cable.



**Fig. 9.** When mounted on a pipe, the top of the 41AC will be elevated 343 mm above the pipe.



## Frequency Response and Directional Response

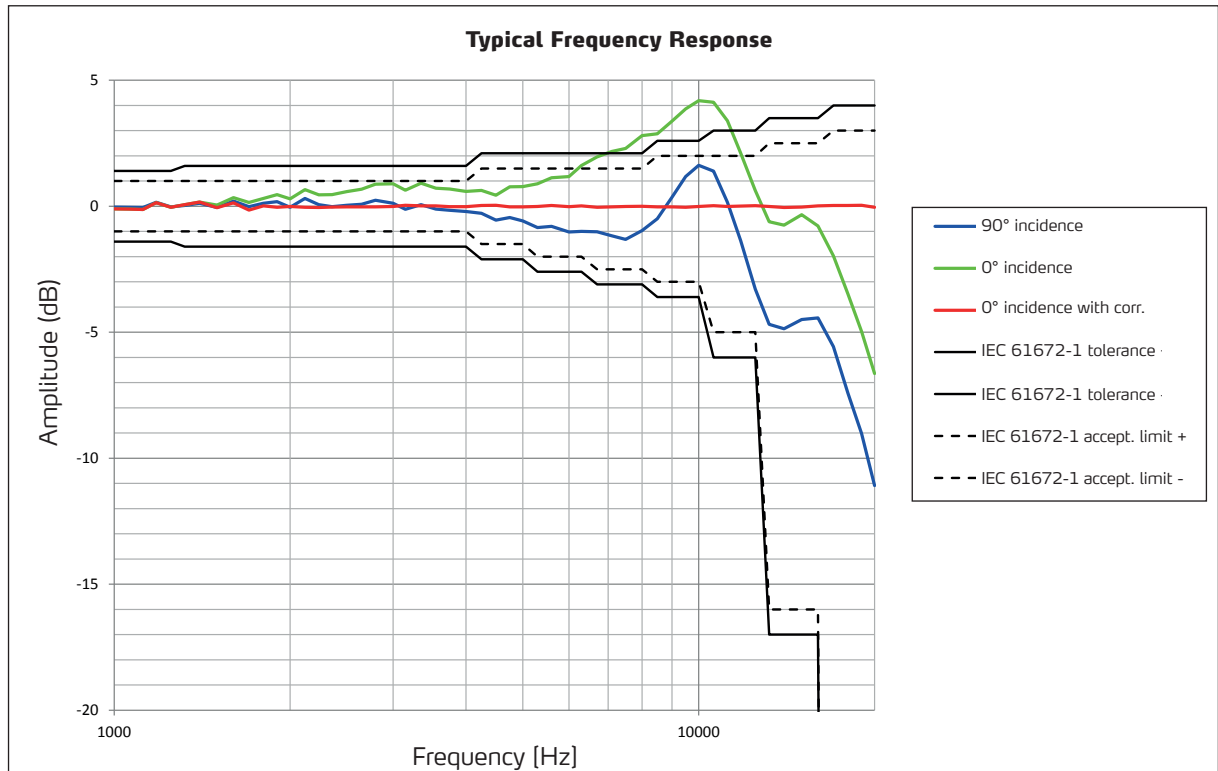


Fig. 10. Typical frequency response.

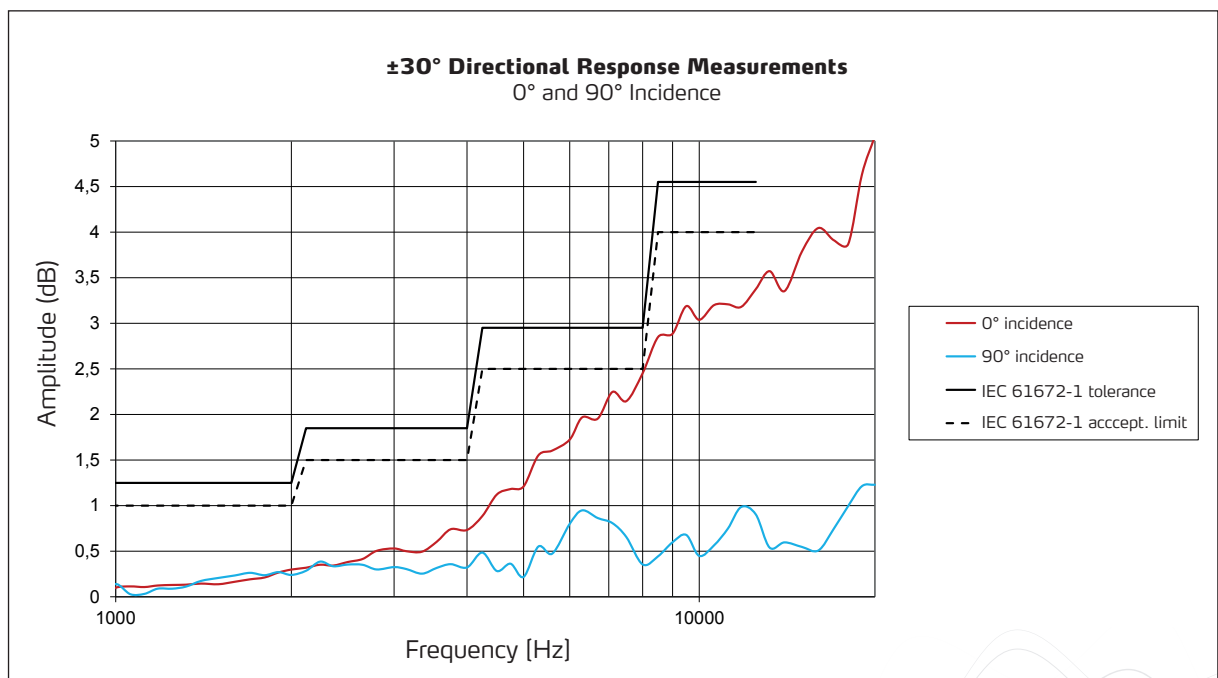


Fig. 11. ±30° directional response at 0° and 90° incidence.

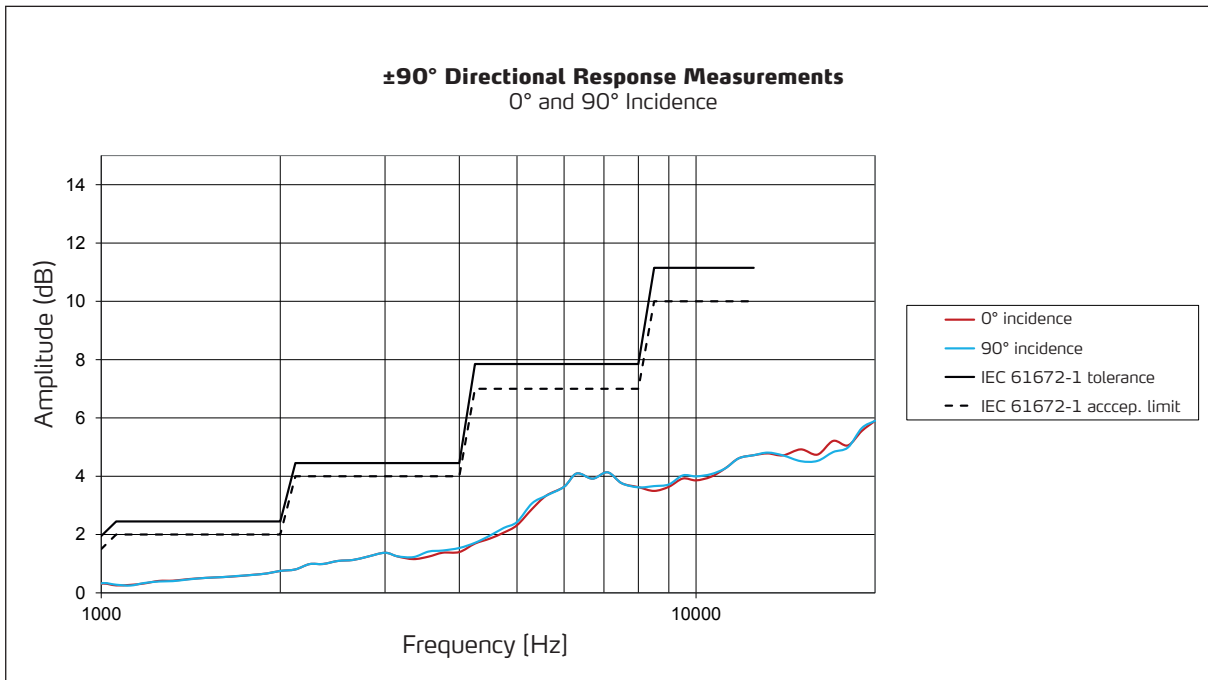


Fig. 12. ±90° directional response at 0° and 90° incidence.

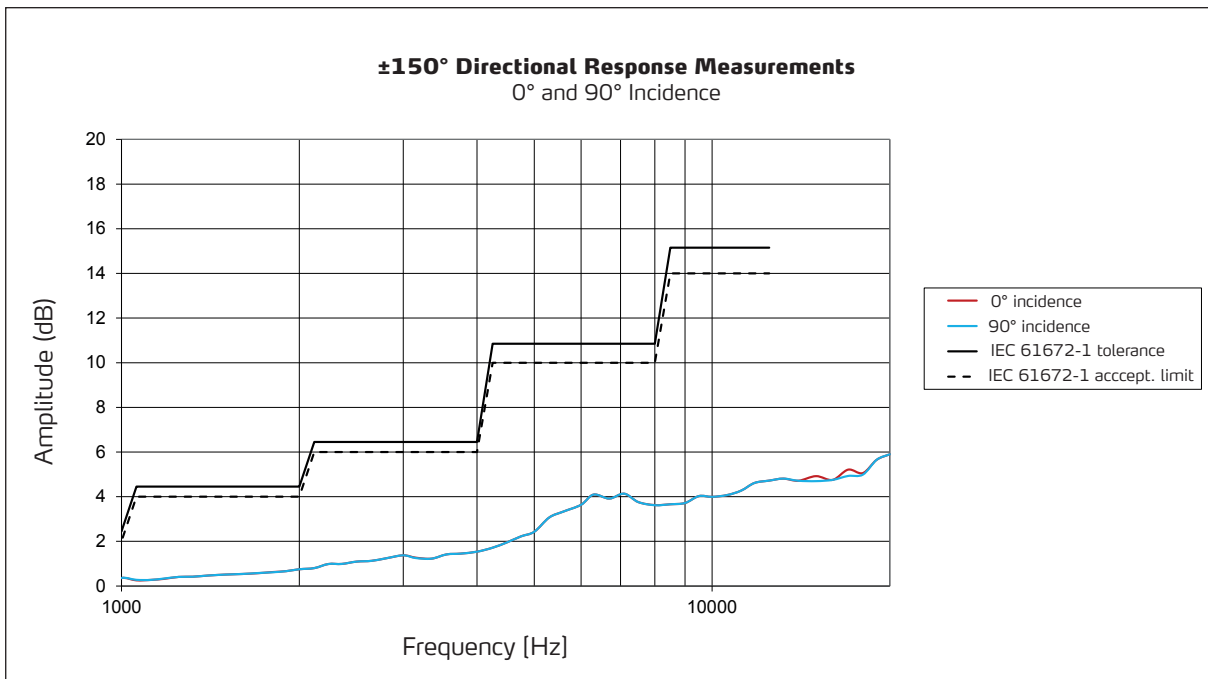


Fig. 13. ±150° directional response at 0° and 90° incidence.





## Calibration, Warranty and Service

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### Calibration

Before leaving the factory, all G.R.A.S. products are calibrated in a controlled laboratory environment using traceable calibration equipment.

An individual test certificate stating the sensitivity and frequency response is included with each product.

### Warranty

All G.R.A.S. products are made of high-quality materials that will ensure life-long stability and robustness. The 41AC-4 is delivered with a 5-year warranty.

The windscreen comes with a 6-month warranty, this warranty covers defective workmanship only and not the effects of normal use.

Damaged diaphragms in microphones can be replaced.

The warranty does not cover products that are damaged due to negligent use, an incorrect power supply, or an incorrect connection to the equipment.

### Service and Repairs

All repairs are made at G.R.A.S. International Support Center located in Denmark. Our Support Center is equipped with the newest test equipment and staffed with dedicated and highly skilled engineers. Upon request, we make cost estimates based on fixed repair categories. If a product covered by warranty is sent for service, it is repaired free of charge, unless the damage is the result of negligent use or other violations of the warranty. All repairs are delivered with a service report, as well as an updated calibration chart.

Manufactured to conform with:

CE marking directive:  
93/68/EEC



WEEE directive:  
2002/96/EC



RoHS directive:  
2002/95/EC



G.R.A.S. Sound & Vibration continually strives to improve the quality of our products for our customers; therefore, the specifications and accessories are subject to change without notice.