

Instruction Manual

*GRAS 41AC-3 CCP Outdoor Microphone with
SysCheck2 for Community & Airport Noise*





Revision History

Any feedback or questions about this document are welcome at gras@gras.dk.

Revision	Date	Description
1	26 August 2014	First edition
2	4 July 2017	42AG substituted for the obsolete 42AB
3	1 September 2022	Add SysCheck2 section

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Introduction

The GRAS 41AC-3 CCP 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° of incidence, typically community noise. With the proper correction data, it can be used for 0° 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., one year or longer.

It uses a GRAS 40AE-S2 ½" Prepolarized Free-field Microphone, High Sensitivity and a GRAS ½" CCP SysCheck2 Preamplifier with BNC Connector.

It has a transducer electronic data sheet (TEDS) according to IEEE1451.4 template UDID 127-0-0-0U and SysCheck2 functionality.

Important. The 40AE-S2 microphone and its protective grid have been modified for the 41AC-3. Therefore, microphone and grid cannot be replaced by standard items.

SysCheck2 and TEDS

Verification with SysCheck2*

SysCheck2™ is a verification tool that performs remote health checks on microphones, channel gain and cable integrity. The verifications can be made on each SysCheck2-enabled microphone connected to a CCP power module with TEDS support and compatible measurement software with one click. SysCheck2-enabled microphones also provide on-demand environmental data (temperature, barometric pressure and humidity).

SysCheck2 microphones are equipped with an ultra-low power microcontroller located in the microphone preamplifier. This microcontroller is able to produce a reference signal that can be compared to a reference measurement to determine the measurement chain status. Changes in microphone, channel gain or the unexpected use of a filter will result in a measurement deviation and will be reflected in a change in the output from the measurement channel. Once detected, the problem can be examined and then rectified.

The microphone can be set to display visual cues to the health of the measurement chain and can be used for the easy identification of specific microphones. In the evaluation of measurement-chain health, SysCheck2 can detect microphone sensitivity or channel gain changes. Additionally, the microphone acquires data on local environmental conditions, including temperature, pressure and humidity.

Full SysCheck2 functionality is ready for use out of the box when connected to compatible setups, such as APx 500 Measurement Software with GRAS 12BA, 12BB or 12BE power modules. Other setups will require a combination of a 12Bx or similar power module and analyzer or sound

* **NOTE:** SysCheck2 is a verification tool, not a calibration tool. SysCheck2 cannot be used to correct microphone sensitivity. While SysCheck2 has the ability to detect small variations in the complete measurement chain from the acquisition hardware to the microphone diaphragm, it cannot detect unexpected physical changes in the vicinity of the microphone (like a forgotten calibrator covering the microphone cartridge). SysCheck2 cannot detect errors due to unlikely scenarios with errors coming from multiple sources that add up and cancel each other out.

card combination with CCP connection and TEDS read/write capability after setup with the GRAS-supplied software development kit (SDK) or our SDK and an application programming interface (API), depending on your system.

System identification with TEDS

TEDS is very useful to determine which microphone is connected to which input channel and contains relevant information needed by SysCheck2 and other tools used for measurement setup and verification. However, it is not by itself a check of whether the microphone is within specifications or not.

Delivered Items

½" Prepolarized Free-Field Microphone, High Sensitivity	40AE-S2
½" SysCheck2 Preamplifier with BNC Connector	SysCheck2
O-ring for preamplifier	OR2038
USB flash drive with correction data for 0° (resolution: 1/12 octave)	
Wind Screen	AM0378
Top cone	-
Upper housing	-
Lower housing	-
1" pole mount adapter	RA0286
Tripod Adapter	GR1096
Tripod thread adapter	SK0017

41AC-3 is delivered preassembled except for the windscreen and thread adapter.

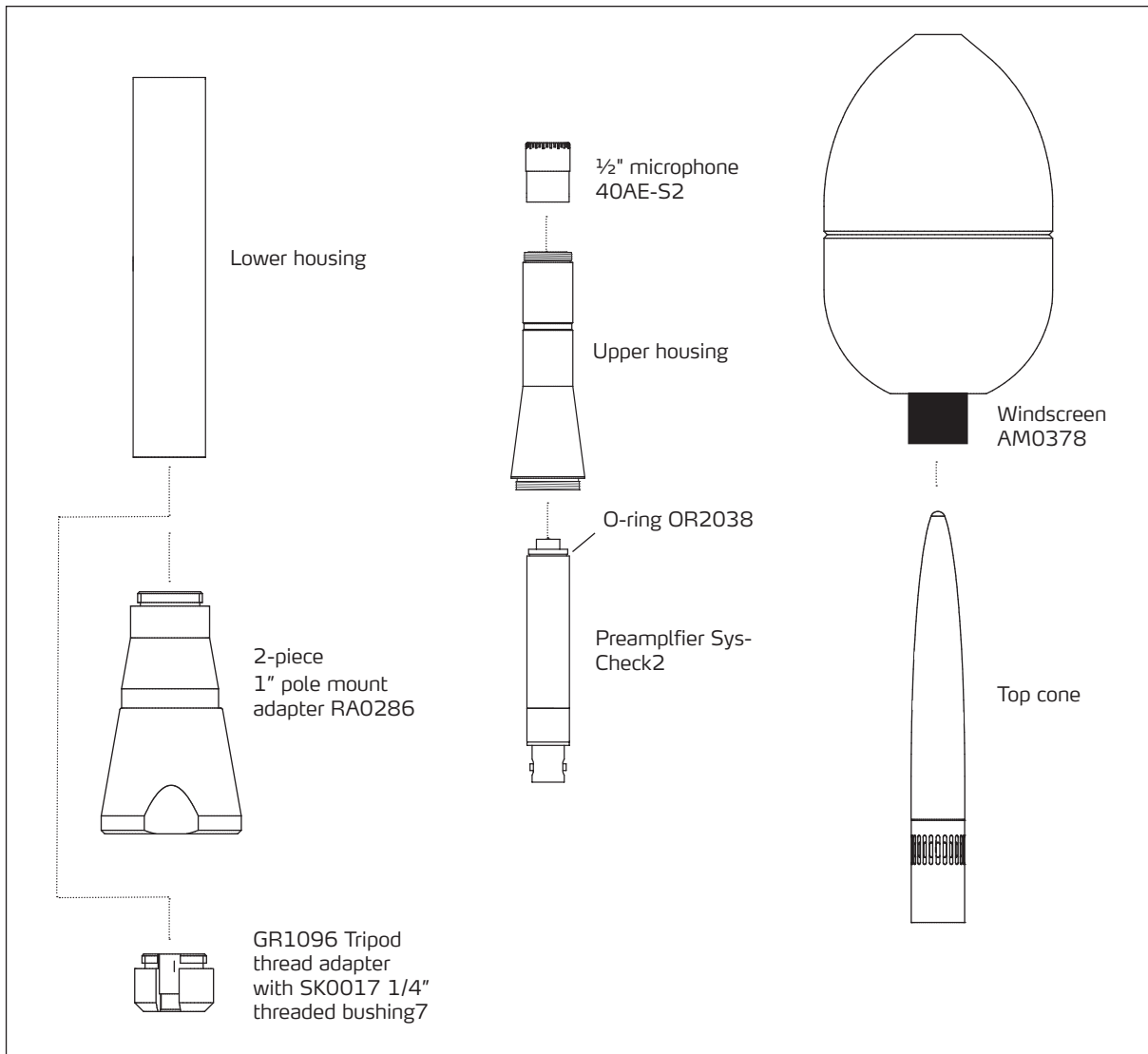


Fig. 1. The parts of 41AC-3.

Installation

Mounting 41AC-3 on Tripod or Pole Mount Adapter

The 41AC-3 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-3's housing is attached to the mounting fittings with a M18 x 1.5 thread.

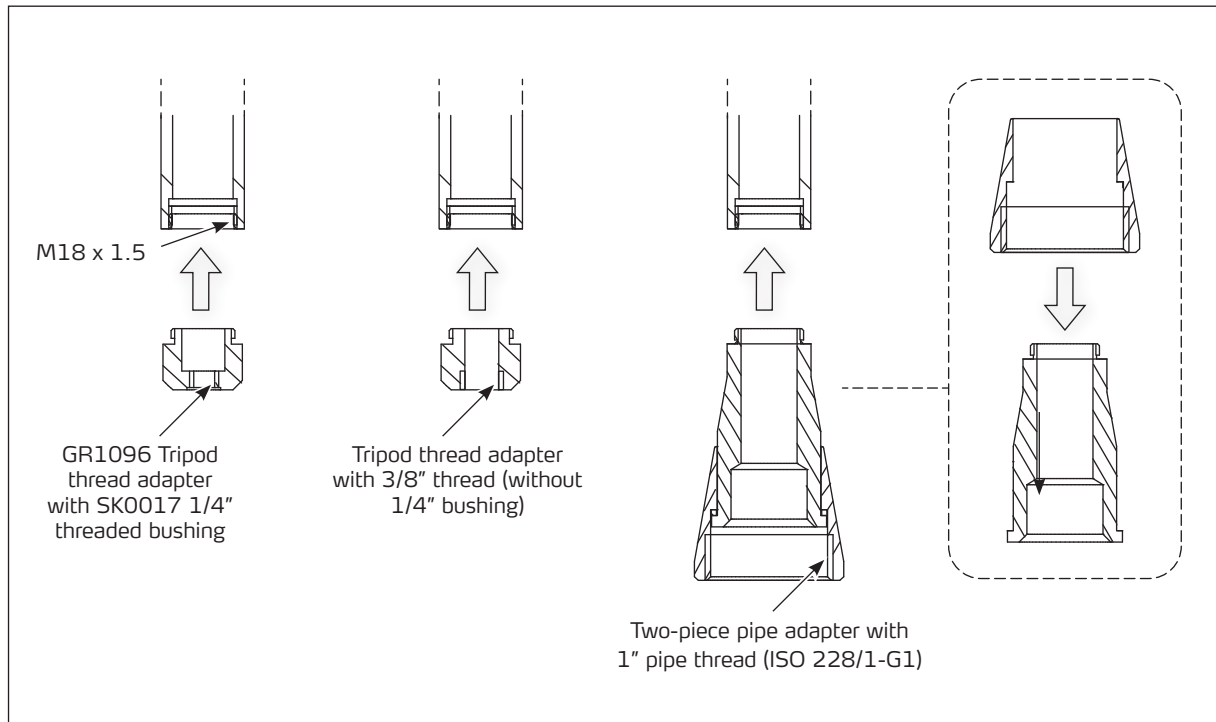


Fig. 2. The 41AC-3 lower housing's thread and adaptor for tripod or pole mount.

Removing the Preamplifier

As delivered, the microphone set is mounted inside the housing. To attach the cable, you must remove the top, remove the microphone and pull out the preamplifier.

1. Unscrew the top cone from the housing.
2. Set it aside and ensure that it is protected from dirt and moisture.
3. Remove the microphone from the preamplifier and set it aside. Ensure that it is protected from dirt and moisture.
4. Push at the top of the preamplifier to make it slide down through the tube.

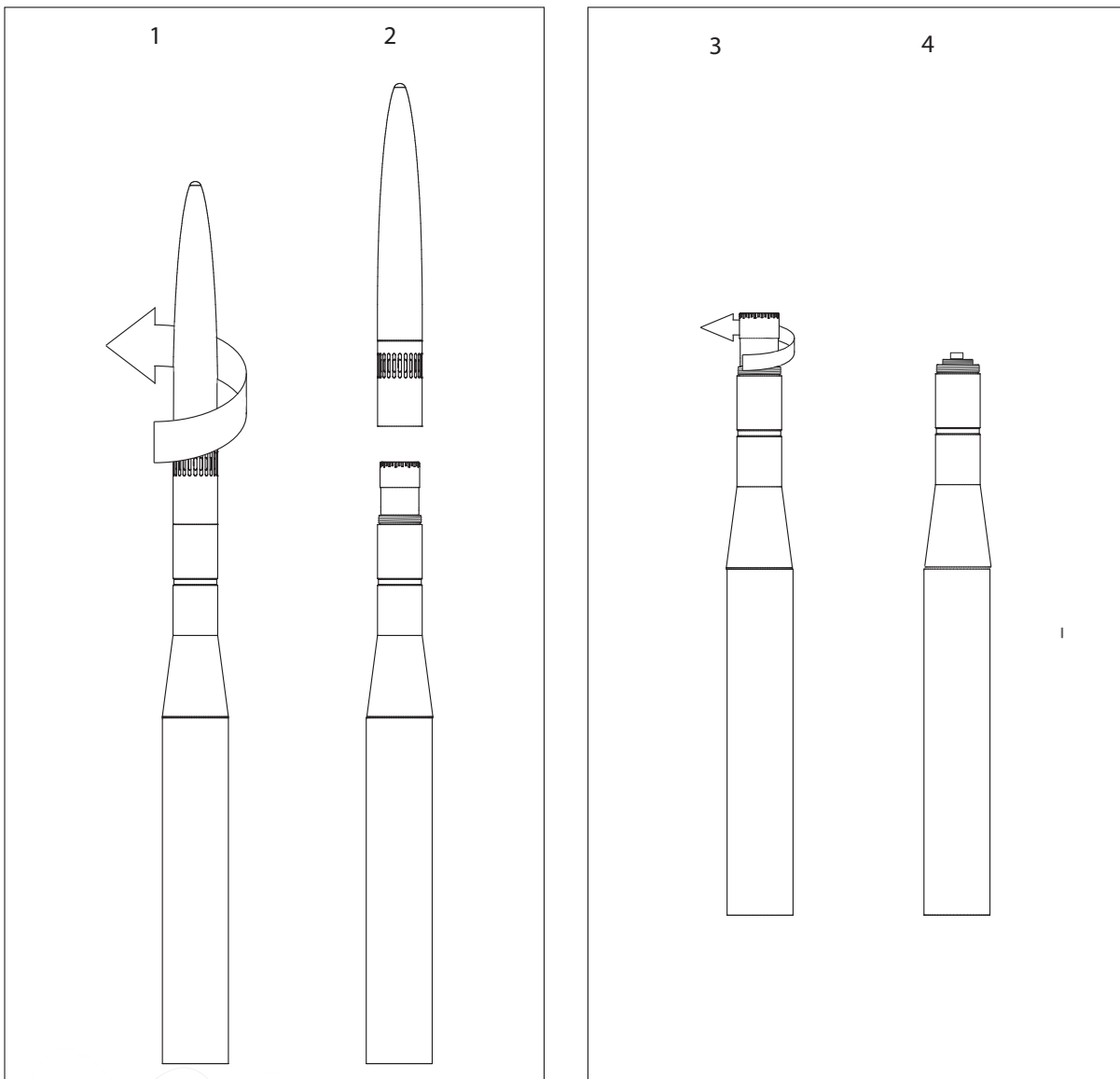


Fig. 3. Removing the top cone and releasing the preamplifier.

Connecting the Cable to the Preamplifier and Remounting the Microphone Set

1. Connect the cable to the preamplifier.
2. Push the preamplifier up through the lower and upper housing.
3. To expose the thread for the microphone, ensure that the preamplifier is pushed up as far as it will go.
4. Mount the microphone onto the preamplifier and tighten lightly.

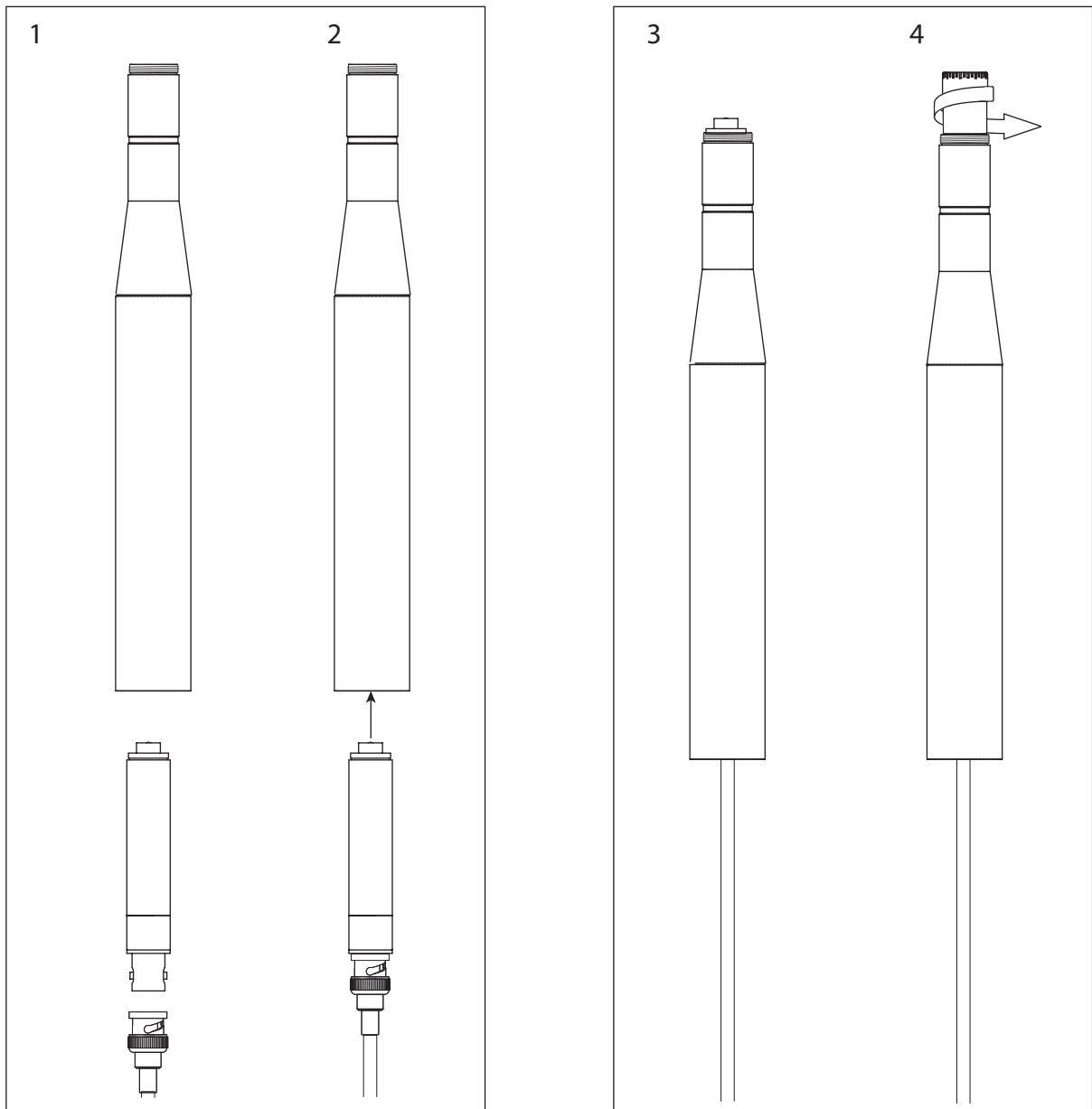


Fig. 4. Connecting the cable and securing the microphone set.

Mounting the Top Cone

When the microphone has been mounted on the preamplifier, you can mount the top cone.

1. Screw on the top cone.
2. Ensure that the top cone is properly fastened.

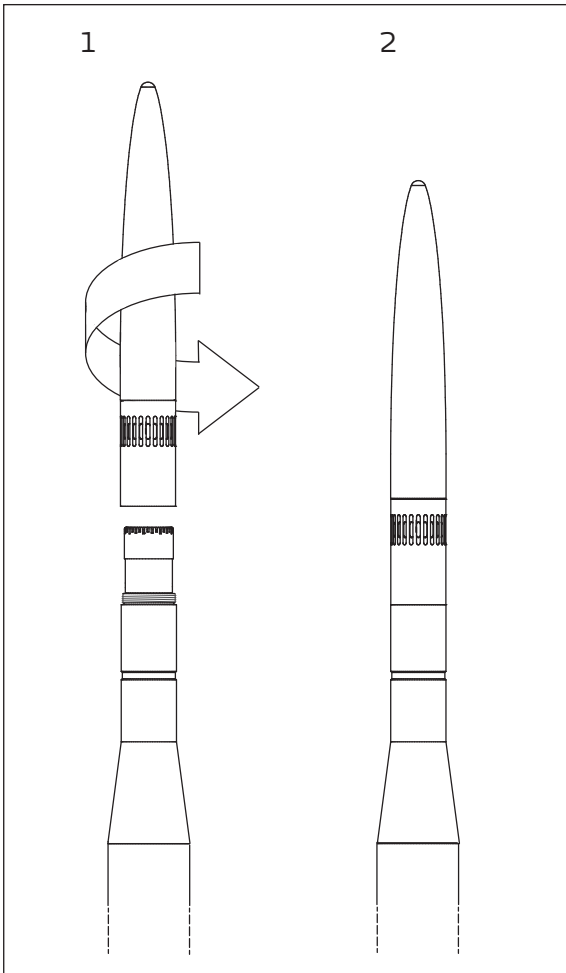


Fig. 5. Mounting the upper housing and the top cone.

Mounting the Windscreen

The windscreen is glued onto a plastic tube that ensures that it can be positioned correctly:

- 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.

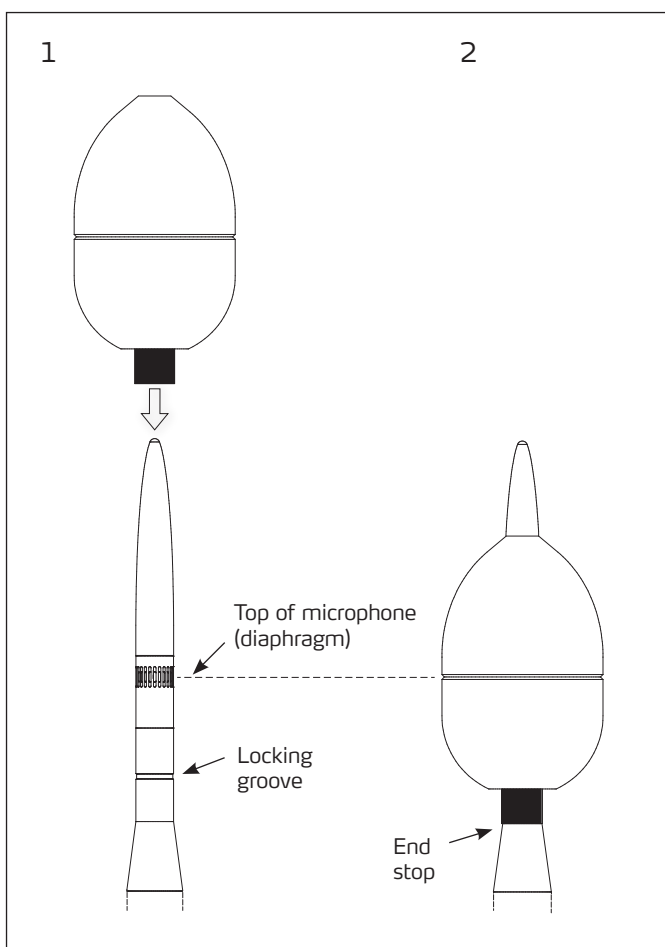


Fig. 6. Mounting the wind screen.

Disassembly

You can disassemble the 41AC-3 by reversing the procedure described on the preceding pages. The windscreen tube is held in place by a locking mechanism. Therefore, some force must be applied to slide the tube back up.

1. Push at the end of the windscreen 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.

2. Unscrew the top cone.
3. Unscrew the microphone.
4. Slide the preamplifier downwards and disconnect the cable.

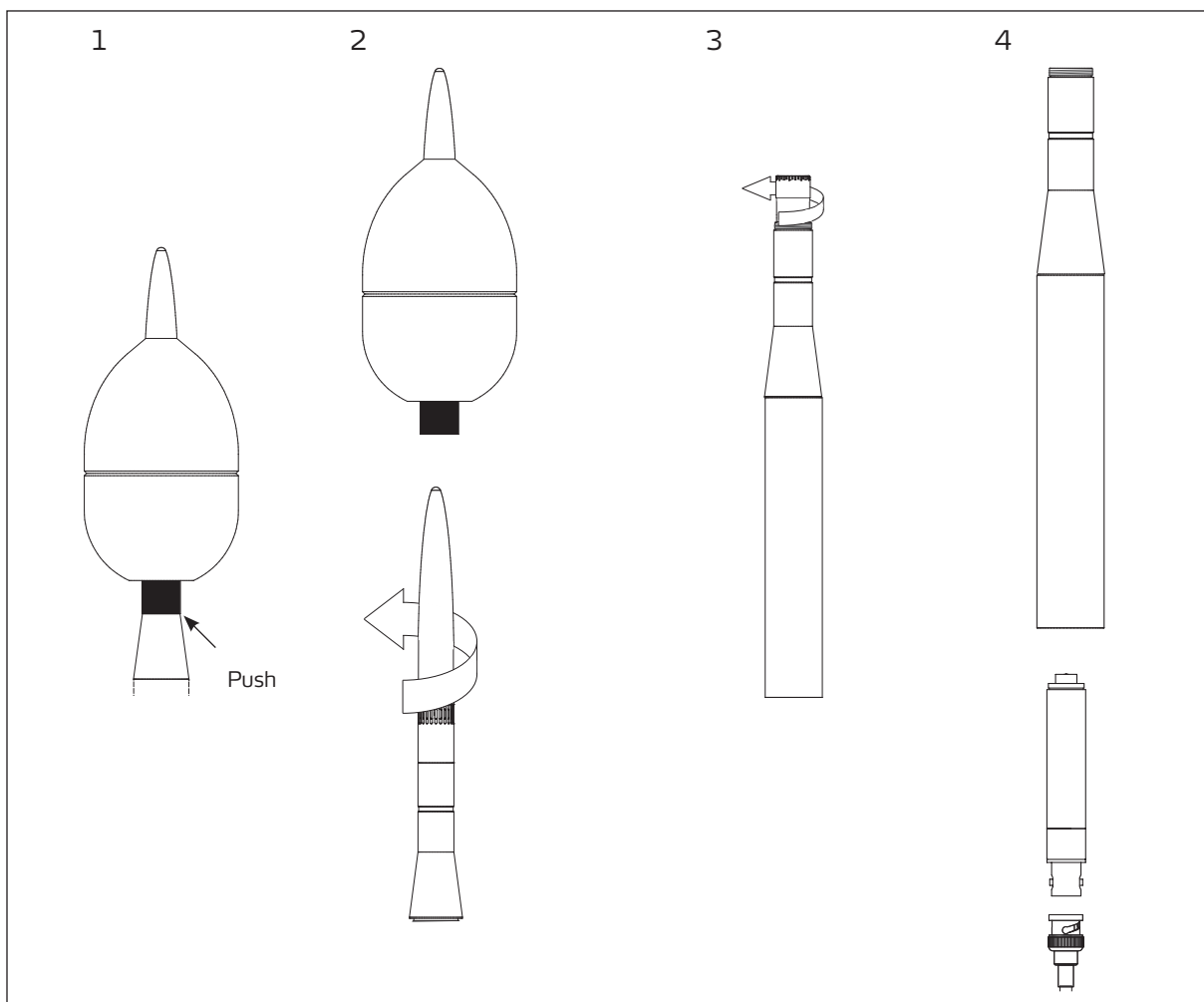


Fig. 7. Removing the wind screen and disconnecting the cable.

System Integration

TEDS

41AC-3 has TEDS according to IEEE1451.4 template UDID 127-0-0-0U.

SysCheck2

41AC-3 has SysCheck2-functionality enabling system status and calibration verification.

Setting the 41AC-3 for 90° or 0° Incidence

The 41AC-3 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° or 0° angle of incidence.

The correction data contained on the USB flash drive that is part of the delivery must be used if the 41AC-3 is used for 0° incidence. The correction data are measured with a resolution of 1/12-octave.

Polarization Voltage = 0 V

41AC-3 uses a prepolarized microphone with a SysCheck2 ½" CCP Preamplifier and must be connected to a CCP input of an analyzer.

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-3. 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 GRAS 42AP Intelligent Pistonphone is recommended because of its built-in thermometer and barometer. The Sound Calibrator/Pistonphone must be fitted with a coupler for ½" microphones.

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

Maintenance

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 6) 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

Intelligent Pistonphone	42AP
Pistonphone	42AA
Multifunction Sound Calibrator	42AG
3 m BNC - BNC Cable	AA0035
10 m BNC - BNC Cable	AA0037
30 m BNC - BNC Cable	AA0038
Customized length BNC - BNC Cable	AA0039-CLXXXX

Specifications

Dynamic range lower limit (microphone thermal noise)	17 dB(A)
Dynamic range upper limit	138 dB
Set sensitivity @ 250 Hz (± 2 dB)	50 mV/Pa
Compliance	IEC 61672-1
Polarization voltage	0 V
Power supply	2 – 20 mA*
Temperature range, operation	-30 to 70 °C / -22 to 158 °F ††
Connector type	BNC
SysCheck2 resolution	0.3 dB§
TEDS	IEEE1451.4 template UDID 127-0-0-0U
CE/RoHS compliant/WEEE registered	Yes/Yes/Yes
Water Resistance	IP55

SysCheck2 environmental sensor data accuracy Operational from -40 to 85 °C / -40 to 185 °F¶

Temperature	± 2 °C / 3.6 °F from 0 to 65 °C / 32 to 149 °F
Pressure, static	± 1.5 hPa from 0 to 65 °C / 32 to 149 °F and 300 to 1100 hPa
Relative humidity	$\pm 4\%$ from 0 to 65 °C / 32 to 149 °F

* At temperatures below -10 °C / 14 °F use at least 4 mA for full functionality of SysCheck2.

† If used at temperatures higher than 70 °C / 158 °F, use high-temperature cables.

‡ SysCheck2 functional temperature range is between -20 °C / -4 °F and 65 °C / 149 °F.

§ Requires an ambient noise level less than 65 dBSPL.

¶ This temperature range is solely for the functionality of the environmental data acquisition. This table provides the temperature ranges where the stated accuracy is guaranteed. For example, if the SysCheck2-stated temperature falls below the microphones operational temperature limit, it may not have the stated accuracy, but should still be confirmed.

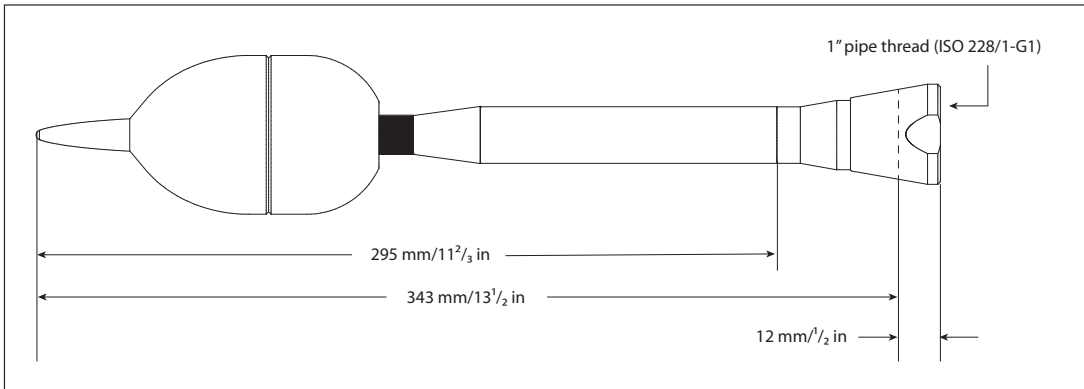


Fig. 8. When mounted on a pipe, the top of the 41AC will be elevated 343 mm above the pipe.

Frequency Response and Directional Response

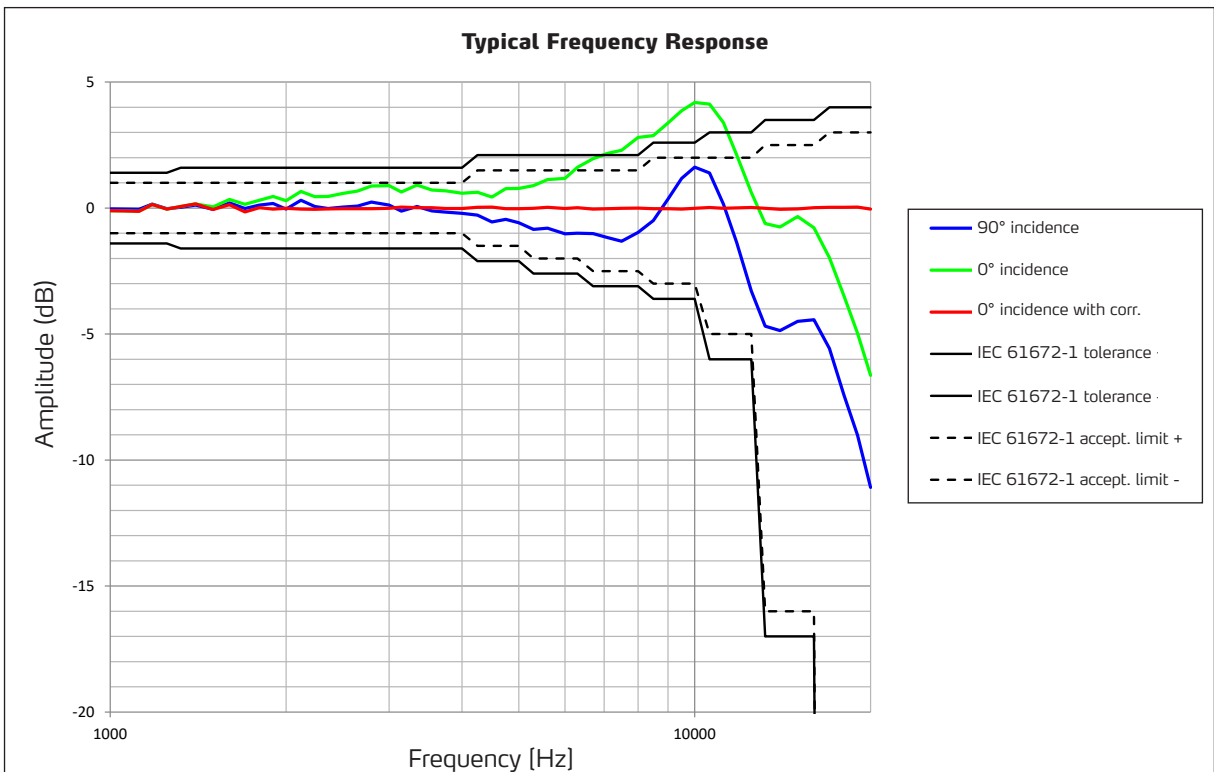


Fig. 9. Typical frequency response.

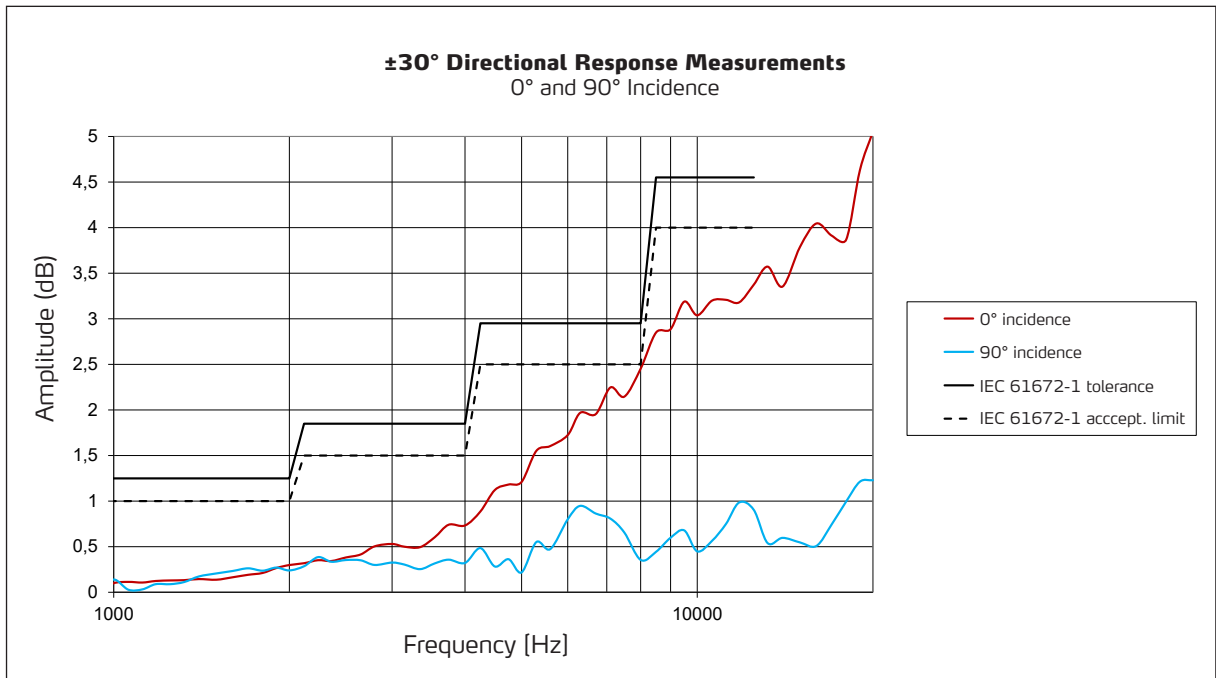


Fig. 10. ±30° directional response at 0° and 90° incidence.

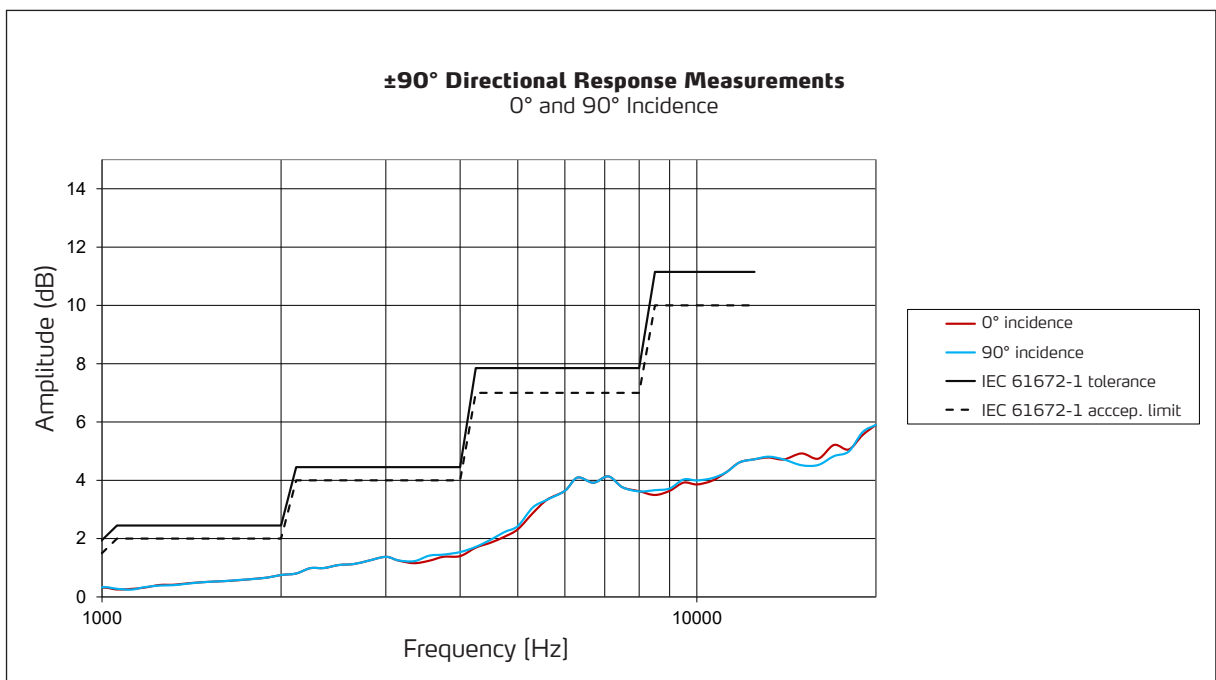


Fig. 11. ±90° directional response at 0° and 90° incidence.

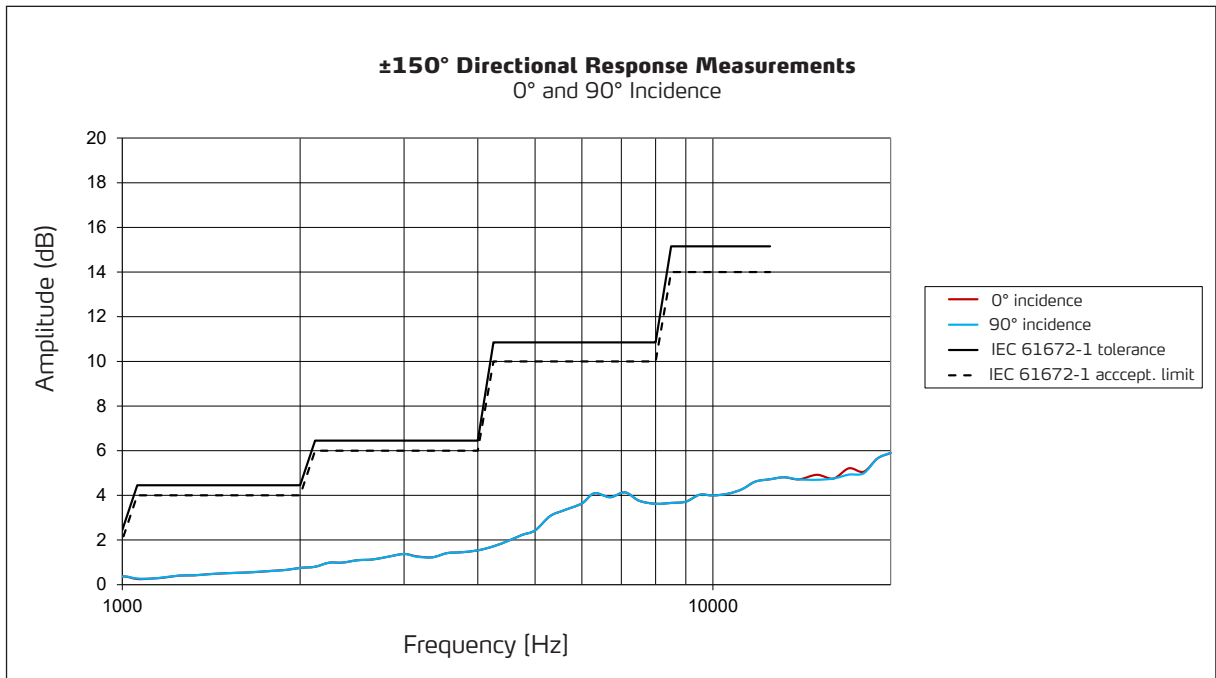


Fig. 12. ±150° directional response at 0° and 90° incidence.



Calibration, Warranty and Service

Calibration

Before leaving the factory, all GRAS 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 GRAS products are made of high-quality materials that will ensure life-long stability and robustness. The 41AC-3 is delivered with a five-year warranty.

The windscreen comes with a six-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 GRAS 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



GRAS 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.