Instruction Manual

G.R.A.S. 1/2", 1/4", and 1/8"
CCP Flush-mount microphone sets

Revision History

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

Revision	Date	Description
1	27 August 2014	First publication
2	29 May 2015	Section about dismounting added.

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Contents

Introduction

The Scope of this Manual

This manual describes how to mount the G.R.A.S 1/2″, 1/4″ and 1/8″ flush-mount microphone sets, how to connect them, and how to perform sensitivity and frequency calibration.

Two mounting options are described:

- **Mounting with Adapter**
  An adapter for each microphone size is available. The adapters are made from a non-conductive plastic material that provides electrical insulation between microphone and test object. The microphone set is attached to the adapter with an O-ring. This makes installation and removal of the microphone set easy.

- **Direct Mounting**
  The measures you need to make your own mounting solution are provided, without the use of a G.R.A.S. mounting adapter.

Brief Description

Venting
The microphone is front-vented for air pressure equalization. This is realized through a tiny hole that is visible when the microphone grid is removed. It is important that the venting is not blocked.

TEDS
The G.R.A.S. flush-mount microphones have TEDS according to IEEE 1451.4, 27 v 1.0. The TEDS (Transducer Electronic Data Sheet) is a memory in the microphone. At delivery, the factory has stored the G.R.A.S. type number, serial number and the sensitivity value as measured during factory calibration.

If your measurement platform supports intelligent transducers according to IEEE 1451.4 (TEDS), this information will automatically be retrieved. G.R.A.S. updates the stored sensitivity value as normal procedure in the calibration service.

Applications for Flush-mount Measurement Microphones

The G.R.A.S. line of flush-mount measurement microphones combines the high precision and reliability of G.R.A.S. measurement microphones with the need for fitting sensors into very confined spaces and narrow structures. With a height of less than 10 mm (0.4 inch) and thin coax connection, these acoustic sensors can be integrated into literally any design without sacrificing aerodynamic properties.
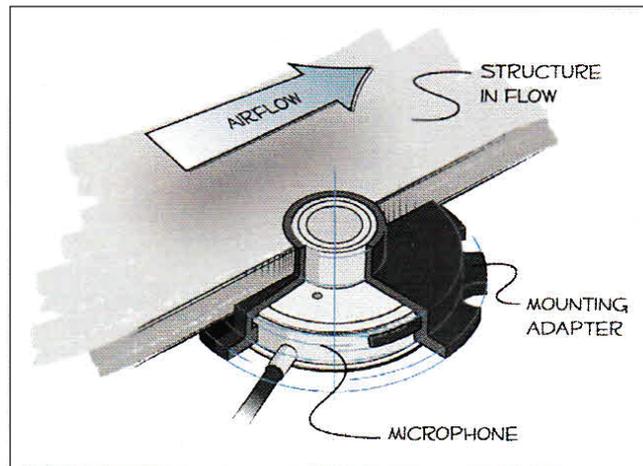
Fig. 1. *A G.R.A.S. 1/4" flush-mount microphone mounted with mounting adapter.*

General Handling Rules for Flush-mount Microphones

Save the Protection Grid
If you use the flush-mount microphone without grid (normal flush-mount application) then store the grid. Mount the protection grid whenever the flush-mount microphone is removed from its operating position.

Physical Deformation
Do not let any object touch the diaphragm. Avoid also touching it with your fingers.

Cleaning
If you must clean the diaphragm, use clean and dry air. This is available in cans from e.g. camera shops.

Delivered items and Accessories

Delivered Items

The microphone sets are delivered with an integrated thin (1.1 mm) coaxial cable terminated with a Microdot male connector. Standard cable length is 1.5 m (4.92 feet).

All the microphones listed below can be ordered with customized cable length, e.g. 47AX-CL, where CL is the cable length in centimeters. For instance, if you wish to order with 25 m cable, you write 47BX-CL2500.

47AX 1/2" Flush-mount Microphone

Item	Part Number
1/2" Flush mount Microphone with 1.5m integrated coax cable	47AX
Microdot female - BNC male adapter	AE0046

47AD 1/2" Flush-mount Microphone

Item	Part Number
1/2" Flush mount Microphone with 1.5m integrated coax cable	47AD
Microdot female - BNC male adapter	AE0046

47BX 1/4" Flush-mount Microphone

Item	Part Number
1/4" Flush mount Microphone with 1.5m integrated coax cable	47BX
Microdot female - BNC male adapter	AE0046

47DX 1/8" Flush-mount Microphone

Item	Part Number
1/8" Flush mount Microphone with 1.5m integrated coax cable	47DX
Microdot female - BNC male adapter	AE0046

Optional Accessories – Mounting

Mounting Adapters

Item	Part Number
Mounting Adapter for 1/2" Flush-mount Microphone Set	RA0501
Mounting Adapter for 1/4" Flush-mount Microphone Set	RA0502
Mounting Adapter for 1/8" Flush-mount Microphone Set	RA0503
Removal Tool for 1/2" and 1/4" Flush-mount Microphone Sets	RA0302

Optional Accessories – Calibration

Adapters for Sensitivity Calibration

Item		Part Number
G.R.A.S Kit for Sensitivity Calibration of Flush-mount Microphones		**OP0023**
This kit contains:		
Pistonphone Calibration Adapter for 1/2" Flush-mount Mic. Set	RA0221	
Pistonphone Calibration Adapter for 1/4" Flush-mount Mic. Set	RA0228	
Pistonphone Calibration Adapter for 1/8" Flush-mount Mic. Set	RA0278	

The adapters can be ordered separately or as part of the OP0023 kit.

Accessories for Frequency Calibration

Item		Part Number
Calibration Stand		AL0021
G.R.A.S Kit for Frequency Calibration of Flush-mount Microphones		**OP0024**
This kit contains:		
Electrostatic Actuator for Flush-mount Microphone Sets	RA0285	
Actuator Calibration Adapter for 1/4" Flush-mount Microphone Sets	RA0242	
Actuator Calibration Adapter for 1/8" Flush-mount Microphone Sets	RA0279	
Actuator Calibration Holder for Flush-mount Microphone Sets	RA0289	

For the 1/2" Flush-mount Microphone Set, no adapter is needed. The adapters can only be ordered as part of the OP0024 kit. The AL0021 Calibration Stand must be ordered separately.

Mounting and Removal

General Information

The procedure for mounting 1/2″, 1/4″ and 1/8″ flush-mount microphone sets is the same. The only difference is the dimensions of the mounting holes.

The microphones are typically mounted without the microphone grid. Store the microphone grid for future use. It is needed during transport and during sensitivity calibration with a pistonphone. It is important that the microphone is not mounted in a way that requires major force to remove it for service or calibration.

We recommend the use of our mounting adapters. These are made of plastic and ensure that the microphone is electrically insulated from the test structure and easy to install and remove. The microphone grid must be removed.

Item	Part Number
Mounting Adapter for 1/2″ Flush-mount Microphone Set	RA0501
Mounting Adapter for 1/4″ Flush-mount Microphone Set	RA0502
Mounting Adapter for 1/8″ Flush-mount Microphone Set	RA0503

The adapters give a snug fit and thereby excellent acoustic performance as no open space is created between the microphone cartridge and the mounting surface. An O-ring between the adapter and the microphone housing provides acoustical sealing.

Caution. Never use the thread for the microphone grid for mounting purpose!
Avoid sharp bends of the coaxial cable.

Mounting without Adapters

Below you will find the measures needed for the various mounting alternatives, including the measures you need to make your own mounting solution. If you have special installation requirements, you are welcome to contact G.R.A.S. to find a customized solution.

Mounting with Adapters

The adapter must be glued to the test object. When applying glue, only apply to the surface shown on the drawings. Be careful not to drop any glue on the microphone diaphragm.

On the drawings, the hole dimensions 32 mm for 1/2″, 32 mm for 1/4″ and 28 mm for 1/8″ are suggested as practical limits as you need some working space when attaching the microphone set to the adapter using an O-ring.

With the adapter mounted in the test object, the microphone is attached to the adapter with an O-ring that is part of the Adapter Kit. You can twist the O-ring once to increase the force on the flush-mount microphone set.

Measures, 1/2" Flush-mount

Dimensions for mounting without adapter

Dimensions for mounting with adapter

O-ring for attaching the microphone set to the adapter

Glue only this surface of the adapter
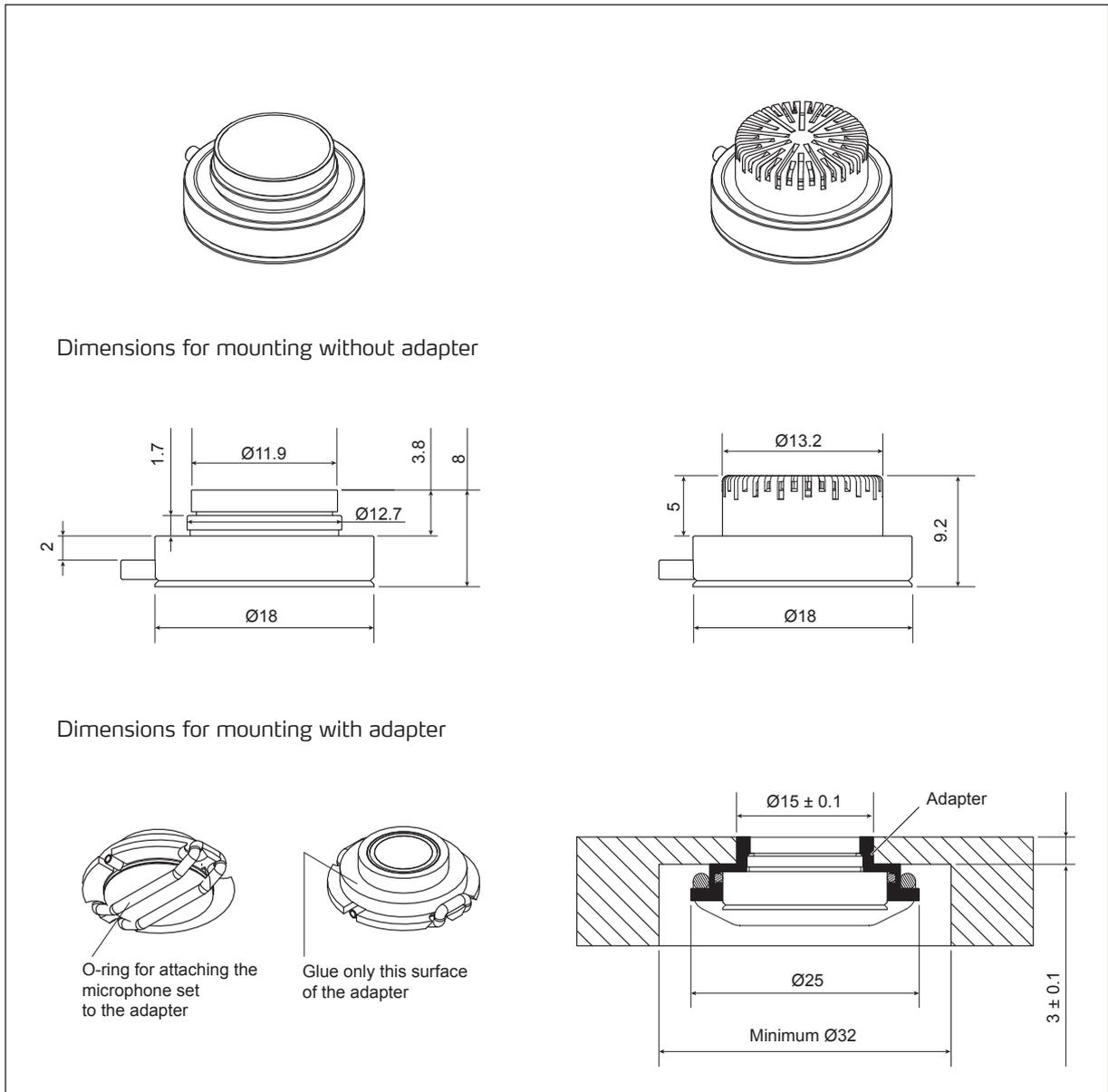
Adapter

Fig. 2. *Dimensions for mounting without and with the RA0501 Mounting Adapter. All measures in mm.*

Measures, 1/4" Flush-mount

Dimensions for mounting without adapter

Dimensions for mounting with adapter

O-ring for attaching the microphone set to the adapter

Glue only this surface of the adapter
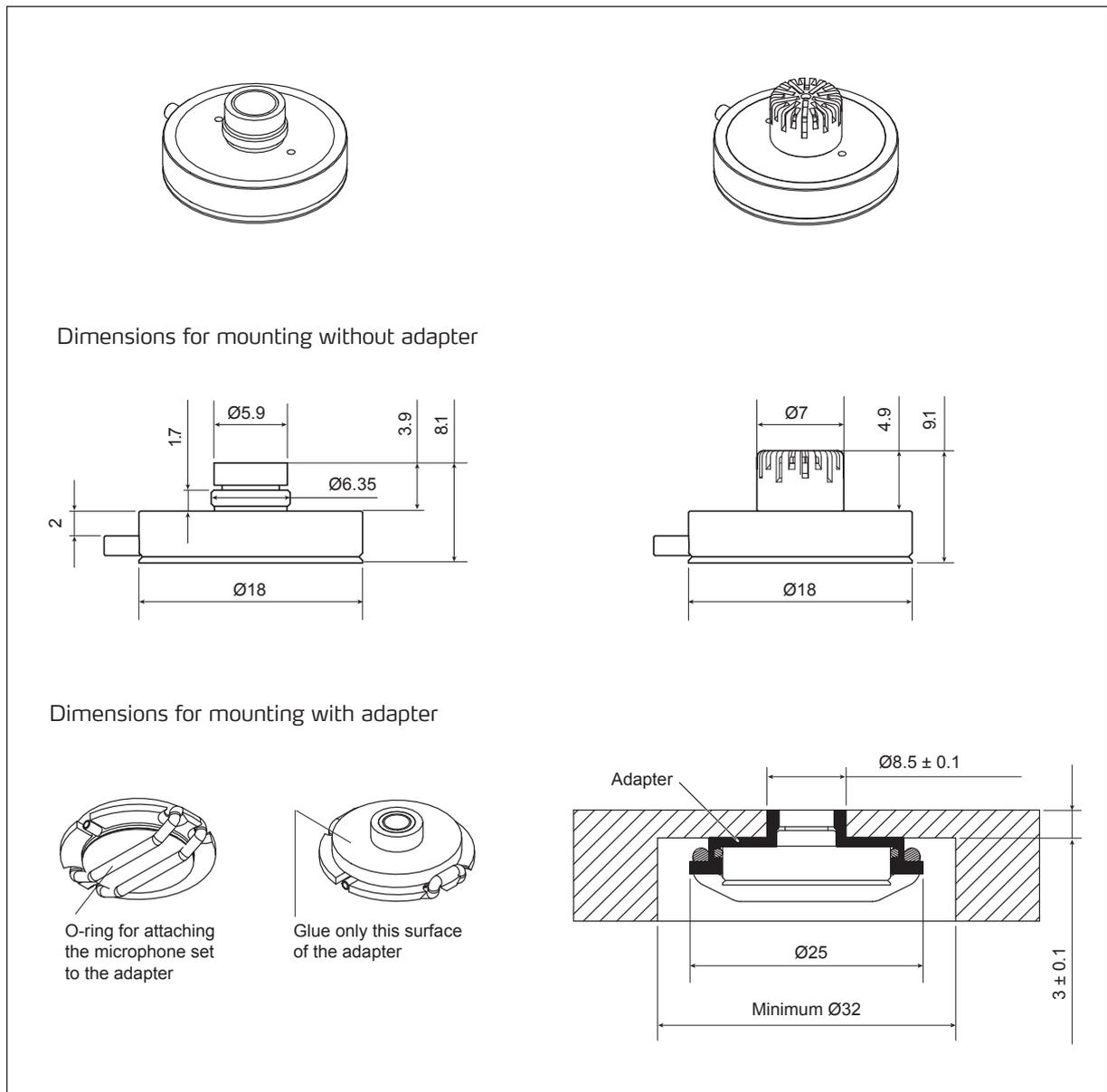
Adapter

Fig. 3. *Dimensions for mounting without and with the RA0502 Mounting Adapter. All measures in mm.*

Measures, 1/8" Flush-mount

Dimensions for mounting without adapter

Dimensions for mounting with adapter

O-ring for attaching
the microphont
to the adapter

Glue only this surface
of the adapter
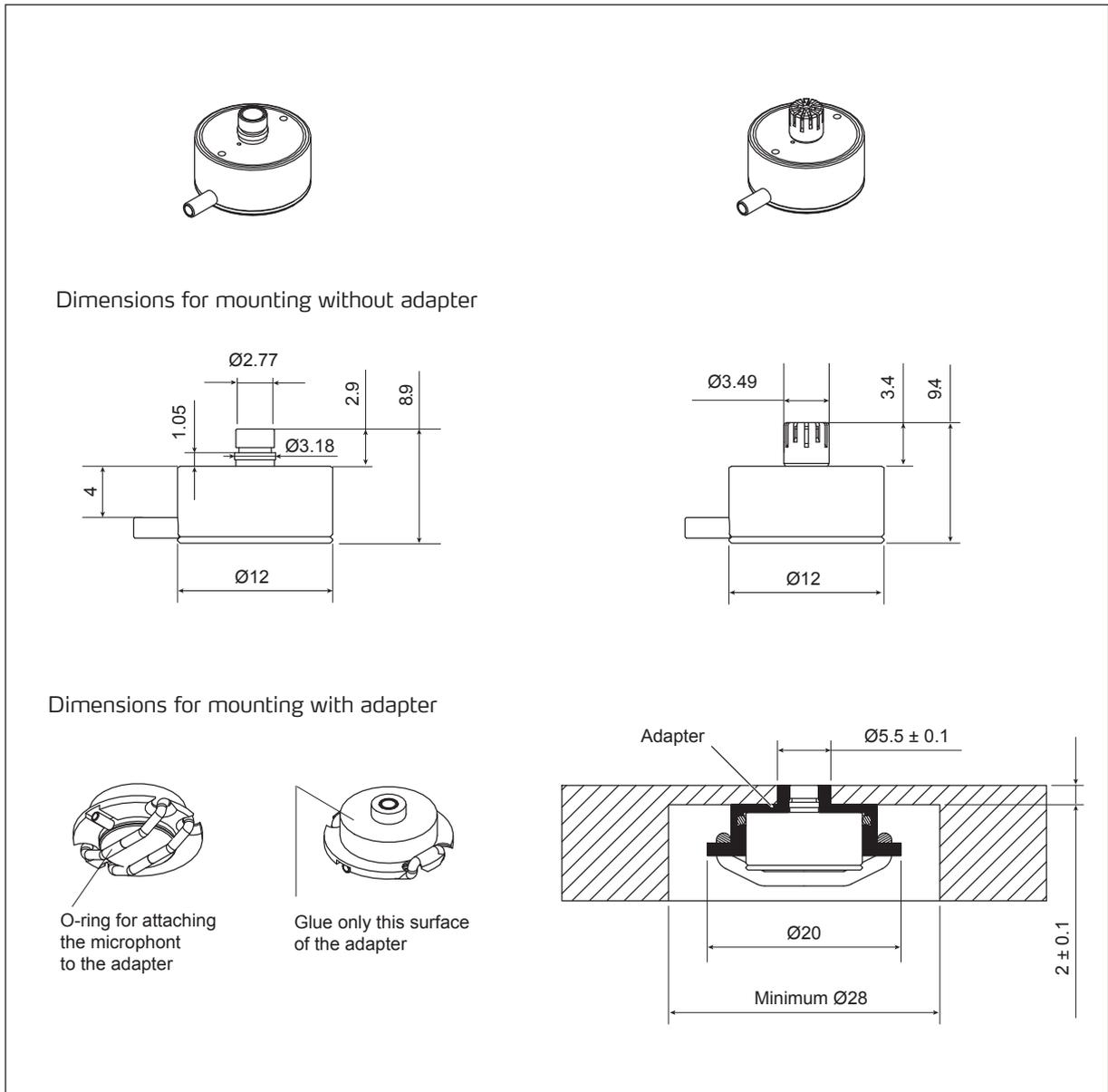
Adapter

Fig. 4. *Dimensions for mounting without and with the RA0503 Mounting Adapter. All measures in mm.*

Removal of 1/2 inch and 1/4 inch Flush-mount Microphones

Once mounted, a flush-mount microphone can be difficult to remove. The G.R.A.S. RA0302 Removal Tool for 1/2 inch and 1/4 inch flush-mount microphones makes it possible to remove the microphone without damage to structure, microphone housing or cable. The removal tool holds the microphone housing with 8 claws, tightened and loosened by turning a knob, see Fig. 5.

Space for cable
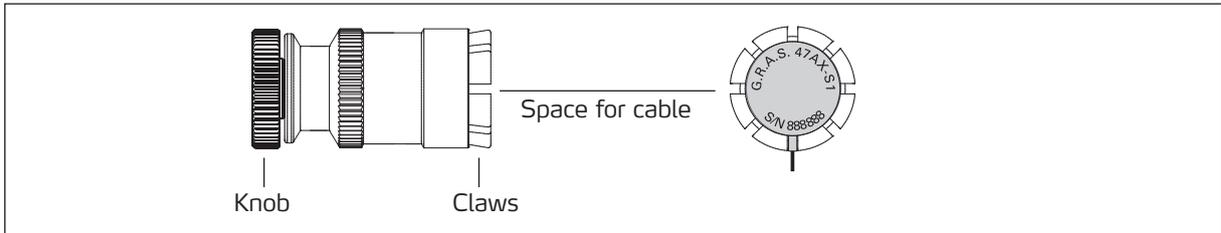
Knob   Claws

Fig. 5. *The RA0302 Removal Tool for 1/2-inch and 1/4-inch flush-mount microphones.*

1. If the surface microphone is secured with an O-ring, start by removing it.

2. Loosen the claws by turning the knob counterclockwise.

3. Slide the removal tool over the surface microphone and tighten its claws firmly by turning the knob clockwise.

   Caution: To avoid damage to the cable, be sure to locate it in the space between the claws, as shown in Fig. 5, and Fig. 6, steps 2 and 3.

4. Pull out the microphone.

5. Loosen the claws by turning the knob counterclockwise. Remove the microphone.

The removal tool should not be used for mounting.
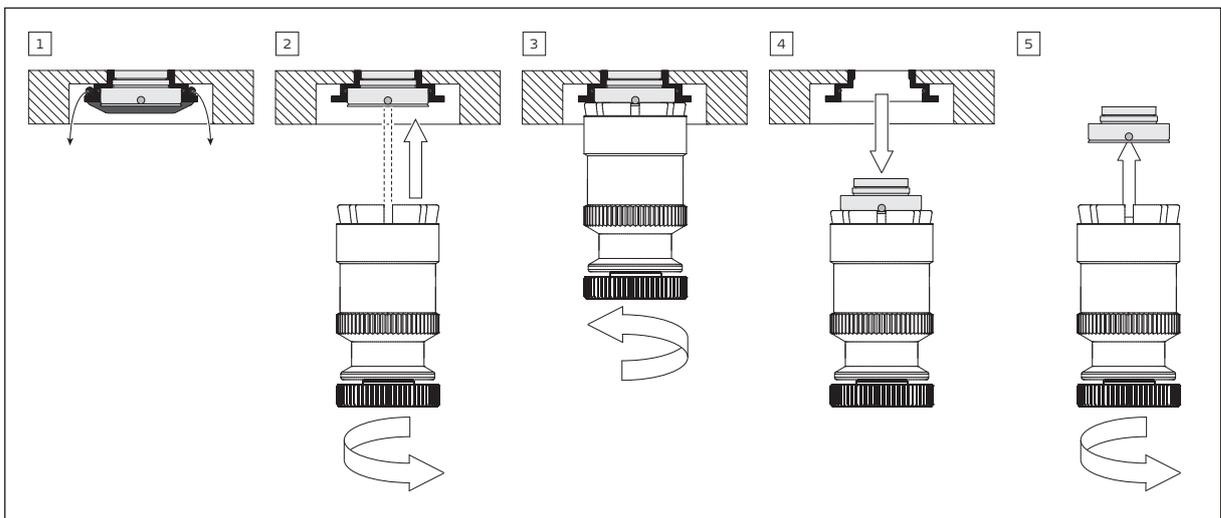
Fig. 6. *Removal of a 1/2 inch flush-mount microphone. The procedure for a 1/4 inch microphone is the same.*

Powering & Connection – CCP

General Information

The powering and connection is electrically exactly the same as for G.R.A.S. CCP standard microphone sets. A constant current input module that can deliver 4 mA and 24 V unloaded CCP voltage supply is required. If the constant current supply is lower, the capability of driving long cables is reduced and consequently the upper frequency is reduced. If the voltage supply is lower it will reduce the dynamic range.

Connection

The flush-mount microphone sets are provided with an integrated cable that is only 1.1 mm in diameter. The cable is terminated with a Microdot male connector. A G.R.A.S. AE0046 Microdot - BNC Adapter is included. The cable length is:

- 1.5 m (4.92 feet), in standard flush-mount microphone sets

- Customized length, when ordered as -CL variant

Connection examples

Connection	Adapter	Adapter Part number
Flush-mount microphone + BNC-BNC extension cable	Microdot to BNC BNC to BNC	AE0046 AE0074
Flush-mount microphone + Microdot-BNC extension cable	Microdot to Microdot	AE1038
Flush-mount microphone with customized length (-CL variant) cable (all the way to input module)	Microdot to BNC	AE0046

Extension Cables

BNC – BNC

Item	Part Number
3 m BNC - BNC Cable (RG-58, 4.9 mm diam.)	AA0035
10 m BNC - BNC Cable (RG-58, 4.9 mm diam.)	AA0037
Customized length BNC - BNC Cable (RG-58, 4.9 mm diam.)	AA0039-CL

Microdot – BNC

Item	Part Number
3 m Microdot - BNC Cable (RG-174, 2.8 mm diam.)	AA0070
10 m Microdot - BNC Cable (RG-174, 2.8 mm diam.)	AA0072
Customized length Microdot - BNC Cable (RG-174, 2.8 mm diam.)	AA0073-CL
3 m Microdot - BNC Cable, High Temp (Hi-Temp, 2 mm diam.)	AA0018
10 m Microdot - BNC Cable, High Temp (Hi-Temp, 2 mm diam.)	AA0062
Customized length Microdot - BNC Cable, High Temp (Hi-Temp, 2 mm diam.)	AA0061-CL

Cable Adapters

Item	Part Number
Microdot to BNC	AE0046
BNC male to BNC male Adapter	AA0037
Microdot male to Microdot male Adapter	AE1038

Calibration

Periodical Calibration

All measurement microphones need periodical calibration for obtaining reliable results. How often depends on your requirements and on the environment the microphone sets are exposed to. We recommend at least one calibration per year. G.R.A.S. offers equipment for calibration as well as calibration services. There are 2 types of calibration:

- Sensitivity (performed with the microphone grid on)

- Frequency response

How to Perform Sensitivity Calibration

Sensitivity calibration requires that the microphone set is detached, the grid mounted, and placed in the appropriate calibration adapter. The following items are needed:

- A pistonphone (The G.R.A.S. 42AP is recommended)

- One of the following pistonphone calibration adapters contained in the OP0023 Kit for Sensitivity Calibration of Flush-mount Microphone Sets:
  - 1/2" flush-mount microphone set: RA0221
  - 1/4" flush-mount microphone set: RA0228
  - 1/8" flush-mount microphone set: RA0278

No correction factor is required with any of these adapters.

For further instructions, see the manual for the G.R.A.S. OP0023 Kit for Sensitivity Calibration of Flush-mount microphones and the manual for your pistonphone.

How to Perform Frequency Calibration

Frequency calibration requires that the microphone set is detached and that the grid is removed. The G.R.A.S. OP0024 Kit for Frequency Calibration of Flush-mount Microphone Sets and the G.R.A.S. 14AA Electrostatic Actuator Amplifier are required.

Frequency calibration is performed as described in the manuals for

- G.R.A.S. OP0024 Kit for Frequency Calibration of Flush- mount Microphone Sets

- G.R.A.S. 14AA Electrostatic Actuator Amplifier

- G.R.A.S. 90CA Microphone Calibration System

The only difference is that other actuator and adapters are used. See page 7 for a list of the contents of the G.R.A.S. OP0024.

Specifications

Specifications are given on our website. Visit www.gras.dk

Calibration, Warranty and Repair

Calibration

Before leaving the factory, all G.R.A.S. products are calibrated in a controlled laboratory environment using traceable calibration equipment. A calibration card is included. In addition, the sensitivity data is stored in the TEDS memory.

We recommend a yearly recalibration at minimum, depending on the use, measurement environment, and internal quality control programs.

We recommend calibration prior to each use to ensure the accuracy of your measurements.

Warranty

G.R.A.S. microphone sets are made of components from our proven standard portfolio and are all manufactured of high-quality material and branded parts that were chosen and processed to ensure life-long stability and robustness.

All parts are manufactured and assembled at the factory in Denmark by skilled and dedicated operators in a verified clean-room environment. The microphone diaphragm, body and unique protection grid are made of high-grade stainless steel and make the microphone set resistant to physical damage as well as corrosion caused by aggressive air or gasses.

This, together with the enforced gold-plated microphone terminal which guarantees a highly reliable connection, enables us to offer 5 years warranty against defective materials and workmanship.

Exception: For cables, also integrated, a 6 month warranty applies.

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.

G.R.A.S.
SOUND & VIBRATION

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.