

Instruction Manual

*G.R.A.S. AL0030 Production Line
Acoustic Test Chamber*



Revision History

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

Revision	Date	Description
1	29 October 2014	First publication
2	24 September 2015	Accessories for mounting of DUT and sound source added, and connector panel modified.
3	7 October 2015	Customized connector panel added to Ordering Information.
4	5 July 2017	42AG substituted for the obsolete 42AB
5	2 November 2017	Amendment to Fig 1 about foam at the bottom of the box.

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Introduction

The G.R.A.S. AL0030 Production Line Acoustic Test Chamber is an anechoic test chamber for acoustic production line testing of mobile devices such as smart phones, tablets and similarly sized portable acoustic devices.







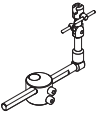
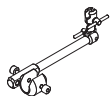
It provides a flexible platform that can be configured to suit specific requirements.

- The AL0030 is built from medium density fibre board lined with acoustic damping material.
- A large opening at the back of the chamber allows easy access to the chamber for configuring the test setup.
- The chamber has shock and vibration absorbing feet that prevent vibration from the outside from influencing the measurements.
- It has a drawer with multi-adjustable holders for easy and safe mounting and removal of the Device Under Test.
- The drawer can hold small and medium sized portable devices up to 300 x 200 mm (12 x 8 inches).
- It has 4 fixing points for microphones and sound source, 2 at the top and 2 at the bottom panel. Holders for a total of 4 microphones and/or sound sources can be mounted at these fixing points. Additionally, one microphone can be attached to the drawer.
- A connector panel with 4 BNC connectors, 2 USB, and 2 Mini DIN connectors provides connections to external instruments.

Ordering Information

AL0030 is a flexible platform that you can configure to suit your needs. The basic package consists of the test chamber and selectable microphone sets and fittings for immediate audio response testing. These are listed below.

Additionally, the test chamber can be fitted with an array of options, e.g. sound source and artificial ear - to suit your needs. They are listed on the next page.

Included Items		
	Acoustic Test Box (not configured)	AL0030
	Microdot-BNC cable 1 meter	AA0079
Included Items - User selected, one from each category		
Reference Microphone Set		
	1/4" CCP Pressure Microphone Set, 18 mV/Pa	46BL
	1/4" CCP Pressure Microphone Set, 1.45 mV/Pa	46BD
	1/4" CCP Free-field Microphone Set (4 mV/Pa)	46BE
DUT Holder Set		
	DUT Holder Set for top-mounting	OP0032
	DUT Holder Set for low mounting, big	OP0030
	DUT Holder Set for low mounting, small	OP0031
Microphone Holder		
	Microphone Holder for top/bottom mounting	OP0040
	Microphone Holder for mounting in the drawer	OP0041

Connector Panel	
Standard Connector Panel, (4 x BNC, 2 x USB, 2 x 4-pin Mini DIN)	OP0050
Blank for customization by customer	OP0051
Customized panel	OP0070

Optional Accessories

The following items are optional and can be ordered separately.

Optional Accessories	
Cables	
BNC-BNC Cable 0.5 meter	AA0032
BNC-BNC Cable 1 meter	AA0033
BNC-BNC Cable 2 meter	AA0034
BNC-BNC Cable 3 meter	AA0035
Microdot-BNC cable 3 meter	AA0070
Microdot-BNC cable custom length	AA0073-CL
Sound Source	
Mouth Simulator according to ITU-T Rec. P51 with built-in power amplifier	44AA
Mouth Simulator according to ITU-T Rec. P51	44AB
Sound Source Holder	
Sound Source Holder with swivel head for mouth simulator	OP0045
Sound Source Holder with swivel head for mouth simulator, heavy duty version	OP0046
Ear Simulator	
CCP Ear Simulator for Production Testing Based on ITU-T Rec. P57 Type 3.2 Low-leak	43AH
CCP Ear Simulator for Production Testing Based on ITU-T Rec. P57 Type 3.2 high-leak	43AI
Miscellaneous	
Set of 2 Drawer Latches	OP0061
1-Channel CCP Power Module with A-weighting filter	12AL
4-Channel CCP Power Module with Gain	12AX
Intelligent Pistonphone, Class 0	42AP
Multifunction Sound Calibrator	42AG

Description

The Acoustic Test Chamber

The AL0030 is built from medium density fibre board for excellent acoustic performance and is lined with 50 mm acoustical foam.

It has up to four mounting points with adjustable poles, two at the bottom and two at the top, for fittings for microphone(s) and sound source.

It has carrying handles on the sides. As the back plate is attached with four snap locks, it can easily be removed for access to the interior of the chamber. The tension of these locks can be adjusted for best acoustic isolation. The handles and locks are not shown in Fig. 1 for clarity.

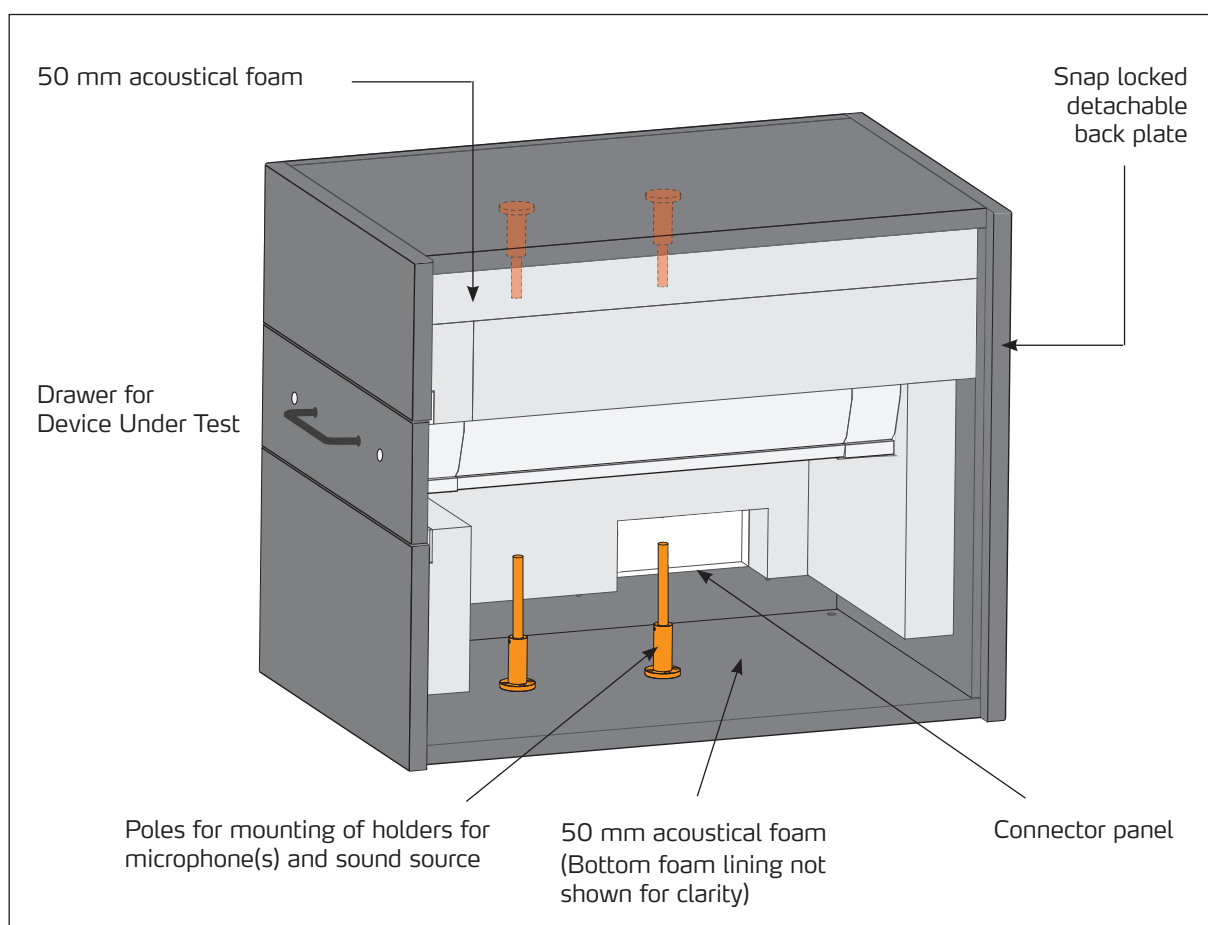


Fig. 1. Inside view of the AL0030 with one side panel removed. The rails for the drawer are not shown for clarity.

The Drawer

The drawer is mounted on telescopic rails for easy opening and closing. These are not shown in Fig. 2. The inside of the drawer's front plate is lined with acoustical foam and a sealing strip (not shown) to provide acoustical sealing. When pushed in, a spring provides pulling force to ensure that the drawer stays firmly closed.

The drawer has an adjustable mounting system that can accommodate devices up to 200 mm wide and 300 mm long. It consists of 4 holders that can be positioned at will on transversal and longitudinal bars with engraved metric scales. The holders are secured with finger screws.

Either of the longitudinal bars can be used for attaching the OP0041 Microphone Holder shown in Fig. 3 on page 9.

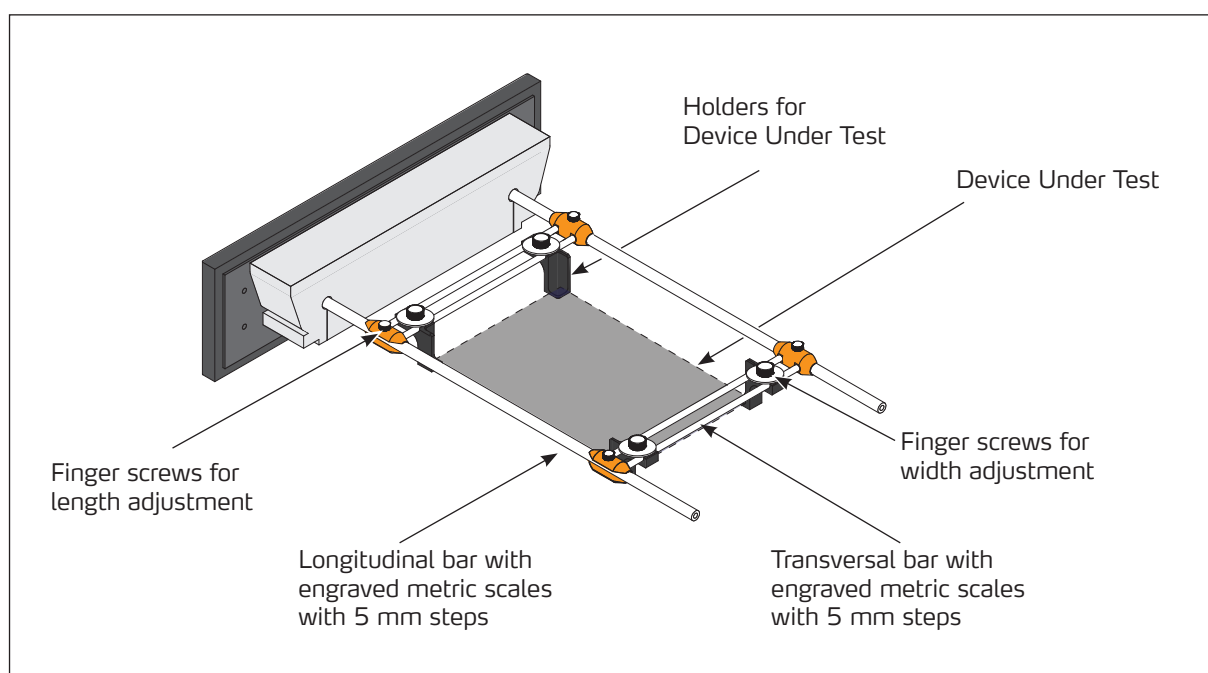



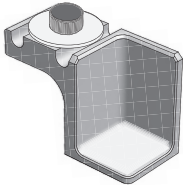
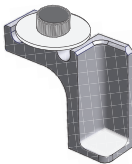
Fig. 2. The drawer and its fittings for holding the DUT. The drawer is shown without its telescopic mounting and sealing strip.

Accessories for Mounting

AL0030 comes with accessories for flexible mounting of DUT and test equipment. The DUT can be mounted at two different heights in the drawer. The test chamber has up to 4 mounting points for microphone sets and a sound source.

DUT Holders

Three different holders are available for mounting the DUT in the drawer. The holders' mounting surface is covered with soft felt.

	OP0032 DUT Holder Set for top-mounting
	OP0030 DUT Holder Set for low mounting of large DUT
	OP0031 DUT Holder Set for low mounting of small DUT

The holders are made from POM to prevent damage to the DUT when it slides into place.

Holder for Drawer-mounted Microphone

The OP0041 Microphone Holder is for attaching a microphone set to one of the drawer's longitudinal bars. The adjustment possibilities are shown in Fig. 3.

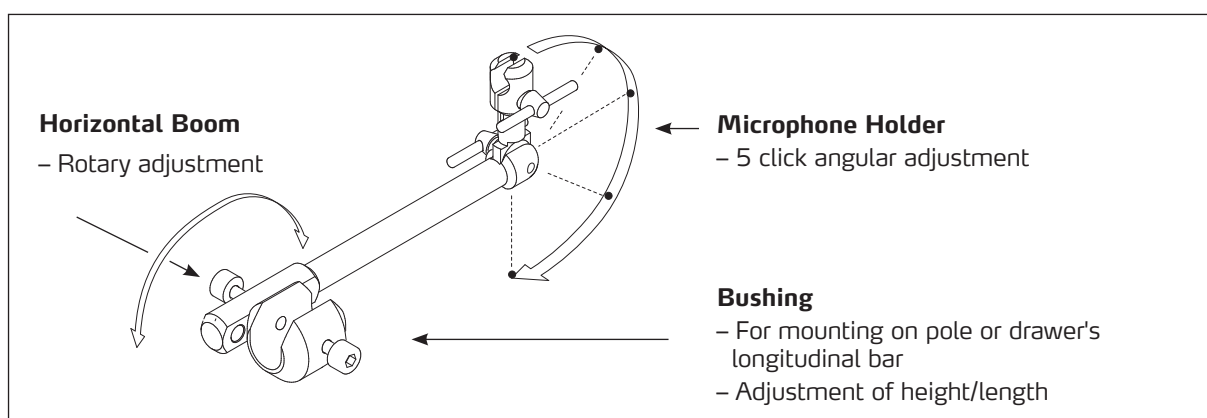


Fig. 3. The OP0041 Microphone Holder for attaching a microphone to the drawer.

Holder for Chamber-mounted Microphones and Sound Source

The AL0030 has four mounting points for microphones and sound source, two at the top and two at the bottom. They allow for adjustment of horizontal and vertical position as well as angle. These adjustments make it possible to position the microphone(s) and sound source in virtually any position in relation to the DUT. The adjustment possibilities are shown in Fig. 4 and Fig. 5.

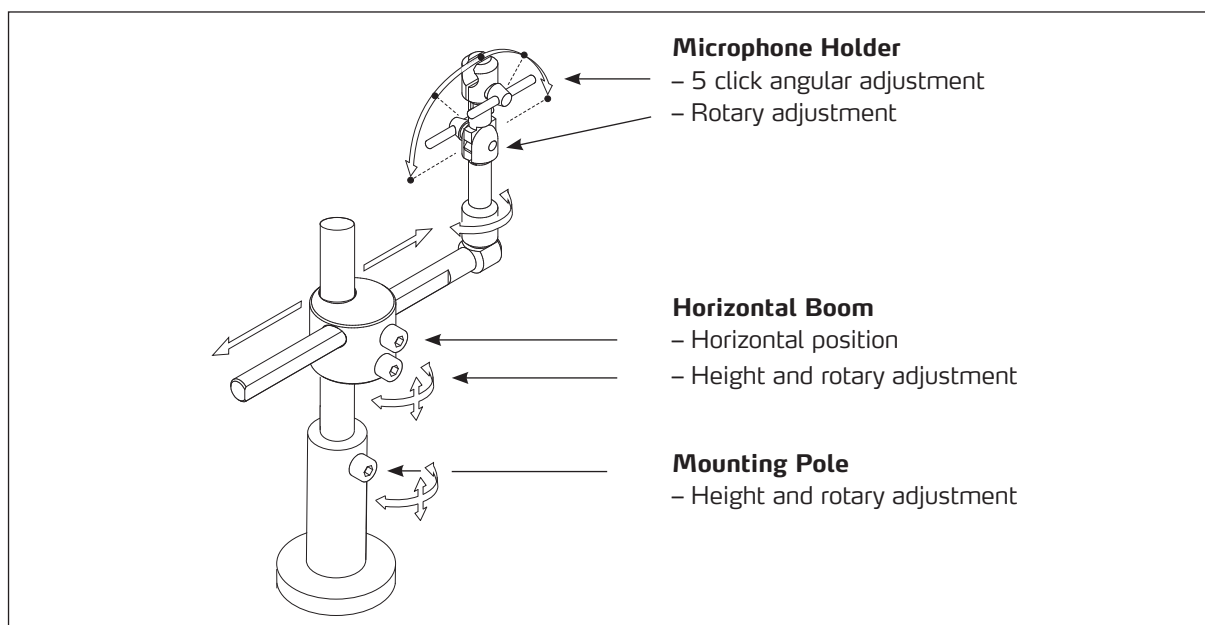


Fig. 4. The adjustment possibilities of the OP0040 Microphone Holder.

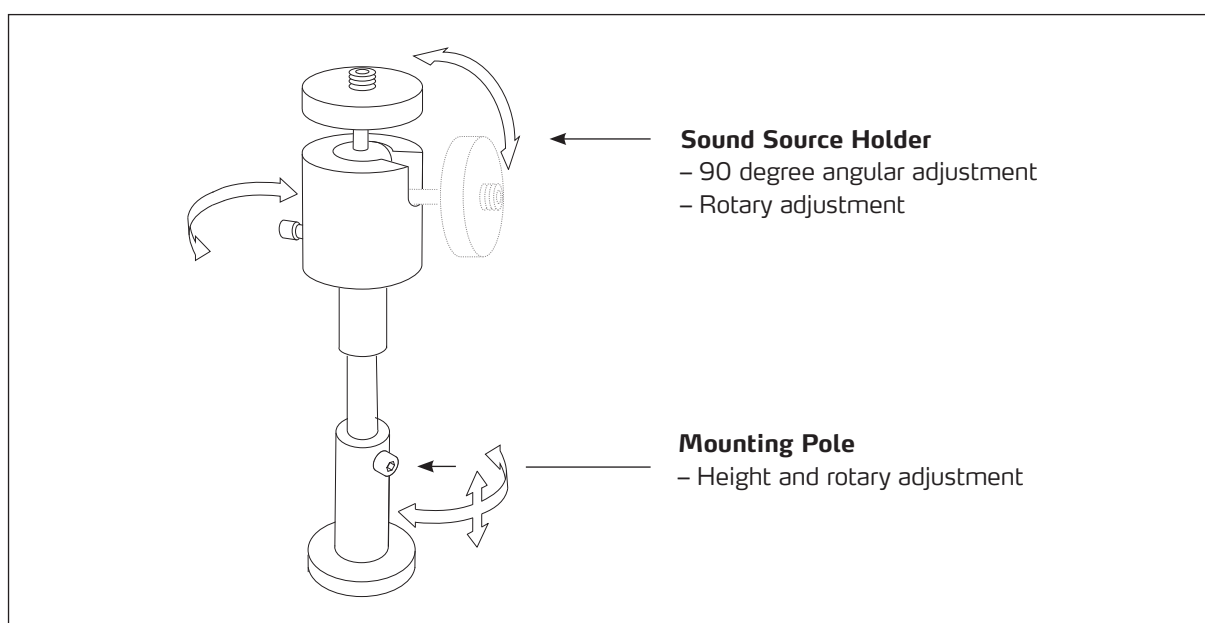


Fig. 5. The adjustment possibilities of the OP0045 Sound Source Holder.

The Microphone Set

The AL0030 can be delivered with either of these three microphone sets:

- 46BL 1/4" CCP Pressure Standard Microphone Set, High Sensitivity.
- 46BD 1/4" CCP Pressure Standard Microphone Set.
- 46BE 1/4" CCP Free-field Standard Microphone Set.

They all comply with the specifications IEC 61094: Measurement Microphones, Part 4: Specifications for working standard microphones.

The Connector Panel

The connector panel has 4 BNC sockets, 2 multipurpose Mini DIN 4-pin sockets and 2 USB Type B sockets.

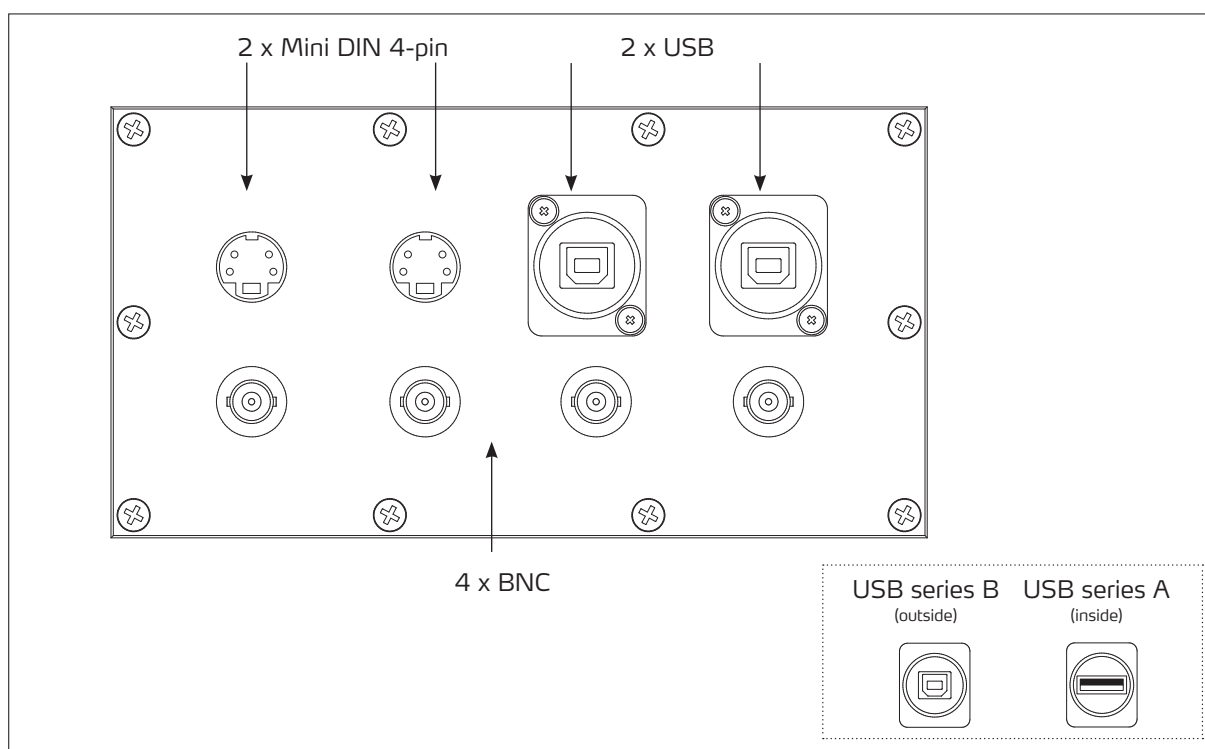


Fig. 6. The connector panel, outside view.

The inside of the panel is identical to the outside, except that the USB sockets are series A sockets.

Technical Specifications

Acoustic Test Chamber

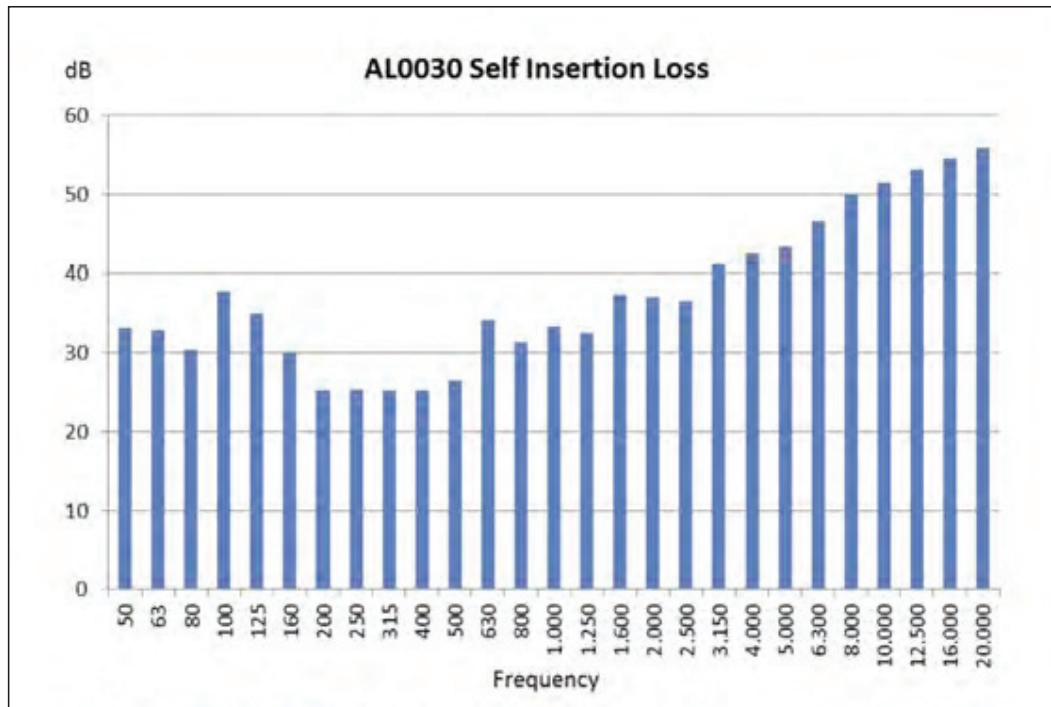


Fig. 7. SIL measured in reverberant conditions.

Frequency range	Hz	100 Hz to 20 k*
Noise insulation (SIL)	dB	>25 dB (3rd Octave)
Patch Panel Connections		4 x BNC 2 x USB 2 x Mini DIN 4-pin
Dimensions (W x D x H)	cm	42.4 x 63.8 x 52.8
Weight	kg	39

*The recommended useful frequency range for AL0030 is from 100 Hz to 20 kHz. It can be used down to 50 Hz, however, below 100 Hz phenomena like room gain can make measurements unpredictable, and therefore we recommend 100 Hz as a practical lower limit.

AL0030 is specified to work as intended up to 20 kHz. However, with 46BD or 46BE, it is possible to measure well above this upper limit. There is no reason why it could not be used up to for example 40 kHz, however, we have not investigated its properties above 20 kHz, which therefore is the upper limit of the recommended useful frequency range.

Reference Microphones

46BL

Frequency range	Hz	4 to 20 k
Dynamic range	dB	25 dB(A) to 147
Sensitivity	mV/Pa	18

46BD

Frequency range	Hz	4 to 70 k
Dynamic range	dB	44 dB(A) to 156
Sensitivity	mV/Pa	1.45

46BE

Frequency range	Hz	4 to 80 k
Dynamic range	dB	35 dB(A) to 150
Sensitivity	mV/Pa	4

Mouth Simulators 44AA and 44AB

Standards		IEE 269.661 and ITU-T Rec. P51
Continuous output level	200 to 6 kHz 100 to 16 kHz	110 dB 100 dB
Loudspeaker		8Ω /20 W (max)
Gain (44A only)*		10
Power Supply		24 Vdc
Weight	kg	1.3

*44A has a built-in amplifier, 44AB requires external amplification.

Calibration, Service and Warranty

Calibration

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

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

The acoustic test chamber is covered by a 2 year warranty. The drawer is guaranteed for 100.000 operations (open + close).

Damaged diaphragms in microphones can be replaced. The microphone diaphragm, body, and improved protection grid are made of high-grade stainless steel, which makes the microphone resistant to physical damage, as well as corrosion caused by aggressive air or gasses. This, combined with the reinforced gold-plated microphone terminal which guarantees a highly reliable connection, enables G.R.A.S. to offer 5 years warranty against defective materials and workmanship.

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.