Hemispheres

for Sound Power Testing

G.R.A.S.
SOUND & VIBRATION

Sound Power made easy

Introduction
If you have ever tried to configure and use a sound power setup based on microphones mounted on single tripods around your DUT, you will surely appreciate G.R.A.S.' new sound power hemispheres. The hemispheres will hold and position the measurement microphones according to the standards and have been designed with focus on your workflow; They are very easy to assemble and it is easy to position and access the DUT. Furthermore, in best G.R.A.S. tradition they are optimized acoustically for correct and repeatable measurement data.

The structure is made portable to achieve a high degree of freedom of location. This, combined with the easy, tool-less assembly in minutes, enables you to save expensive anechoic chamber time and to offer on-site sound power diagnostics.

Standards
The G.R.A.S. hemispheres are compliant with the ISO 3744, 3745 and 3746 (ANSI S12.54, S12.55, S12.56) standards and accommodate for 4, 10 and 20 positions. These are clearly marked to ease the mounting and maintain measurement repeatability.
Two hemisphere structures are available; a 1 m measurement radius and a 2 m measurement radius.

Applications
Depending on the size and the emitted acoustic level of the DUT, the hemispheres will allow sound power measurements on everything from small sized personal electrics to office machines and IT products, household appliances, power tools and smaller engines. The only restriction is, that the characteristic dimension of the DUT may be no more than half the measurement radius. See the aforementioned standards for further details.

Configurations and interface
The hemispheres are available as preconfigured kits with 4, 10 or 20 microphone sets in 3 variations; CCP, LEMO and low-noise LEMO. In the table to the right you will be able to find the hemisphere kit that suits your type of input module along with dynamic specifications for your application.

Plug & Play
The recommended microphone sets can be connected directly to all professional measurement systems and are as indicated available for both CCP and 7-pin LEMO inputs. If your system platform supports intelligent transducers according to IEEE 1451.4 (TEDS), the system can be set up to identify the microphone properties and position in the array.

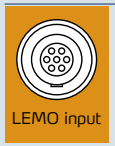
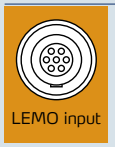
Holders and cables
The pre-configured hemispheres are delivered with microphone set holders that will fit all 3 microphone types. Respective cables and cable clips are included and everything are delivered in high-quality flight cases.

Calibration data
All included microphone sets are delivered with individual calibration charts including sensitivity values and frequency responses. These sensitivity values can be used directly in your system setup.

Verification and calibration
For frequent measurement chain verification a reference sound source will be required. G.R.A.S. supplies 114 dB types for the standard microphone sets and a special 94 dB adapter for the low-noise sets.

Depending on the use and your internal quality control requirements we recommend that the sets are re-calibrated at least every second year.

Contact your G.R.A.S. Partner for options and services.

Microphone Sets	ISO 3746:2010 ANSI S12.56 4 Channels	ISO 3744:2010 ANSI S12.54 10 Channels	ISO 3745:2012 ANSI S12.55 20 Channels
 **Frequency Range** 3.15 Hz – 20 kHz **Dynamic Range** 17 dBA – 135 dB **Sensitivity** 50 mV/Pa	1 m radius: **G.R.A.S. 67HA-01** 2 m radius: **G.R.A.S. 67HB-01** **Including** 1x Hemisphere structure 4x G.R.A.S. 46AE 1/2" CCP Standard Microphone Sets , cables, holders 2x Flight cases	1 m radius: **G.R.A.S. 67HA-02** 2 m radius: **G.R.A.S. 67HB-02** **Including** 1x Hemisphere structure 10x G.R.A.S. 46AE 1/2" CCP Standard Microphone Sets , cables, holders 2x Flight cases	1 m radius: **G.R.A.S. 67HA-03** 2 m radius: **G.R.A.S. 67HB-03** **Including** 1x Hemisphere structure 20x G.R.A.S. 46AE 1/2" CCP Standard Microphone Sets , cables, holders 2x Flight cases
 **Frequency Range** 3.15 Hz – 20 kHz **Dynamic Range** 17 dBA – 146 dB **Sensitivity** 50 mV/Pa	1 m radius: **G.R.A.S. 67HA-04** 2 m radius: **G.R.A.S. 67HB-04** **Including** 1x Hemisphere structure 4x G.R.A.S. 46AF 1/2" LEMO Standard Microphone Sets, cables, holders 2x Flight cases	1 m radius: **G.R.A.S. 67HA-05** 2 m radius: **G.R.A.S. 67HB-05** **Including** 1x Hemisphere structure 10x G.R.A.S. 46AF 1/2" LEMO Standard Microphone Sets, cables, holders 2x Flight cases	1 m radius: **G.R.A.S. 67HA-06** 2 m radius: **G.R.A.S. 67HB-06** **Including** 1x Hemisphere structure 20x G.R.A.S. 46AF 1/2" LEMO Standard Microphone Sets, cables, holders 2x Flight cases
 **Frequency Range*** 6 Hz – 20 kHz **Dynamic Range** 6.5 dBA – 113 dB **Sensitivity** 900 mV/Pa	1 m radius: **G.R.A.S. 67HA-07** 2 m radius: **G.R.A.S. 67HB-07** **Including** 1x Hemisphere structure 4x G.R.A.S. 40HL 1/2" LEMO Low-noise Microphone Sets, cables, holders 2x Flight cases	1 m radius: **G.R.A.S. 67HA-08** 2 m radius: **G.R.A.S. 67HB-08** **Including** 1x Hemisphere structure 10x G.R.A.S. 40HL 1/2" LEMO Low-noise Microphone Sets, cables, holders 2x Flight cases	1 m radius: **G.R.A.S. 67HA-09** 2 m radius: **G.R.A.S. 67HB-09** **Including** 1x Hemisphere structure 20x G.R.A.S. 40HL 1/2" LEMO Low-noise Microphone Sets, cables, holders 2x Flight cases

Accessories

Reference sound sources
G.R.A.S. 42AB Sound Calibrator (114 dB)
G.R.A.S. 42AP Intelligent Pistonphone (114 dB)
G.R.A.S. RA0090 94 dB Pistonphone Coupler for G.R.A.S. 42AP

Extension cables
For G.R.A.S. CCP Microphone Sets: 10 m BNC-BNC Cable AA0037
For G.R.A.S. LEMO Microphone Sets: 10 m LEMO-LEMO Cable AA0009

Frequency range value is within ± 2 dB of nominal sensitivity value unless other is specified. Upper limit of dynamic range is specified at 3% distortion. *(+2 dB / -3 dB)
CCP - Constant Current Power is the same as IEPE and CCLD and is compatible with ICP™, DeltaTron®, ISOTRON® etc.
7-pin LEMO – the classic measurement microphone input including a 200 V polarization voltage supply.

We Make Microphones

Since the company was established in 1994, we have been 100% dedicated to develop and manufacture high-quality measurement microphones and related acoustic equipment.

Tradition
We are located in Denmark and founded by the Danish acoustics pioneer, Gunnar Rasmussen who for more than 60 years has contributed to the world of sound and vibration with his unique ideas and designs. In 1956 Mr. Rasmussen designed the first reproducible 1" condenser measurement microphones. And the commercialization of these measurement microphones enabled quality measurements and instrumentation which could be acoustically calibrated and accredited.

Mr. Rasmussen's ingenuity and understanding of not yet spoken customer needs soon lead to the world's most popular and probably most copied acoustic sensor: The 1/2" measurement microphone. Then the 1/4" and 1/8" microphones followed with outstanding dynamic and high-frequency capability that brought higher definition and transparency into impulse noise diagnostics. Many variants have been made available over the years; all based on Gunnar Rasmussen's original 1" pressure microphone design.

Innovation
At G.R.A.S., we and our customers benefit daily from Mr. Rasmussen's exceptional understanding of acoustics, physics, electronics and measurement needs. Not only in our R&D department but in the entire house we are proud to develop, produce and offer the broadest range of high-quality measurement microphones and accessories in the industry. And as a family company, now owned and managed by the two sons, Per Rasmussen and Peter Wulf-Andersen, we safeguard our heritage and knowledge to help create new opportunities with our customers. We work with everybody who has an interest in sound or noise within the fields of aerospace, automotive, audiology, consumer electronics, noise monitoring, building acoustics and telecommunications, metrology, education, consultancy, legislation and system integration.

Quality
All our microphones are solely produced in stainless steel and in a quality that allows for a 5 year warranty.

Should you by mistake damage the diaphragm on a G.R.A.S. microphone, our special technique enables repair at a very reasonable price. A fact often valued not only by the users but also by their purchase departments who are guaranteed a long term investment with equipment from G.R.A.S.

Partners
G.R.A.S. is represented worldwide in more than 40 countries by subsidiaries and partners. Whether you are searching for a multi-channel solution, a replacement microphone for your sound level meter or a customized sensor design, your local G.R.A.S. partner will in close corporation with us be able to help solve your measurement needs.

Please visit gras.dk for your local G.R.A.S. partner.