GRAS 147AX CCP RUGGED PRESSURE MICROPHONE

Engine Noise Microphone

ACOUSTIC SENSORS FOR PREMIUM NVH DATA

GRAS Sound & Vibration

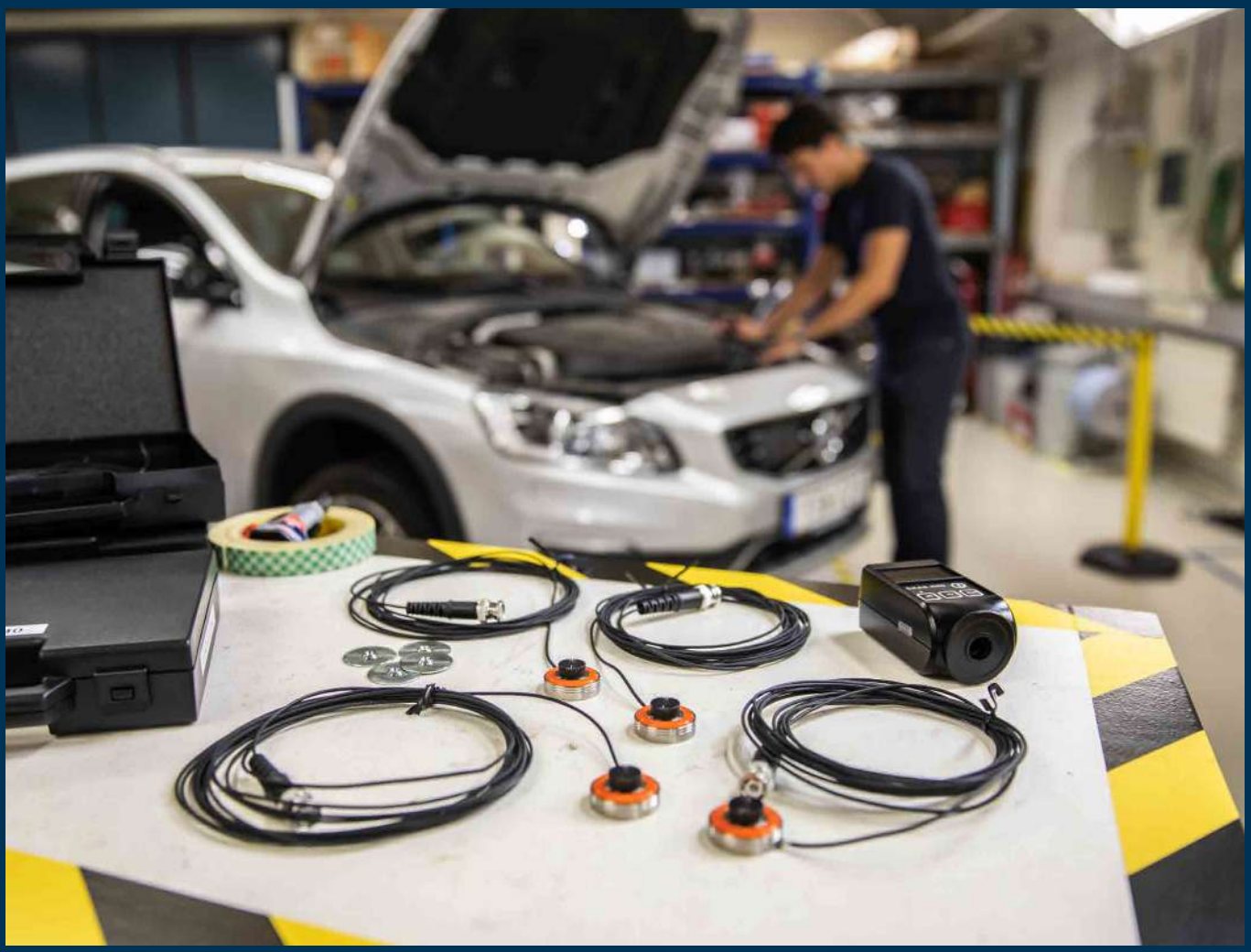
A new paradigm for engine noise testing

GRAS 147AX CCP Rugged Pressure Microphone

Rugged surface microphone for cold and hot engine testing

Growing customer expectations increasingly push for noise-reduced cars. Therefore, OEMs continuously struggle to identify and reduce noise sources. Also, the increasing pressure for fast prototyping and shorter “time to market” calls for improved and more efficient noise, vibration and harshness (NVH) test methods. Generating reliable data is critical in this process, and it requires using the best measurement microphones as well as constantly improving the measurement procedures.

This is why GRAS has developed a new surface microphone optimized for cold and hot engine measurements. With its laboratory precision, extreme ruggedness to match the hot and harsh conditions in an engine bay as well as a novel form factor and mounting system, the 147AX microphone (patent pending) is destined to become the preferred solution for testing facilities around the world. Together with highly improved testing methods that ensure easy and repeatable transfer path analysis (TPA) measurements, GRAS is introducing a new era in engine noise testing.



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THE CHALLENGE

Engine noise testing includes acoustic transfer function (ATF) determination. Most widely used is the reciprocity method with a high number of free-field, standard ½“ microphones fixed to the engine with glue, adhesive tape or mounted on a tripod. This method is cumbersome and very time-consuming, and because the setup is difficult to reproduce, the accuracy of the results is limited.

- Microphone positioning is imprecise.
- Exact repositioning is virtually impossible.
- The free-field characteristics of the microphones do not match the properties of the sound field.
- Even minor repositioning differences introduce considerable measurement errors.
- Detecting and investigating specific noise sources is impossible due to the fact that all noise sources are averaged to compensate for imprecise microphone positioning.
- Conventional microphones are easily damaged which means that the advantage of using the same sensor in the exact same position over a longer period of time is not possible.
- Many OEMs use microphones with a short lifetime, consequently cost of ownership is high.

THE SOLUTION

The 147AX is optimized to withstand challenging conditions found in an engine bay. It provides easy and repeatable mounting for highly accurate and fast measurement results.

- ✓ A novel mounting system – MagMount™ – provides strong, easy and repeatable mounting with high precision.
- ✓ Surface mounting at engine bay boundaries combined with pressure-field response ensure correct match to the properties of the sound field.
- ✓ Shock-absorbing and rugged features make it able to cope with extended testing on proving grounds and public roads.
- ✓ Effective protection against moisture, dirt and oil mist makes it resilient to engine bay conditions.
- ✓ Temperature resistance up to 125 °C (257 °F) enables hot engine testing. TPA and hot engine measurements can easily be compared.
- ✓ A robust cable reduces the likelihood of an unreliable connection. The cable is user-replaceable.
- ✓ Small form factor – can be used in confined spaces.
- ✓ Rugged design (and a replaceable diaphragm) translates into lower total cost of ownership.

Explore the benefits

– the details that make all the difference...

Water, Oil and Dust-resistant Grid

Can be used in contaminated environments – filter replacement is easy.

Shock-absorbing Design

Accurate data even during rough testing, e.g. on proving grounds or public roads.

Temperature Resistant

Can be mounted close to heat sources.

Power-on Indicator

Visual confirmation of status and transducer electronic data sheet (TEDS) reading during power-up ensure efficiency and readiness for data collection.

Waterproof Design

Microphone-preamplifier housing, including the connection, is certified watertight according to IP67.

Small Form Factor

Can be used in small or difficult-to-access spaces where conventional free-field microphones must give up.

Robust Cabling

Strain-relieved and waterproof connection ensure data integrity and survivability during outdoor tests. The cable is user replaceable.

Online Calibration Data

Calibration data for each specific microphone can be assessed at gras.dk/e-data.

Protected Venting

Wet or moist conditions will not interfere with your measurements.

MICROPHONE MOUNTING MADE PRECISE, REPRODUCIBLE AND EASY

The backside of the 147AX microphone housing has a strong built-in magnet which makes it possible to place the microphone on any flat metal surface without compromising measurements. It is also possible to fix it easily anywhere in the engine bay by use of a mounting disc allowing for fast, precise and repeatable mounting of the microphone – even in confined spaces.

Repeated mounting and demounting will not affect mounting precision or the repeatability of measurements. The same mounting points can be used for cold and hot engine testing, including testing on proving grounds or public roads.

MagMount™ mounting system for 147AX

147AX Surface-mounted microphone
The grid with its built-in filter is easily replaceable whenever the filter is clogged.

Mounting disc
The disc can be attached to the test object with glue, double-sided adhesive tape or a screw.

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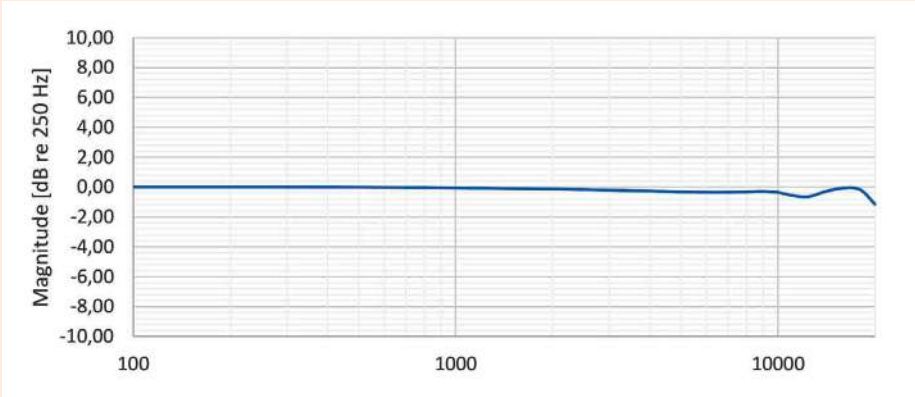
Specifications

High sensitivity, flat pressure frequency response and temperature resistance are key performance characteristics.

147AX Typical Pressure Frequency Response



Frequency [Hz]

MODEL SPECIFICATIONS

147AX CCP Rugged Pressure Microphone Set

FREQUENCY RANGE:
3.15 Hz to 20 kHz

DYNAMIC RANGE:
19 dB(A) to 133 dB

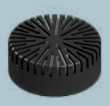
SENSITIVITY:
42 mV/Pa

TEMPERATURE, OPERATION:
-40 to 125°C (-40 to 257 °F)

ACCESSORIES

- **High-temperature Windscreen, Click-mount**
  Reduces turbulence and adds protection, AM0388-1 (1 pc), AM0388-2 (5 pcs).

- **RA0390 Protection Grid**
  Dust, oil and water-resistant protection grid.



- **RA0398 Fairing**
  For use when 147AX is mounted in airflow.

- **Cable Replacement Kits**
  RA0393 Cable Replacement Kit, 5 m.
  RA0394 Cable Replacement Kit, 10 m.
  RA0395 Cable Replacement Kit, 20 m.

- **RA0391 Calibration Adapter**
  Calibration adapter for in-situ calibration with a ½" coupler.

- **MagMount™ Discs**
  RA0392-1 Pack of 5 pcs.
  RA0392-10 Pack of 50 pcs.
  Double-sided adhesive tape included.

For full information about included and optional accessories, please refer to the 147AX product page at ***www.grasacoustics.com***

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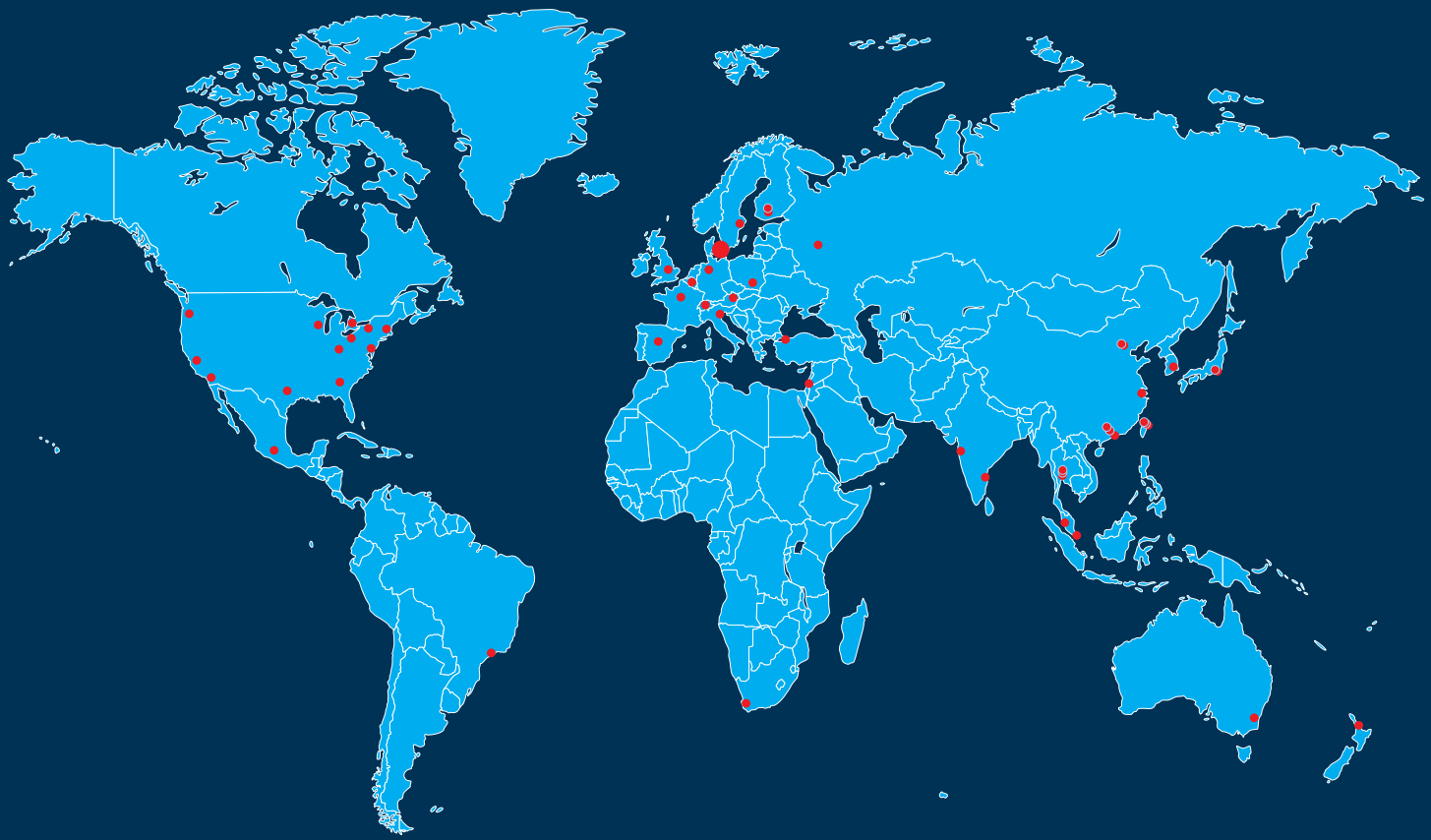

About GRAS Sound & Vibration

GRAS is a worldwide leader in the sound and vibration industry. We develop and manufacture state-of-the-art measurement microphones to industries where acoustic measuring accuracy and repeatability is of utmost importance in R&D, QA and production. This includes applications and solutions for customers within the fields of aerospace, automotive, audiology, and consumer electronics. GRAS microphones are designed to live up to the high quality, durability and accuracy that our customers have come to expect and trust.

grasacoustics.com

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