# GRAS 40PO-H

## EQset™ High Freq. Production Line Microphone, High SPL


Freq Range: 10 Hz to 40 kHz
Dyn Range: 36 dBA to 138 dB
Sensitivity: 8 mV/Pa (-42 dB ref 1V/Pa)

The GRAS 40PO-H with EQset™ technology is a 1/4" high-frequency production line pressure microphone capable of conducting precise measurements up to 40 kHz. Designed for ease of use and environmental stability, it features EQset technology, which utilizes digital signal processing to maintain consistent sensitivity and a flat frequency response across all frequencies within strict tolerances. Unlike other production microphones, the 40PO-H incorporates a high-quality condenser measurement microphone capsule, ensuring high-precision and reliable testing up to 40 kHz. This innovative design provides exceptional environmental stability, setting the 40PO-H apart. It is ideal for measuring high sound pressure levels, while the GRAS 40PO-L, with its higher sensitivity, is suited for lower sound pressure level measurements.

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## GRAS 40PO-H with EQset™ technology

The GRAS 40PO-H with EQset™ technology is engineered specifically for production line environments, where both audio frequencies and ultrasound frequencies up to 40 kHz need to be measured. Despite incorporating a high-quality condenser microphone capsule, it is designed to be cost-effective while offering significant advantages over traditional production line microphones. Te 40PO-H overcomes common challenges such as long-term stability, robustness, and limited frequency range, delivering a solution that is both user-friendly and error-resistant, making it the best in its class.

Each GRAS 40PO-H microphone features a flat frequency response curve and fixed sensitivity. Thanks to EQset™ technology, every microphone maintains the same fixed sensitivity within a tolerance of ±0.2 dB at 250 Hz, along with a flat frequency response within ±0.5 dB from 10 Hz to 25 kHz and ±1 dB from 10 Hz to 40 kHz. These advanced capabilities are packed into a compact, small form factor.

Optimized for high sound pressure level measurements due to its low sensitivity, the 40PO-H excels in challenging environments. For applications requiring lower sound pressure level measurements, the GRAS 40PO-L is available, offering higher sensitivity and a low noise floor.

## EQset Technology

EQset is a groundbreaking technology developed by GRAS, incorporating a digital signal processing (DSP) module directly into the microphone. This DSP module equalizes the microphone's frequency response and sets its sensitivity, ensuring that all microphones of the same type have a uniformly fixed sensitivity and flat frequency response with tight tolerances. As a result, these microphones are as identical to each other as technically possible, minimizing measurement uncertainty and significantly simplifying the signal path setup.

With EQset, everything is streamlined—no individual microphone adjustments or corrections are needed. This not only speeds up the setup process but also reduces the time required for operator training. However, the most significant advantage of EQset goes beyond time savings: it virtually eliminates the risk of false passes or fails on production lines, a common issue with other production microphones.

For more on EQset technology scan the QR-Code or visit grasacoustics.com/EQset.

## Environmental stability

The unique design and features of the GRAS 40PO-H gives it unmatched environmental stability: The sensitivity deviation on a typical production line* is less than ±0.1 dB despite changes in temperature, static pressure, and relative humidity. This means there is no need for corrections due to environmental changes over the course of a normal day in a typical production-line environment – which again makes the 40PO-H ideal for production line system integration.

**Typical environmental conditions on a production line are defined by temperature varying between 13 and 35°C (55 to 95°F), static pressure varying between 983 and 1043 hPa, and non-condensing humidity.*

## Typical applications and use

- Production line testing of audio devices such as loudspeakers, loudspeaker drivers, micro-speakers, MEMS speakers, speakerphones, and microphones.
- Production line testing of audio devices with

ultrasonic output for tests up to 40 kHz.
- Measurements in confined spaces.

## Design

The GRAS 40PO-H is a robust, cost-effective 1/4" pressure microphone designed for use in production line testing of audio devices. Thanks to its high-quality condenser microphone capsule, 40PO-H is especially useful in situations where testing close to and above 20 kHz is needed, as this microphone is specified from 10 Hz and up to 40 kHz. It has a dynamic range that goes from 36 dBA to 138 dBpk.

The cost-effectiveness of the GRAS 40PO-H is a key consideration when setting up multiple production lines. Thanks to EQset™ technology, each GRAS 40PO-H is interchangeable with any other 40PO-H without the need for recalibration or additional corrections.

The GRAS 40PO-H packs all its groundbreaking features in a 65 mm housing that holds the microphone capsule and preamplifier electronics with EQset™ and TEDS while keeping a 7 mm housing diameter all the way through. The microphone has an SMB connector, that allows for an easy, robust, and reliable snap-on connection and disconnection of the microphone from the test setup. The small form factor of the 40PO-H makes it possible to install it in test setups in confined spaces like acoustic test boxes, or to mount it close to sound sources such as small loudspeakers.

## Compatibility

40PO-H microphones require a constant current power (CCP) supply to work. Most modern data acquisition systems and analyzers used for sound and vibration measurements have this type of sensor supply built into their analogue inputs. For devices where this type of supply is not available, GRAS offers a range of power modules with CCP supply that can be connected in between the microphone set and the data acquisition system.

40PO-H can also be powered using +48V Phantom Power supply by using an adapter like GRAS AG0003 XLR-BNC adapter. This opens for the possibility of using 40PO-H with a large range of pro audio equipment that uses this type of microphone power supply

40PO-H is also compatible with TEDS (Transducer Electronic Data Sheet) IEEE 1451.4 v1.0. TEDS is a small memory inside the sensor that is used to store the essential data of the sensor such as sensor type, serial number, sensitivity, calibration date, etc. Any data acquisition system compatible with TEDS will be able to read the TEDS data inside the 40PO-H and use it to setup the measurement channel.

TEDS can also be used for sensor identification or storing other data relevant for the user 40PO-H microphones have a bar code engraved on the microphone housing that can also be used for sensor identification.

## Calibration – Measurement Chain

GRAS 40PO-H microphones can be calibrated both in sensitivity and frequency response. For sensitivity calibration it is possible to use a sound calibrator like GRAS 42AG, or pistonphones, like GRAS 42AA or 42AP. As 40PO-H uses a high-quality condenser measurement microphone capsule, there is the potential for measuring its frequency response in the same way any other measurement microphone is tested. For example, it is possible to remove the microphone protection grid and have access to the diaphragm for a pressure response measurement using the electrostatic actuator method. RA0571 Actuator adapter for 40PO(-X) microphone is available for this purpose, and it should be use with

the GRAS RA0014 1/2" electrostatic actuator.

As the 40PO-H has EQset technology, the sensitivity will always be within ±0.2 dB tolerance. If the rest of the signal chain like cables, signal conditioner, and DAQ/Analyzer are not introducing any positive or negative gain, it is possible to use the nominal sensitivity value of the microphone as specified without the need of an acoustical calibration. However, if that is not a given or a check is required, a sound calibrator or pistonphone can be used. The acoustical calibration will then serve as a tool to adjust for sensitivity changes caused by other elements on the signal chain or checking if the microphone is working according to specifications. Once the signal chain remains stable and unchanged, swapping one 40PO-H microphone for another 40PO-H will not require an acoustical calibration, as one unit is virtually the same as the other.

## Quality and Warranty

GRAS microphone sets are made of components from our proven standard portfolio and are all manufactured of high-quality materials 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.

Thanks to the high-quality materials and assembly, our warranty against defective materials and workmanship is 2 years.

# Specifications

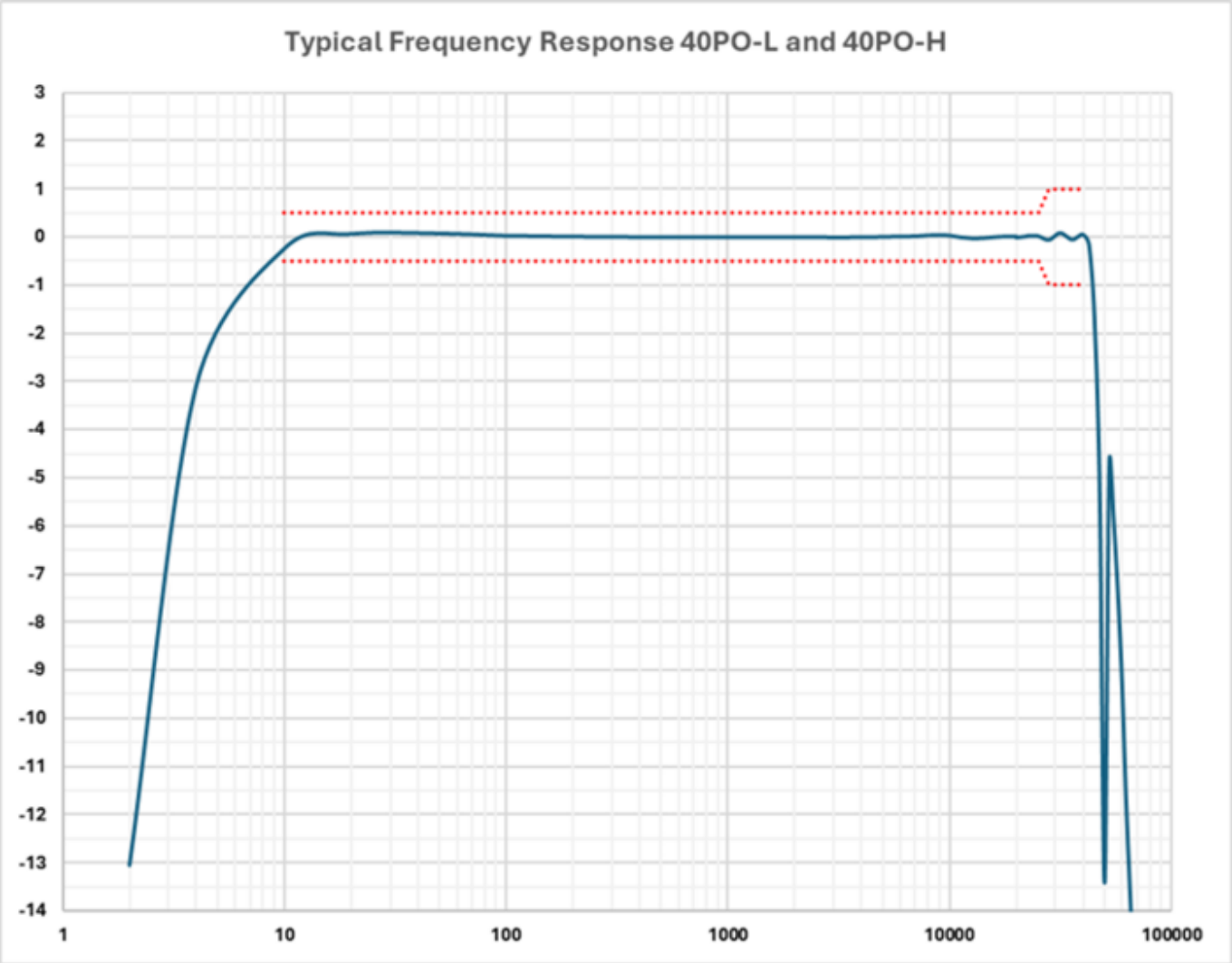


| | | |
|---|---|---|
| Acoustic field type | | Pressure Field |
| Acoustic Polarity | | Negative |
| Power Supply | | CCP |
| Frequency range (± 0.5 dB) | | 10 Hz to 25 kHz |
| Frequency range (± 1 dB) | | 10 Hz to 40 kHz |
| Low frequency cutoff (-3 dB) | | 4-6 Hz |
| Dynamic Range Lower Limit | dB(A) | 36 |
| Dynamic Range Upper Limit (peak) | dB | 138 |
| Sensitivity (250 Hz; ±0.2 dB) | mV/Pa | 8 |
| Sensitivity (250 Hz; ±0.2 dB) | dB ref 1V/Pa | -42 |
| Output impedance | | 50 |
| Environmental Stability* | dB | ±0.1 |
| Supported CCP Current | mA | 4 to 10 (min to max) |
| DC Bias Voltage, typical | V | 13.7 |
| Microphone venting | | Front |
| Temperature range, operation | °C / °F | 10 to 45 / 50 to 113 |
| Temperature range, storage | °C / °F | -10 to 70 / 14 to 158 |
| Humidity range non condensing | % RH | 0 to 90 |
| TEDS (IEEE 1451.4) | | UDID I27-0-0-0U |
| Connector type | | SMB |
| CE/RoHS compliant/WEEE registered | | YES/YES/YES |
| Weight | g / oz | 8.4 / 0.3 |
| Maximum cable length tested @ 4mA CCP | m | 30 |
| Diameter | mm | 7 ±0.03 |
| Length (incl. connector) | mm | 65 |
| Phase Spread up to 1 kHz | °(degrees) | ±0.5 |
| Phase Spread up to 5 kHz | °(degrees) | ±1 |
| Phase Spread up to 10 kHz | °(degrees) | ±2 |

| | | |
|---|---|---|
| Phase Spread up to 20 kHz | °(degrees) | ±5 |
| Phase Spread up to 30 kHz | °(degrees) | ±7 |
| Phase Spread up to 40 kHz | °(degrees) | ±11 |

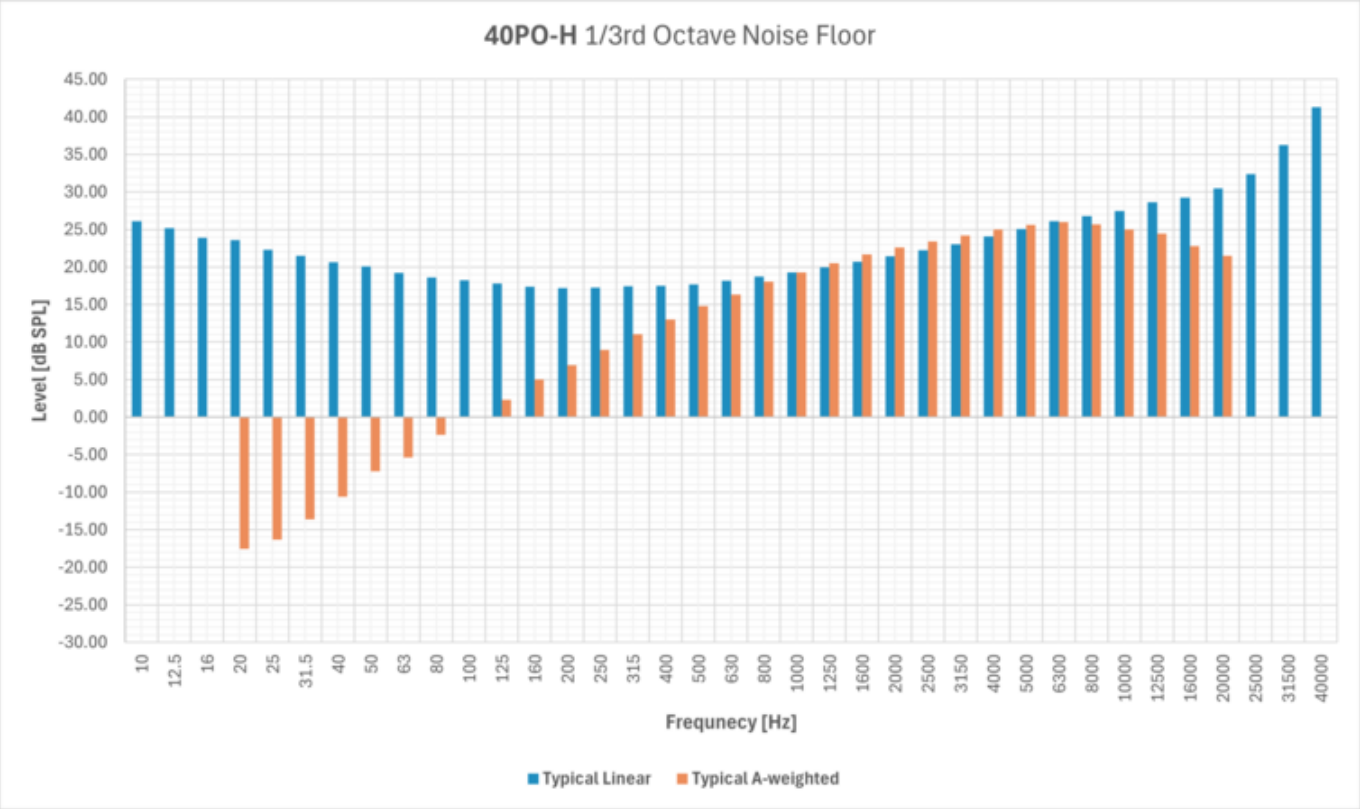
*Measured with the following environmental conditions: Temperature varying between 13 and 35°C (55 to 95°F), static pressure varying between 983 and 1043 hPa, and non-condensing humidity.

## Typical Frequency Response



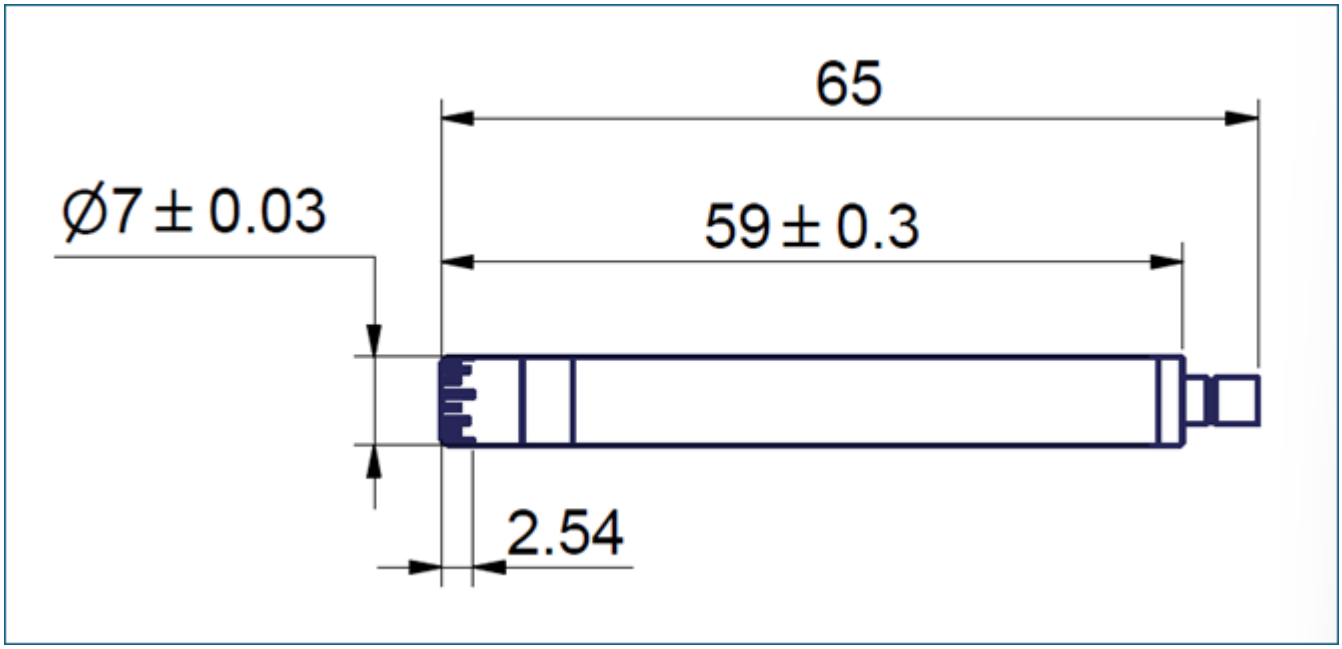

| | | |
|---|---|---|
| Frequency Range | ± 0.5 dB | 10 Hz - 25 kHz |
| Frequency Range | ± 1 dB | 10 Hz - 40 kHz |

## 1/3" Octave Noise Floor



# Dimensions

Dimensions in mm




Weight: 8.4 grams / 0.3 ounces

## Optional items

| | |
|---|---|
| GRAS AA0025 | 1 m SMB - BNC Cable |
| GRAS AA0026 | 5 m SMB - BNC Cable |
| GRAS AA0027 | 3 m SMB - BNC Cable |
| GRAS AA0028 | 10 m SMB - BNC Cable |
| GRAS AA0029 | 30 m SMB - BNC Cable |
| GRAS AA0055 | 20 m SMB - BNC Cable |
| GRAS AA0078 | 3 m SMB angled - BNC Cable |
| GRAS AG0003 | Adapter for CCP preamplifier to 48V phantom power (BNC to XLR) |
| GRAS AL0028 | 7 mm Microphone Holder, POM |
| GRAS RA0096-S1 | 7 mm 5-Click Microphone Holder, Stainless Steel |
| GRAS 42AG | Multifunction Sound Calibrator, Class 1 |
| GRAS 42AP | Intelligent Pistonphone, Class 0 |
| GRAS 42AA | Pistonphone, Class 1 |
| GRAS 12AL | 1-Channel CCP Power Module with A-weighting filter |
| GRAS 12BA/BE/BB | 12BA, 12BE and 12BB CCP Power Modules with TEDS Support |
| GRAS RA0571 | Actuator adapter for 40PO(-X) microphone |
| CA0029 | Factory traceable calibration for microphone sets |
| CA2300 | Accredited calibration for microphone sets |
| CA0046 | Low frequency calibration for microphone sets |

GRAS Sound & Vibration reserves the right to change specifications and accessories without notice.

# GRAS Worldwide

## Subsidiaries and distributors in more than 40 countries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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 and related equipment for industries where acoustic measuring accuracy and repeatability are of the utmost importance. This includes applications and solutions for customers within the fields of aerospace, automotive, audiology, consumer electronics and other highly demanding industries. GRAS microphones are designed to live up to the high quality, durability and accuracy that our customers have come to expect, trust and require.
GRAS Sound & Vibration is represented through subsidiaries and distributors in more than 40 countries and is part of Axiometrix Solutions, a leading test solutions provider comprised of globally recognized measurement brands. Read more at www.grasacoustics.com

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