

# ***Instruction Manual***

*G.R.A.S. 40PS-1 CCP Surface Microphone*



## Revision History

Any feedback or questions about this document are welcome at [gras@gras.dk](mailto:gras@gras.dk).

Revision	Date	Description
1	25 August 2015	First publication
2	25 September 2015	Section about calibration: Adapter RA0145 is used.

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## 1. Introduction and Description

The G.R.A.S. 40PS-1 CCP Surface Microphone (Fig. 1) is a low-cost microphone for general purpose measurements on planar and curved surfaces exposed to slipstreams. It has a wide frequency range from 20Hz to 20kHz (Fig. 2) and a large dynamic range from below 26 dB(A) to 145 dB.

### 1.1 CCP and TEDS Tecnology

The 40PS-1 has an integrated CCP<sup>1</sup> preamplifier with a built-in TEDS<sup>2</sup> chip which enables it, as a whole, to be programmed as a single unit.

It requires a constant-current power supply such as the G.R.A.S. 12AL 1-Channel CCP Power Module with A-weighting filter shown in Fig. 3, or any other compatible constant-current power supply.

### 1.2 Lightness

Because of its lightness, the 40PS-1

- a) can be readily mounted with its fairing using a thin double-sided adhesive pad
- b) contributes very little mass to thin plates

### 1.3 Pressure Equalisation

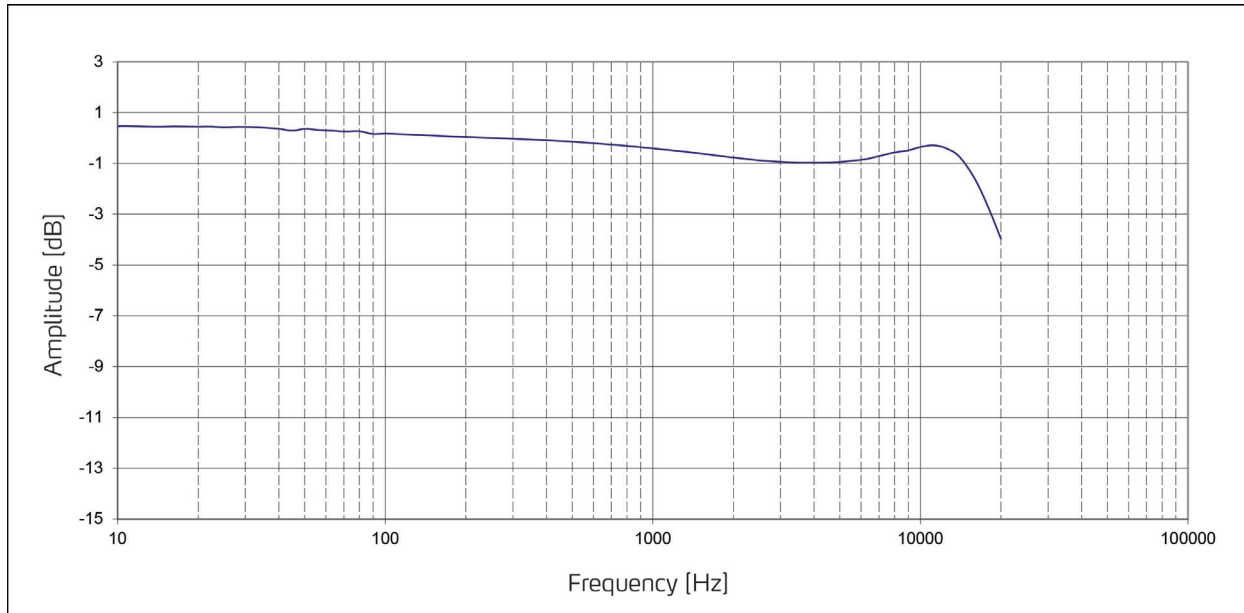
Pressure equalisation is via a frontal vent placed just by the side of the diaphragm. This is important especially when used on aircraft and on road vehicles in mountainous country.



**Fig. 1.** Surface Microphone 40PS-1. Left: with fairing. Right: without fairing

<sup>1</sup> CCP stands for Constant Current Power.

<sup>2</sup> Transducer Electronic Data Sheet - according to IEEE-1451.4.



**Fig. 2.** Typical pressure frequency response curve of the 40PS-1

## 1.4 Interchangeability

Close manufacturing tolerances together with the advantages of the TEDS chip, provide the 40PS-1 with a high degree of interchangeability; a major advantage which excludes accounting for individual characteristics.

It is both stable and robust and has an integrated 1 m co-axial cable with a microdot connector. It is also delivered with a supple detachable silicon-rubber fairing.



**Fig. 3.** 12AL 1-Channel CCP Power Module with A-weighting filter

## 2. Mounting the 40PS-1

### 2.1 Mounting Methods

Depending on ambient wind-speeds, there are several methods of securing the Surface Microphone to its mounting point. Fig. 4 shows these in the form of an exploded diagram.

When there is no wind, the microphone needs only be secured in place using the double-sided adhesive pad (possibly trimmed to match the size of the microphone alone).

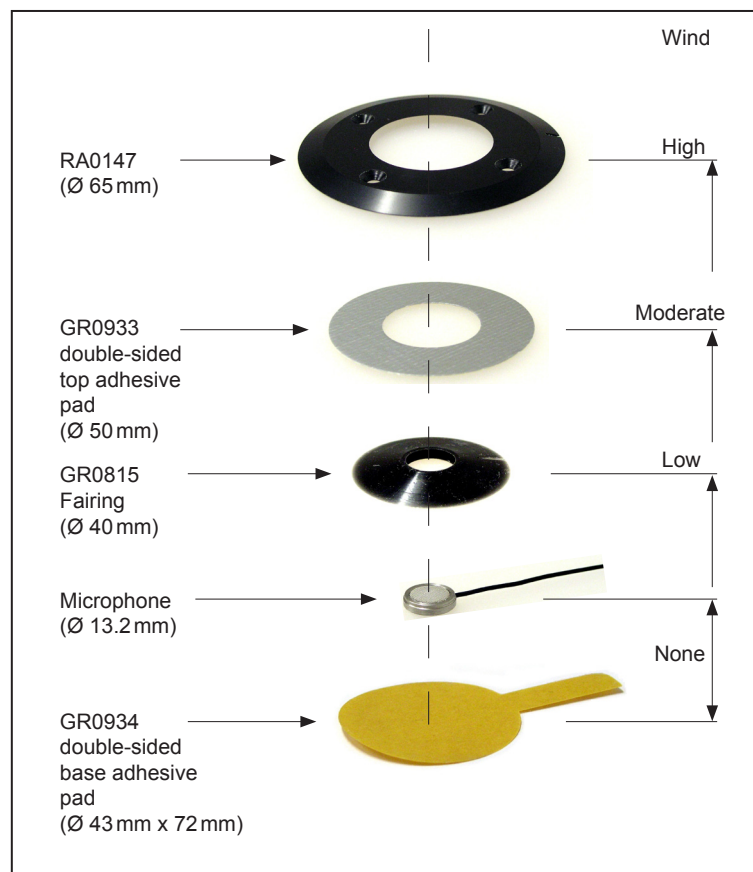
For low wind speeds, e.g. on the side of a car (see Fig. 5), include the Fairing.

At moderate wind speeds, e.g. a wind tunnel, include the single-sided adhesive pad (see also Fig. 6.)

At high wind speeds, e.g. on the fuselage of a low-speed test aeroplane, include the aluminium mounting plate (see also Fig. 7) and four screws.

#### 2.1.1 Low Profile

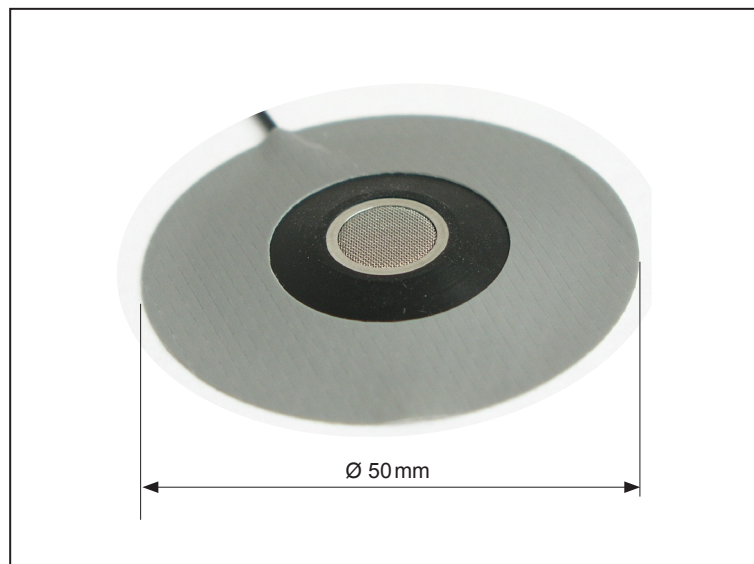
Whatever mounting is used, the profile of the Surface microphone will not exceed 3 mm.



**Fig. 4.** Exploded view of the recommended methods of securing the Surface Microphone to its mounting point



**Fig. 5.** An array of four Surface Microphones with Fairings (GR0815) mounted on the external surface of a car



**Fig. 6.** Showing how the Top Adhesive Pad (GR0933) secures the Surface Microphone in place



**Fig. 7.** RA0147 mounting plate for screwing the Surface Microphone firmly in place. It has four 90° countersunk holes, Ø3.2 mm, equally pitched on a radius of 22 mm.

## 2.2 Procedure for Mounting the Surface Microphone

### 2.2.1 For measurements in the presence of air movement

In cases where there is air movement, proceed as follows:

1. Clean the surface where the Surface Microphone is to be mounted using the Cleansing Tissue (MI0031) provided (alternatively use isopropanol or cleaning benzine).
2. GR0934 (Fig. 8) pre-cut, double-sided adhesive pad: Peel off the protective layer to expose one adhesive surface, stick it to the underside of the Surface Microphone, then peel off the yellow paper to expose the other adhesive surface and press it onto the clean surface.
3. Line-up the slit on the Fairing (GR0815) with the microphone's cable and press the Fairing down over the microphone. Make sure to smooth it out if necessary.
4. GR0933 (Fig. 9) pre-cut, single-sided adhesive pad: Peel off the protective layer to expose its adhesive surface and place it on the Surface Microphone as shown in Fig. 6.

In strong airflow, a mounting plate (RA0147, Fig. 7) is available from G.R.A.S. for screwing the Surface Microphone firmly in place. It has as four countersunk holes, Ø3.2 mm, equally pitched on Ø44 mm.

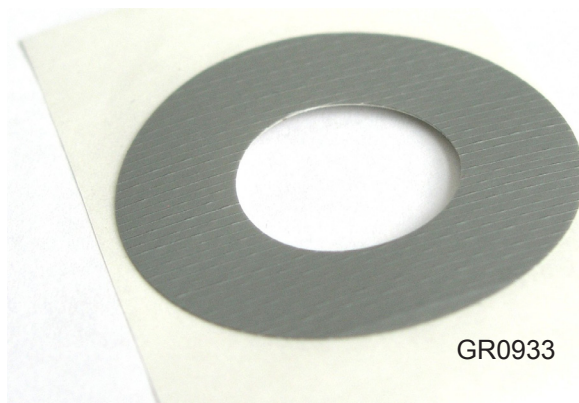
### 2.2.2 For measurements in the absence of air movement

In cases where there is no air movement, there is no need to use the Fairing (GR0815). The microphone can be simply stuck to the (pre-cleaned) surface using a suitable double-sided adhesive pad.





**Fig. 8.** GR0934 pre-cut, double-sided adhesive pad



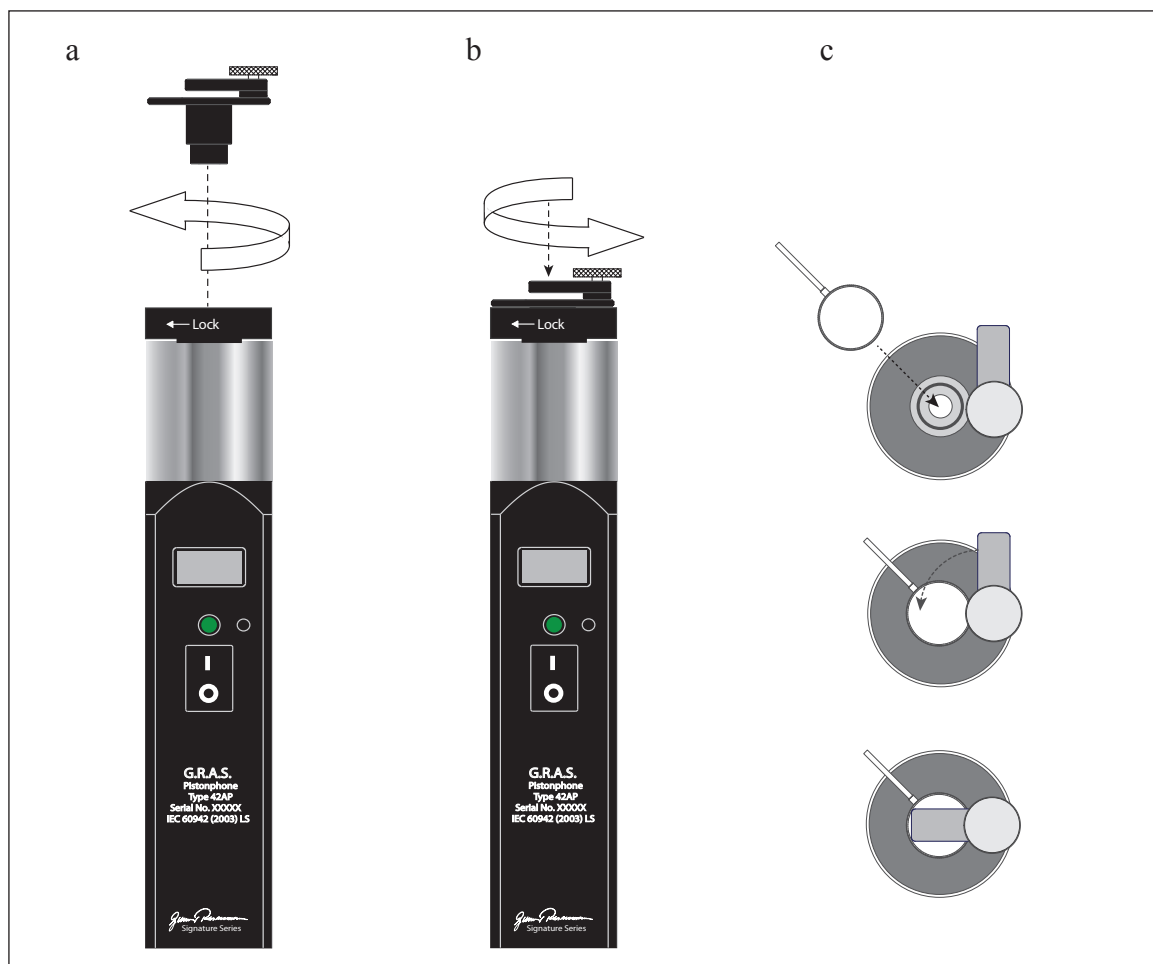
**Fig. 9.** GR0933 pre-cut, single-sided adhesive pad

### 3. Sensitivity Calibration

For sensitivity calibration, the RA0145 Calibration Adapter shown in Fig. 10(a) is required. This kit contains a calibration adapter with a holder arm for securing the microphone during calibration.

1. Connect the 40PS-1 to a CCP supply, e.g. the G.R.A.S. 12AL 1-Channel CCP Power Module with A-weighting filter (12AL is shown in Fig. 3).
2. Connect the output of the 12AL to a suitable voltage measuring device.
3. Loosen the collar of the Pistonphone, a 42AA Pistonphone, Class 1 or 42AP Intelligent Pistonphone, Class 0 is recommended.
4. Push the calibration adapter as far as it can go into to the coupler entrance of the Pistonphone and lightly tighten the collar of the Pistonphone (Fig. 10 (b)).
6. Place the Surface Microphone (without fairing, grid side down) into the recess of the adapter, and turn the holder until it covers the microphone as shown in Fig. 10 (c) and switch on the Pistonphone.
7. When conditions are stable, adjust the voltage measuring device so that it correctly gauges the Pistonphone signal (nominally 114 dB  $20\mu\text{Pa}$ ).

See your Pistonphone manual for making barometric corrections.



**Fig. 10.** Calibration using a Pistonphone

## 4. Specifications

Refer to: <http://www.gras.dk/40ps-1.html>

## 5. Ordering Information

### Accessories included:

Fairing:	GR0815
Top adhesive pad (0.5 mm):	GR0933 (pre-cut, single-sided)
Base adhesive pad (0.13 mm):	GR0934 (pre-cut, double-sided)
Cleaning tissue:	MI0031
Adapter:	AE0046 (BNC male to microdot female)

### Available accessories:

Aluminum mounting plate	RA0147 Mounting Plate for 40PS-1
Pistonphone:	42AA Pistonphone, Class 1
or	42AP Intelligent Pistonphone, Class 0
CCP supply:	12AL 1-Channel CCP Power Module with A-weighting filter
Calibration adapter:	RA0145

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.