

PHYWE Systeme GmbH & Co. KG
Robert-Bosch-Breite 10
37079 Göttingen
Germany

Tel. +49 (0) 551 604-0
Fax +49 (0) 551 604-107
E-mail info@phywe.de
Internet www.phywe.de

Operating instructions



The unit complies with the corresponding EC guidelines.



Fig. 1: 13289-30 Doppler source for TESS Acoustics

TABLE OF CONTENTS

2 PURPOSE AND CHARACTERISTICS

3 FUNCTIONAL AND OPERATING ELEMENTS

4 OPERATING NOTES

5 EXPERIMENT

6 TECHNICAL DATA

7 EQUIPMENT SYSTEM, LITERATURE, AND SOFTWARE

8 WARRANTY

9 DISPOSAL

1 SAFETY INSTRUCTIONS



- Read the operating instructions thoroughly and completely prior to starting the unit. This is important for your own protection and for avoiding damage to the unit.
- Use the unit solely for its intended purpose.
- The unit is intended for use in dry rooms where there is no risk of explosion.
- Do not start up this instrument should there be visible signs of damage to it.

2 PURPOSE AND CHARACTERISTICS

The acoustic Doppler effect occurs when the sound source and receiver move relative to one another. The measured frequency is higher than the frequency of the source when both move towards one another. In the opposite case, it is smaller than the source frequency.

The Doppler source enables the qualitative and quantitative examination of the Doppler effect.

For this purpose, the device emits sinusoidal sound waves of different frequencies: 4.6 kHz for qualitative observations of the Doppler effect in the range of audibility. In this case, it is absolutely sufficient to move the source quickly to and fro by hand and to listen to the frequency change, like in the case of a passing car.

19 kHz signal sound in the ultrasound range for quantitative experiments concerning the determination of the Doppler frequency by way of the "measure Acoustics" software. In this case, for example, the source moves at a known speed while the microphone remains stationary.

3 FUNCTIONAL AND OPERATING ELEMENTS

1 ON/OFF slide switch

for switching the Doppler source on and off.

The 4.6 kHz sound (slide switch 3) can be used to check whether the device is switched on or off, since the sound is audible.

2 Amplitude adjusting knob

for the continuous adjustment of the sound amplitude.

3 Frequency slide switch

for selecting the source frequency (4.6 kHz or 19 kHz).

4 Loudspeaker

5 Hook

for hanging the Doppler source up.

6 Battery compartment (back)

for a 9V battery, block battery, 6F 22.

4 OPERATING NOTES

The Doppler source fulfils the technical requirements that are summarised in the current directives of the European Community.

Electrostatic charges or similar electromagnetic phenomena (HF, bursts, indirect lightning discharge, etc.) may affect the unit so that it will not work within the specified data range.

The following measures reduce or eliminate the potential interferences: avoid carpets; provide equipotential bonding; perform the experiments on a conductive, earthed surface, use shields and shielded cables. Do not use radiofrequency transmitters (radio sets, mobile phones) in the direct vicinity of the unit.

5 EXPERIMENT

For the experiment concerning the Doppler effect, the Doppler source is suspended above a (immobile) microphone by way of a helical spring and performs harmonic oscillations. The signal with a frequency of 19 kHz is registered by the microphone and recorded with the aid of the "measure Acoustics" software. The frequency shift during the oscillation is observed in the frequency spectrum. Then, the maximum frequency shift and the maximum velocity of the source on the spring pendulum are calculated.

For comparison, the maximum velocity of the source can be calculated with the aid of the oscillation equations of a spring pendulum.

Note:

The microphone that is used for this experiment must have a high input sensitivity for 19 kHz so that it can optimally receive the source signal without being perturbed too strongly by sounds from the audible range. In addition, the amplitude and shape of the signal can be influenced by reflections.

6 TECHNICAL DATA

Operating temperature	5 ... 40 °C
Rel. humidity	≤ 80%
Frequency ranges	4.6 kHz ± 10% 19 kHz ± 10%
Frequency drift	± 3%*

*The source frequencies may differ from the nominal value by 10%; they are controlled and stabilised. After the warm-up period, the value will not change by more than ±3% maximum.

The closed-loop control requires a supply voltage of 6 V minimum, i.e. a fully charged (storage) battery.

Power supply (07496-10) or	9V battery, block battery, 6F22 (included in the scope of supply) 9V Ni-MH storage battery, block battery, (07925-02)
----------------------------------	--

Housing dimensions (mm)

incl. hook and adjusting knob	approx. 101 x 66 x 33 (LxWxH)
Weight	120 g

7 EQUIPMENT SYSTEM, LITERATURE, AND SOFTWARE

The Doppler source is included in the equipment set "TESS advanced, Applied Sciences Acoustics 2 - AE2". The "measure Acoustics" software enables the recording and evaluation of the amplitude courses and frequency spectra of the source and microphone signals.

During the experiment concerning the Doppler effect, the shift of the 19 kHz signal is measured in the frequency spectrum with the aid of the software.

Equipment set

TESS advanced Applied Sciences Acoustics set 2, AE2	15321-88
--	----------

Literature

TESS advanced Appl. Sciences Acoustics Handbook	13289-01
--	----------

Software

measure Acoustics	14441-61
-------------------	----------

8 WARRANTY

We provide a warranty of 24 months for units supplied by us within the EU, and a warranty of 12 months outside the EU. Any damage that is due to non-compliance with the operating instructions, improper use, or natural wear is excluded from the warranty.

The manufacturer can only be held liable for the function and safety-relevant properties of the unit if the maintenance, service, and modifications of the unit are performed solely by the manufacturer or by an institution that is expressly authorised by the manufacturer.

9 DISPOSAL

The packaging mainly consists of environmentally-friendly materials that should be returned to local recycling stations.



Do not dispose of this product with normal household waste. If this unit needs to be disposed of, please return it to the address that is stated below for proper disposal.

PHYWE Systeme GmbH & Co. KG
Customer Service
Robert-Bosch-Breite 10
D-37079 Göttingen
Germany

Tel. +49 (0) 551 604-274
Fax +49 (0) 551 604-246