Pulse Box K 1017341

Instruction manual

01/14 ALF

1 Output sockets
2 Pulse button
3 Battery compartment (not shown, at rear)

1. Safety instructions

Safe operation of this equipment is guaranteed as long as it is used as stipulated. However, there is no guarantee of safety if the equipment is used incorrectly or carelessly.

If there is any suspicion that the equipment can no longer be operated without risk (e.g. if visible damage is detected), the equipment must immediately be withdrawn from use and secured in such a way as to prevent its inadvertent operation.

- Only use the instrument in a dry environment.
- Do not apply any external voltage to the output sockets.
- Only use with the supplied 9-V battery or batteries of similar type.

2. Description

The pulse box is for generating electrical square-wave pulses by means of a button. These are then output from the two output sockets, e.g. to a speaker.

The pulse box is particularly suitable for use in sample experiments using Kundt's tube to establish the speed of sound in various media.

The pulse box itself is supplied with a 9-V battery and an instruction manual.

3. Technical data

Output

Signal form:	Square
Pulse length:	30 ms @ 8 Ω
Amplitude:	9 V

General data

Voltage supply:	9 V battery
Dimensions:	100x75x35 mm³ approx.
Weight:	150 g incl. batteriy approx.

4. Operation

- Insert the supplied battery.
- Connect the desired sound source, e.g. a loudspeaker, to the Kundt's tube E via its 4-mm safety sockets, making sure you maintain the correct polarity.
- Trigger an electrical pulse by pressing the button. (Any number of pulses can be triggered one after the other.)

Changing the battery

- Prize open the battery compartment on the back of the box with a flat object, e.g. a screwdriver.
- Replace the flat battery with a new one of identical type. Close the battery compartment again.
- Properly dispose of the empty battery.

Fig. 1 Battery compartment

5. Example experiment

Determining the speed of sound in Kundt's tube

Additionally required:

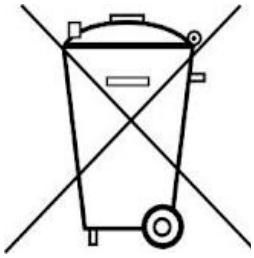
1 Microphone box (230 V, 50/60 Hz)	1014520
or	
1 Microphone box (115 V, 50/60 Hz)	1014521
1 Microsecond counter (230 V, 50/60 Hz)	1017333
or	
1 Microsecond counter (115 V, 50/60 Hz)	1017334
1 Kundt's tube E	1017339
1 Microphone probe, long	1017342
1 Microphone probe, short	4008308
2 Adapter cable, BNC/4-mm plugs	1002748

- Place the microphone probes in the Kundt's tube and set up the apparatus. (see Fig. 2)
- Connect the long microphone probe to the Channel A input of the microphone box and connect the short one to the input for Channel B.
- Use a BNC/4-mm adapter cable to connect the output of Channel A to the Start input of the microsecond counter (plug red 4-mm plug into green socket, black 4-mm plug into black ground socket).
- Connect the output of Channel B to the Stop input of the microsecond counter (plug red 4-mm plug into red socket, black 4-mm plug into black ground socket from the side).
- Connect the pulse box to the speaker.
- Set both outputs to trigger mode and set the gain for both channels to a medium value.
- Connect the microsecond counter and microphone box to their power supplies and plug them into the mains.
- Trigger a click pulse from the pulse box and read off from the counter the time it takes for the sound to propagate from the long microphone probe to the short one.

Use the distance between the two microphones and the time measured to calculate the speed of sound in the tube at room temperature.

6. Storage, cleaning and disposal

- Keep the equipment in a clean, dry and dust-free place.
- Do not clean the unit with volatile solvents or abrasive cleaners.
- Use a soft, damp cloth to clean it.
- The packaging should be disposed of at local recycling points.
- Should you need to dispose of the equipment itself, never throw it away in normal domestic waste. Local regulations for the disposal of electrical equipment will apply.



- Do not dispose of the battery in the regular household garbage. Follow the local regulations (In Germany: BattG; EU: 2006/66/EG).

7. Example experiment

Fig. 2: Experiment set-up with Kundt's tube