NaRiKa

# Instruction manual

**K50-1207-W0**

# Seismic Waves Reproduction Apparatus


May 2021

# ⚠Safety Precaution

- **Do not disassemble, repair, or remodel this product. This product might stop working and warranty will be void.**
- **Teacher or trainer must provide safety instruction to students before using this product.**
- **When any failure is found with this product, contact your local distributor without repairing it by yourself.**
- **Do not place anything that weighs over 2kg on the vibration plate. Violation may cause damage to this product.**
- **Be sure to take measures not to overturn or drop this product during experiments, as it may cause damage to this product.**

# Introduction

Seismic Waves Reproduction Apparatus is a table-top vibration generator that generates oscillating motion similar to the horizontal seismic vibration (surface wave) represented as a pseudo-sine wave to observe how simulated seismic waves affect an on-board mock building and/or other objects.

With the model of 7 stories building that comes with the product, it is possible for anyone to observe how a mock tall building shakes during an earthquake along with the amplitude. As well as, for teachers to reproduce the process of how a building shakes and collapses. Furthermore, an earthquake proof assessment of the self-produced mock building and/or its foundation is possible.

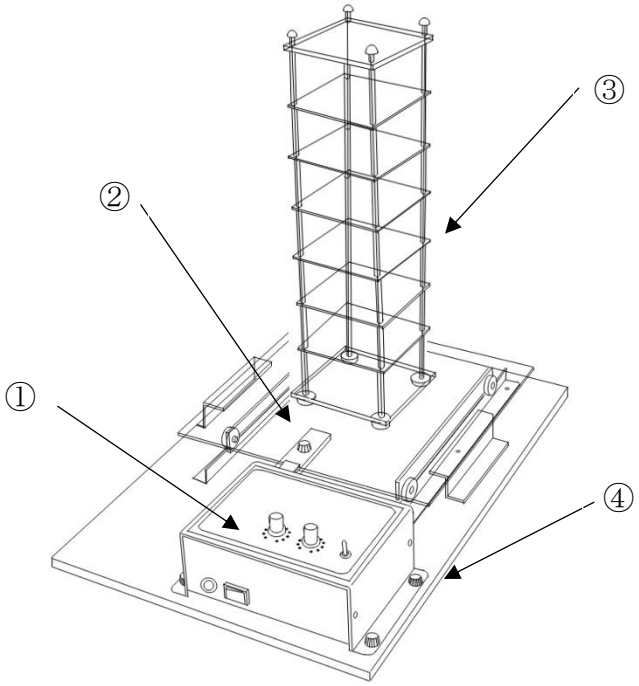
Additionally, this product enables anyone to learn about phenomena of natural disaster in the classroom by reproducing seismic activity to observe the process of how a tall building (or a house) collapses, as well as the mechanism of and the damage from liquefaction.

Liquefaction phenomenon can easily be reproduced by using the “Liquefaction Experiment Apparatus” (K50-1208-W0) that includes materials necessary such as sand, blocks, and a small shovel in addition to the “Seismic Waves Reproduction Apparatus” (K50-1207-W0).

# Specification

- Material: Base (with rubber legs) – Wood, Vibration plate – Acrylic
- Drive unit: DC servomotor type actuator
- Vibration mode: Horizontal seismic vibration (surface wave) (pseudo-sine wave)
- Vibration amplitude: 1.5-50mm
- Frequency: 0.1-12Hz
- Power Source: Four (4) size AA batteries (sold separately) or AC adapter (6V, 2A) (not included)
- Size and weight
    - Main body: 450 x 300 x 53mm, 2300g (including vibration plate)
    - Vibration plate: 250 x 250mm
- Accessory: model building (Acrylic, 7 stories, 90 x 90 x 320mm, 250g)

# Name of parts and their functions




① Drive-control unit
② Vibration plate (table)
③ Model (mock) building (Acrylic, 7 stories)
④ Wooden base with rubber legs

① Drive-control unit has a DC servo motor type actuator to control and adjust the vibration plate motion with a built-in microprocessor.

② Vibration plate is equipped with four wheels for easier placement on guide rails. Possible to put on the plate a model building or other object for demonstration.

③ Model building (Acrylic, 7 stories) is pre-assembled. Therefore, this instruction manual does not include how to assemble it.

④ Wooden base (with rubber legs) has rails guiding the vibration plate.

# Operating Procedure

This product (Seismic Waves Reproduction Apparatus) is designed to shake the “Vibration plate” horizontally as if horizontal seismic vibration happens to the surface on the plate. Possible to independently set each condition of the vibration amplitude and vibration period (stroke speed). Set conditions for your experiment referring to the graphic label adhered to the drive-control unit that expresses the relationship between two output values of the vibration amplitude (mm) and frequency (Hz).

Note that, as shown in the graph, the maximum vibration amplitude is controlled by setting of the frequency. For instance, maximum vibration amplitude is controlled and determined by setting of frequency (see Fig. 3 and its downward line) even if the knob for controlling vibration amplitude is turned maximally to the right.

Controlled by the microcomputer built into the drive-control unit, the vibration plate generates vibration waveform that is similar to pseudo-sine wave but contains some distortion.

## 1. Power source

You can use two types of power source.

1) In case of using four (4) size AA batteries (sold separately):
Remove all the four (4) knurled screws securing the drive-control unit to the wooden base, as well as the knurled screw connecting the drive-control unit with the vibration plate (see Fig. 1). Remove the cover of the battery box found on the back surface of the drive-control unit to load four (4) size AA batteries (see Fig. 2).

2) In case of using an AC adapter (not included):
Plug the AC adapter (DC6V, 2A) into the “Input” port found on the side of the drive-control unit (see Fig. 1). Use an AC adapter with rated output of “DC6V, 2A” only.

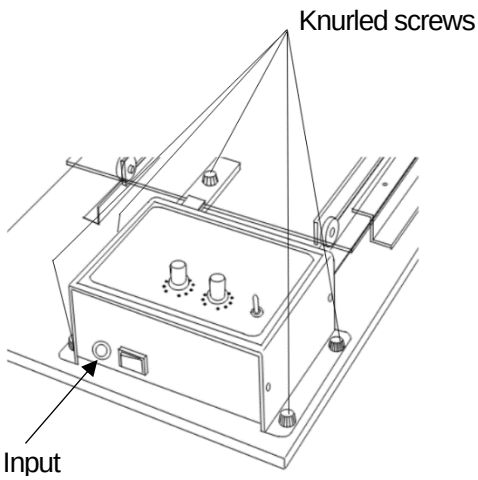



Fig. 1

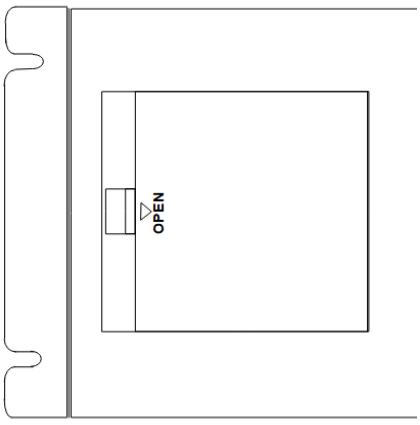



Fig. 2

**2. Operating panel:**

Drive-control unit has an operating panel, as shown in Fig. 3, that has a toggle-type on-off switch, as well as two (2) knobs for independently controlling vibration amplitude and frequency.

1) Knob for controlling vibration amplitude:
For controlling vibration amplitude of the vibration plate in the range of up to 50mm.

2) Knob for controlling vibration period (stroke speed):

For controlling vibration period of the vibration plate in the range of up to around 10Hz.

3) Frequency (x-axis) - Vibration amplitude (y-axis) graph:
Graphic label adhered to the operating panel expresses the characteristic of the DC servo motor type actuator built in the drive-control unit. As already mentioned, the graph indicates that the vibration amplitude is constrained by the setting of the frequency. Refer to this graph when using the Seismic Waves Reproduction Apparatus.

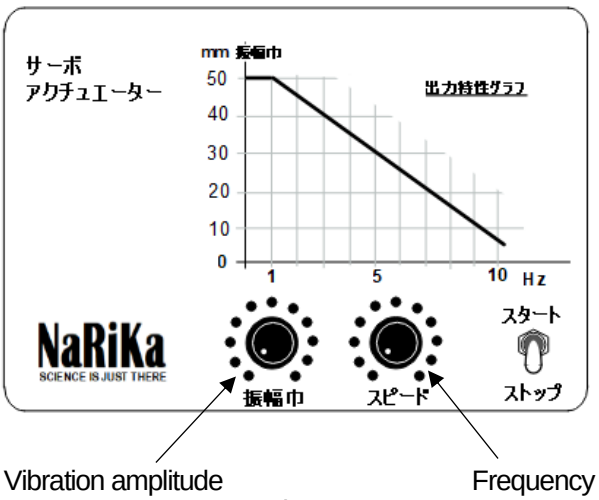


Fig. 3

**3. How to operate** (see Fig. 3 and 4)**:**

1) Ensure that both the main power-supply switch and toggle-type on-off switch (start switch) are off.

2) Set the vibration condition adjusting the vibration amplitude knob and the frequency knob respectively.

3) Place the model building (or other test object) on the vibration plate.

4) Turn on the start switch after turning on the main power-supply switch.

5) The vibration plate starts shaking.

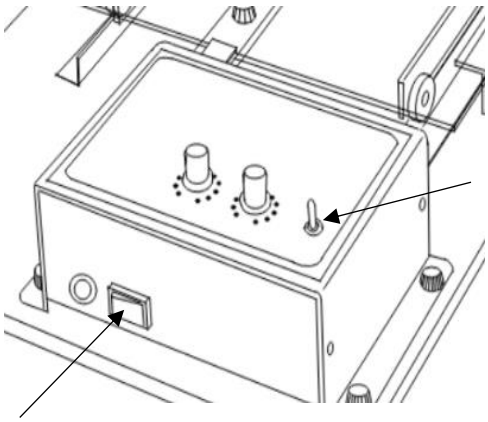



Fig. 4

Note: Make sure to check first, without placing the model building (or other test object), if the vibration plate actually shakes in accordance with the intended vibration condition and/or if the setting of the vibration condition is what was supposed to be. Otherwise, the model building (or another test object) may be damaged by overturning or falling from the table.

NaRiKa Corporation

www.global.narika.jp