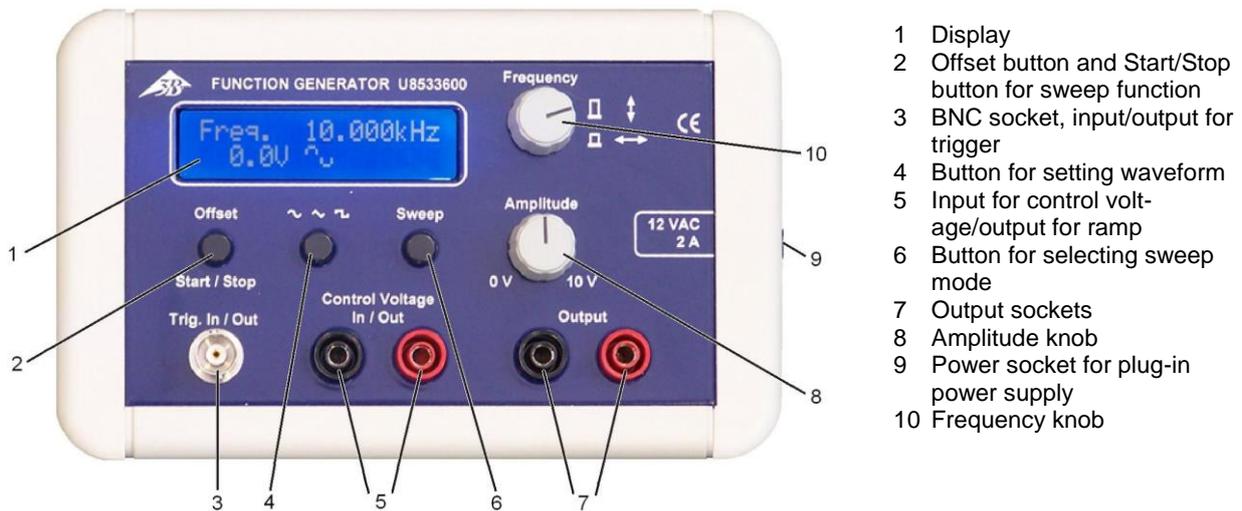


Function Generator FG100

1009956 (115 V, 50/60 Hz)
 1009957 (230 V, 50/60 Hz)

Instruction Sheet

10/15 SD/ALF



1. Safety instructions

The function generator FG100 conforms to safety regulations for electrical measuring, control and laboratory equipment as specified in DIN EN 61010 Part 1. It is to be operated in dry rooms as appropriate for the use of electrical equipment.

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can no longer be operated without risk (e.g. if visible damage is detected), the equipment must immediately be withdrawn from use and secured in such a way as to prevent its inadvertent operation.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 attempt to operate the equipment except with its own power supply.
- Do not apply any external voltage to the output terminals.
- Do not exceed the maximum input voltage of 5 V for the control voltage and trigger.

Electromagnetic waves can be generated, in particular at high frequencies or with waveforms featuring a large amount of harmonics, which may cause interference to other equipment in the area.

- Ensure that no other equipment is being interfered with.
- If necessary, only operate the FG100 function generator for short periods.
- Do not use experiment leads longer than 5 m.

2. Description

The FG100 function generator features an external sweep function with a power amplifier for use in student and practical experiments on simple harmonic oscillation, alternating current and induction.

The equipment outputs sine-wave, triangular wave and square wave voltages with adjustable amplitude and frequency. The built-in power amplifier allows it to handle currents of up to 1 A.

Operating modes for sweep mode:

External mode: the sweep is proportional to the set frequencies and depends directly on an external control voltage of between 0 and 5 V. This allows for frequency modulation using modulation frequencies of up to 200 Hz.

Internal/Continuous: At the start and whenever the voltage passes through zero a 5-V pulse is output from the *TRIG OUT* socket. A voltage of 0 - 5 V directly proportional to the sweep voltage is output from the *Control Voltage* socket.

Internal/Single: At the start a 5-V pulse is output from the *TRIG OUT* socket. The sweep can also be initiated by a 5-V pulse to the *TRIG IN* socket. A voltage of 0 - 5 V directly proportional to the sweep voltage is output from the *Control Voltage* socket. The sweep stops after one run-through and continues at the starting frequency until another start pulse is input (using the buttons or the trigger).

The most recently used sweep-mode settings will be stored in the function generator for the next time it is switched on.

The output is protected against shorts circuits, inductive voltages and spark discharges.

The device is equipped with fold-away feet.

Power is provided via a 12-V AC plug-in power supply.

The FG100 function generator with order number 1009956 is intended for a mains voltage of 115 V ($\pm 10\%$), whereas the one numbered 1009957 is for 230 V ($\pm 10\%$).

3. Technical data

Signals:

Frequency range:	0.001 Hz to 100 kHz
Distortion factor:	<1 %
Signal forms:	Sine, square, triangular
Offset:	0 to ± 5 V, adjustable in 0.1 V steps

Output:

Output amplitude:	0 to 10 V, continuously adjustable
Power output:	10 W, permanent
Output current:	1 A, 2.0 A max.

Sweep:

Sweep modes: External, continuous internal, individual internal

Frequency range: 1 Hz to 100 kHz

Stop/start

frequency ratio: Max. 1000:1, e.g. 2 Hz to 2 kHz max.

Time range: 0.04 s to 1000 s

External sweep: Start via trigger pulse or application of 0 to 5 V control voltage; max. modulation frequency: 200 Hz

Internal sweep: Start and stop via *Start/Stop* button; one trigger output per cycle plus proportional voltage

General data:

Power supply: Plug-in power supply, 12 V AC, 2 A

Dimensions: 170x105x40 mm³

Weight: 0.5 kg

4. Operation

4.1 Turning on

- Plug the power supply into the mains and connect it to the function generator.

This immediately turns on the equipment so that it is ready to use. The top line of the display will indicate the current frequency while the bottom line shows the DC offset and the waveform.

4.2 Setting the frequency

- Use the frequency knob to set the desired frequency.
- Push in and turn the knob to select the digit to be changed on the display and then turn the knob to set the specific frequency.

The active digit will be indicated on the display by a flashing underline character.

4.3 Setting the offset

- Press the *Offset* button to activate offset adjustment.
- Turn the frequency knob to set the required value in steps of 0.1 V.

Pressing in the frequency knob resets the value back to zero.

- When the desired value has been set, Press *Offset* again.

4.4 Selecting a waveform

- Press the waveform button until the waveform you want is indicated on the display.

It is possible to select a sine wave square wave or triangular wave.

4.5 Sweep

- Press the *Sweep* button to activate sweep mode.

The initial frequency is shown on the top line of the display, while the bottom shows the DC offset, the waveform and the word "START".

- Turn the frequency knob to set the desired initial frequency as described in section 4.2.
- To set the frequency for when the sweep stops, press the *Sweep* button again.
- The bottom line of the display will show the word "STOP".
- Turn the frequency knob to set the desired frequency for when the sweep stops.

Pressing the *Sweep* button again now sets the equipment into sweep mode. The sub-modes *External*, *Internal Continuous* or *Internal Single* will be indicated on the top line of the display.

- Turn the frequency knob to select the desired sub-mode for the sweep function.
- Press *Sweep* again.

If external mode has been selected, then "EXT" will be displayed at the bottom right of the display. If internal mode was displayed, the word "TIME" will be displayed there.

- Adjust the sweep time by turning the frequency knob and press *Sweep* again.

The start frequency will be shown on the display and the word "READY" will appear at the bottom right.

- Press *Offset/Start/Stop* to start the sweep.

While the sweep function is operating, the current frequency will be indicated on the top line of the display, while the bottom line shows the DC offset, the waveform and the word "RUN". The sweep can be paused by holding down the *Offset/Start/Stop* button. Pressing it again allows the sweep to continue. The word "BREAK" will be displayed while it is paused.

- To exit sweep mode press *Sweep* again.

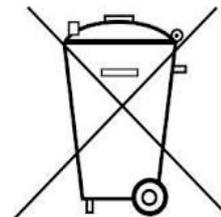
In order to modify the values, it is necessary to exit sweep mode and initiate the procedure again. It should be noted that the DC offset cannot be altered by this means.

5. Care and maintenance

- Before cleaning the equipment, disconnect it from its power supply.
- Do not clean the unit with volatile solvents or abrasive cleaners.
- Use a soft, damp cloth to clean it.

6. Disposal

- 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.



7. Sample experiments

7.1 Demonstration of standing transverse waves on a rubber rope and investigating the dependence of their wavelength on the frequency and the tension

The following equipment is also required to perform the experiment:

1 Accessories for rope waves	1008540
1 Dynamometer, 5 N	1003106
1 Vibration generator	1000701

Experiment leads

- Set up the waves on a string accessory as in its manual.
- Hang the dynamometer on the holder. If necessary, first calibrate the zero point.
- Connect the function generator to the vibration generator.
- Attach the rubber rope to the vibration generator, pass it under the deflection device then upwards, and hang it on the dynamometer. Ensure that it runs as parallel as possible to the base plate.
- Apply tension to the rubber rope by moving the dynamometer.
- On the function generator, select the "sine" waveform.
- Adjust the frequency until 4 vibration loops are obtained.

The wavelength is now half the length of the cord.

- Move the dynamometer higher up the rod until the tension is four times the previous value.

The band now vibrates with just one peak and one trough. The wavelength is therefore equal to the length of the band.

The following parameters are found to give good results:

Rope length (= distance from vibration generator to deflection device): 60 cm, Frequency; approx. 44 Hz, initial cord tension: 0.5 N.

Rope length: 70 cm, Frequency; approx. 38 Hz, initial cord tension: 0.5 N.

7.2 Parallel LC resonant circuit

The following equipment is also required to perform the experiment:

1 3B NETlog™ @230 V	1000540
1 Basic experiment board @230 V	1000573
or	
1 3B NETlog™ @115 V	1000539
1 Basic experiment board @115 V	1000572
1 3B NETlab™	1000544
1 Computer	

Experiment leads

- Start the 3B NETlab™ software and open the parallel LC resonant circuit experiment.
- Set up the experiment in accordance with the instructions in the experiment template.
- Carry out the experiment.

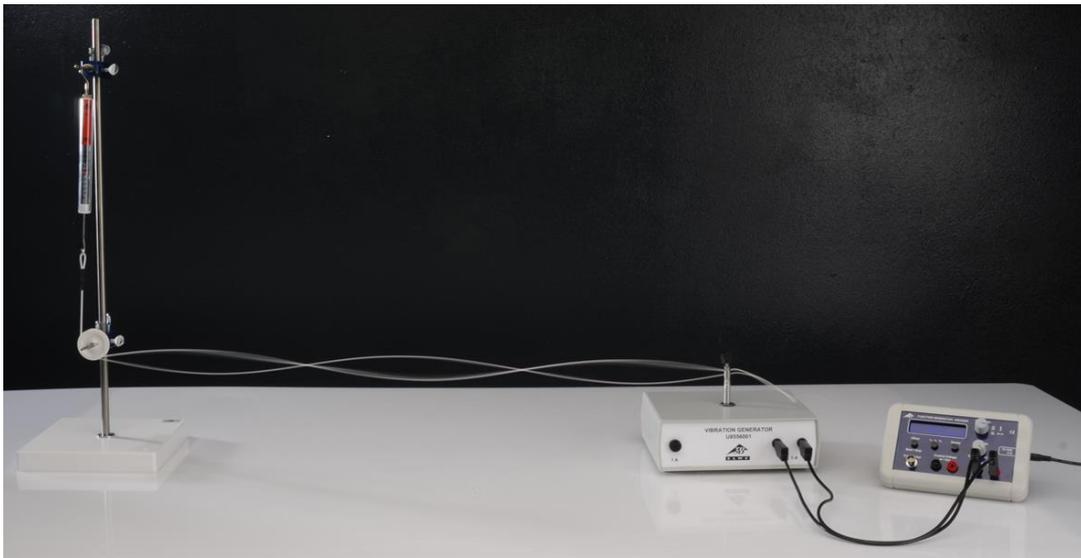


Fig. 1 Experiment set-up to demonstrate standing transverse waves

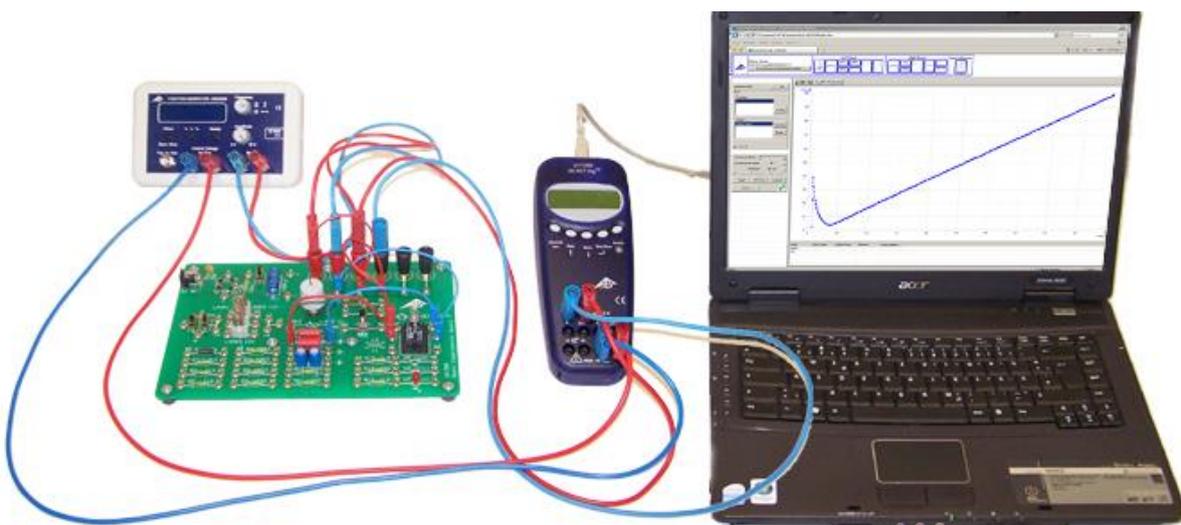


Fig. 2 Experiment set-up for parallel LC resonant circuit