

# FUNCTION GENERATOR PORTABLE

## N600-HB111A



### Manual of Operations

**IMPORTANT!**  
**Read the following before using this equipment:**  
Carefully follow all instructions and observe all precautions given in this manual

Version2.0.JL032114



LOOK US UP ONLINE

# INDEX

## 1. GENERAL DESCRIPTION

## 2. FEATURES

## 3. SPECIFICATIONS

## 4. OPERATIONS

Front Panel

Rear Panel

Operating Procedure

## INSTALLATION

### A. MECHANICAL INSTALLATION

After unpacking the instrument, visually inspect all external parts for Possible damage to connectors, switches, surface areas, etc. (If damage is discovered, file a claim with the carrier who transported the instrument.) The shipping container and packing material should be saved in case reshipment is required or for inspection by carrier if necessary.

### B. ELECTRICAL INSTALLATION

Power Connection

#### WARNING !!

To preclude injury or death due to shock, the third wire earth ground must be connected to the facility outlet. Before connecting to the facility power outlet, examine extension cords, auto-transformers, etc., between the instrument and the facility power outlet for a continuous earth ground path. The earth ground path can be identified at the plug of the instrument power cord; of the three terminals, the earth ground terminal is the non matching shape, usually cylindrical.

#### CAUTION

To prevent damage to the instrument, check for proper match of line and instrument voltage and proper fuse type and rating.

#### WARRANTY

We warrant each of our products to be free from defects in material and workmanship. Our obligation under this warranty shall be limited to replacing or repairing, at our option, any instrument or part thereof (except batteries) which, within ONE year after shipment to the original purchaser, proves defective upon examination.

This warranty shall not apply to any instrument, which our inspection shall disclose to your satisfaction, which has become defective or unworkable due to abuse, mishandling, misuse, accident, alteration, negligence, improper installation, or other causes beyond our control.

We reserve the right to make any changes in design at any times without incurring any obligation to install that same change on units previously purchased.

To exercise this warranty, call your local representative.

## 1. GENERAL DESCRIPTION

The HB111, when combined with our HA-series Potentiostat/Galvanostat, is extremely powerful in voltammetry, coulometry, automatic polarization, and other studies where external control is needed. Four waveforms can be obtained with the simple operations.

Ramp slope can be varied from 0.1mV/sec to 5000V/min (83.3V/sec). This wide range of variation enables close analysis of corrosion on the electrode surfaces, passivity, electrode reactions, etc.

## 2. FEATURES

(1) Low Cost

(2) small size, light weight

(3) Easy to operate

(4) Excellent instructional instrument

(5) High performance

(6) Easily connected to any

(7) Waveforms: Ramps, Triangles  
(One-shot, Repetitive)

(8) Initial, upper, and lower potentials can be set independently





(9) Scan speed (or sweep rate)

either mV/sec or 100mV/min.

(10) Scan speed range:

0.1mV/sec~5000V/min  
(83.3V/sec)

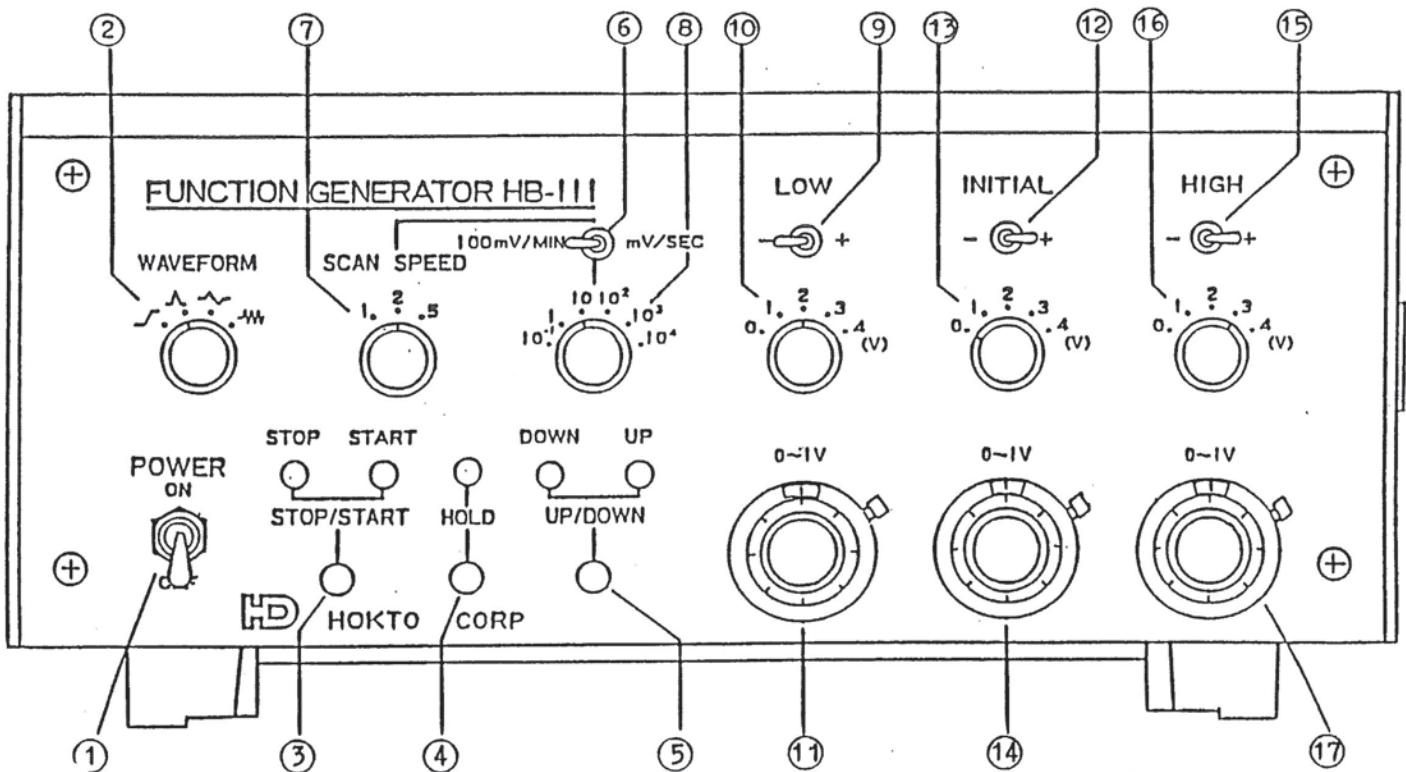
### 3. SPECIFICATIONS

Scanning Speed	
a) Setting 1	$X10^{-1}$ , $X1$ , $X10$ , $X10^2$ , $X10^3$ , $X10^4$
b) Setting 2	1, 2, 5
c) Setting Units	mV/sec, 100 mV/min
d) mV/sec	0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, $10^4$ , $2 \times 10^4$ , $5 \times 10^4$
e) mV/min	10, 20, 50, 100, 200, 500, 1000, 2000, 5000, $10^4$ , $2 \times 10^4$ , $5 \times 10^4$ , $10^5$ , $2 \times 10^5$ , $5 \times 10^5$ , $10^6$ , $2 \times 10^6$ , $5 \times 10^6$
f) Setting Accuracy	1% (for $X1 \sim X10^4$ ); 2% (for $X10^{-1}$ )
Setting Potentials	
a) Range	-5.000V ~ +5.000V
b) Setting	Initial, upper, and lower potentials can be set independently. (INITIAL, HIGH, LOW)
c) Setting Accuracy	1% (setting potential) $\pm 20$ mV
Waveforms	
	Ramp (  ) One-shot triangle (  ) One-shot double triangle (  ) Repetitive triangles (  )
Switches	
	START/STOP HOLD (Output potential drift $< \pm 0.001$ mV/sec) REVERSE
Indicator Lamps	
	STOP LED START LED HOLD LED UP LED DOWN LED
Power Requirements	
	AC V $\pm 10\%$ , 50 / 60 Hz, Single phase, 20 VA
Physical Dimensions	
	8.9"(W) X 3.9"(H) X 11.6"(D) / 227 mm(W) X 100 mm(H) X 295 mm(D)
Weight	
	8.8 lbs. / 4.0 kg

Include Accessories - Output cord (1.2m); earth cord

### 4. OPERATIONS

4-1 FRONT PANEL



① Power ON/OFF Switch

The STOP ③ lamp and the UP lamp ⑤ light up when this switch is turned on.

② Waveform Selection Switch

Desired waveform can be chosen from four waveforms with this rotary switch.

- a) Ramp 
- b) One-shot triangle 
- c) One-shot double triangle 
- d) Repetitive triangles 

③ START/STOP Button

When the power switch ① is turned on, the STOP lamp lights up to indicate that the INITIAL is being output. At this point, when the START Button is pushed, the START lamp (green) lights up indicating the selected waveform is being output from the OUTPUT terminal ⑩. If this button is again depressed, wave generation stops, and the INITIAL potential is output from the OUTPUT terminal ⑩. Note that the STOP lamp will "blink" if the following conditions are not met.

LOW potential + 50mV < INITIAL POTENTIAL < HIGH potential - 50 mV

When setting the potentials levels, the HIGH potential must be at least 50mV higher than the INITIAL potential, and the LOW potential must be at least 50mV lower than the INITIAL potential

④ HOLD Push Button



When the HOLD button is pushed during wave generation, scanning is interrupted and the potential at the point is held constant until the button is again pushed

The output potential drift during HOLD is less than  $\pm 0.001$  mV/sec.

Because of the analog holding scheme, this function is not suitable for long term HOLD

⑤ UP/DOWN Lamps and Reverse Button

Scanning wave reverses its direction when this button is pushed. The UP/DOWN LED lamps indicate the scanning direction.

( Green for , and Yellow for  )

⑥, ⑦, ⑧ and are used for setting scan speed.

⑥ Scan Speed Unit Selecting Switch

This switch selects the unit of scan speed: mV/sec or 100mV/min.

⑦ Scan Speed Setting Switch

This 3-step rotary switch is used for small settings 1,2,5.

⑧ Scan Speed Multiplier Switch

This 6-step rotary switch is used for large settings:  
x10<sup>-1</sup>, x100, x10<sup>1</sup>, x10<sup>2</sup>, x10<sup>3</sup>, x10<sup>4</sup>.

Scan Speed is set with ⑦ x ⑧ x ⑥

0.1mV/sec ~ 50V/sec ---- ⑥ at mV/sec

10mV/min ~ 5000V/min --- ⑥ at 100mV/min

⑨, ⑩, ⑪ LOW Potential Setting Switches

⑨ sets the polarity of the LOW potential which is the sum of the readings on the coarse switch ⑩ and the final dial ⑪.

The setting range is -5.00V ~ +5.00V.

⑫, ⑬, ⑭ INITIAL Potential Setting Switches

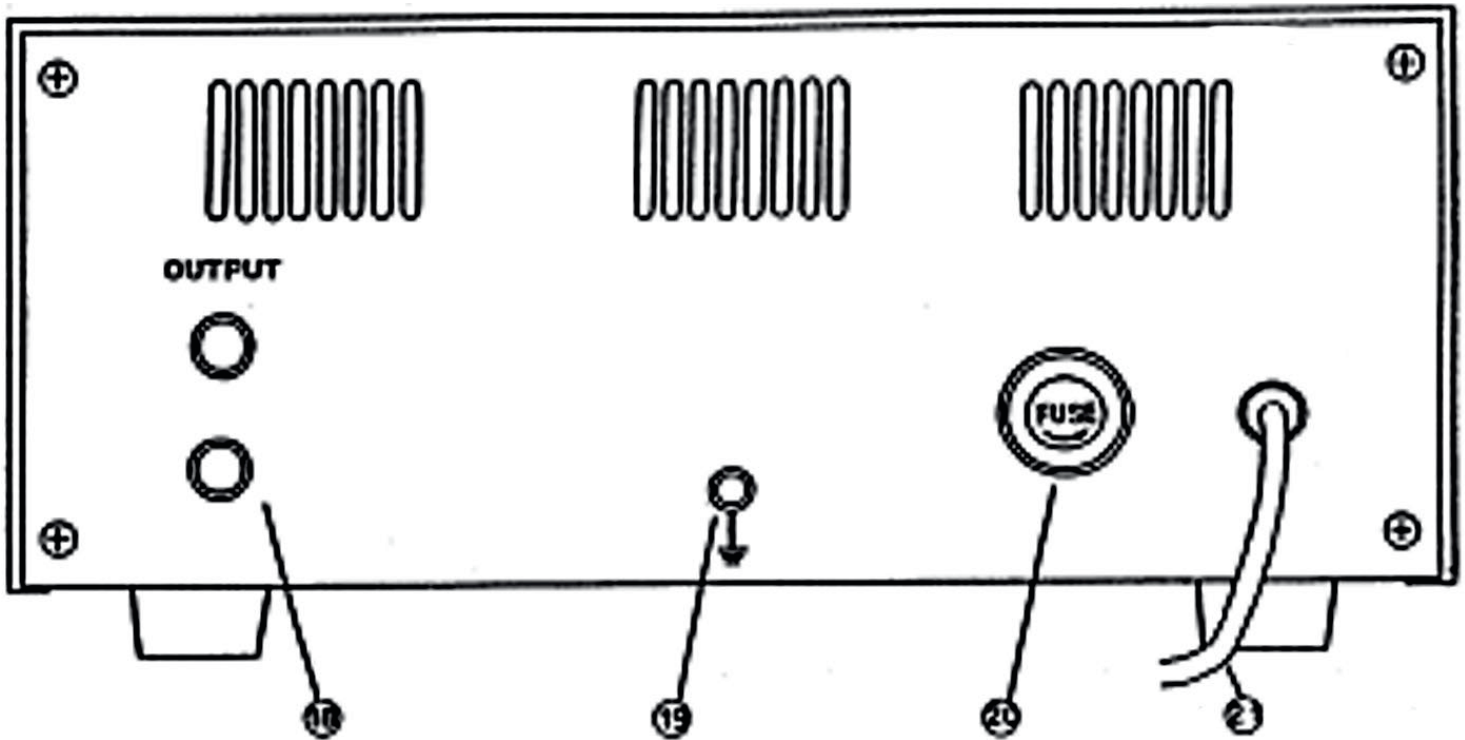
⑫ sets the polarity of the INITIAL potential which is the sum of the readings on the coarse switch ⑬ and the final dial ⑭.

The setting range is -5.00V ~ +5.00V.

⑮, ⑯, ⑰ HIGH Potential Setting Switches

⑮ sets the polarity of the HIGH potential which is the sum of the readings on the coarse switch ⑯ and the fine dial ⑰.

## 4-2 REAR PANEL



### ⑱ OUTPUT

Output Impedance: 510  $\Omega$

### ⑲ Earth Terminal

This terminal is in equipotential with the chassis of the HB111.  
It is electrically isolated from the black terminal of the binding post pair (OUTPUT) ⑱.

### ⑳ Fuse Holder

Use a 0.2A glasstube fuse for replacement.

### ㉑ AC Power Cord

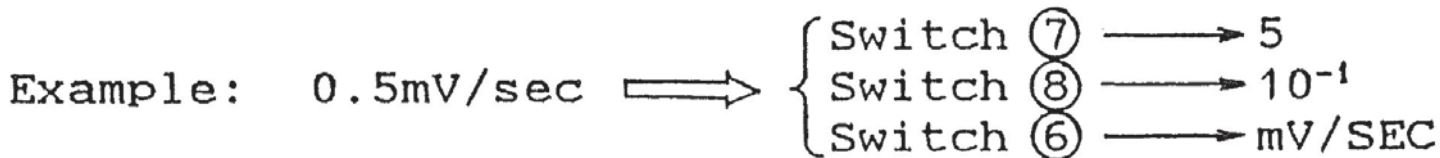
### 4-3 OPERATING PROCEDURE

Connect the power cord (21) to an AC outlet. Connect the OUTPUT terminal (18) to the EXT. INPUT terminal of a Potentiostat/ Galvanostat. Use the 1.2m cord supplied.

Turn on the power switch (1). The STOP lamp and the UP lamp will light up. Let the instrument warm up approximately 15 minutes.

Choose and set the desired waveform at the rotary switch (2).

Set the scan speed. Scan speed is set with switches (6), (7), and (8).



Set the INITIAL potential using (12), (13), (14).

Set the HIGH potential using (15), (16), (17).

Set the LOW potential using (9), (10), (11).

Recall that the following condition must be satisfied:

LOW potential +50mV < INITIAL potential < HIGH potential -50mV

Check the UP/DOWN lamps.

If the wave is to scan upwards