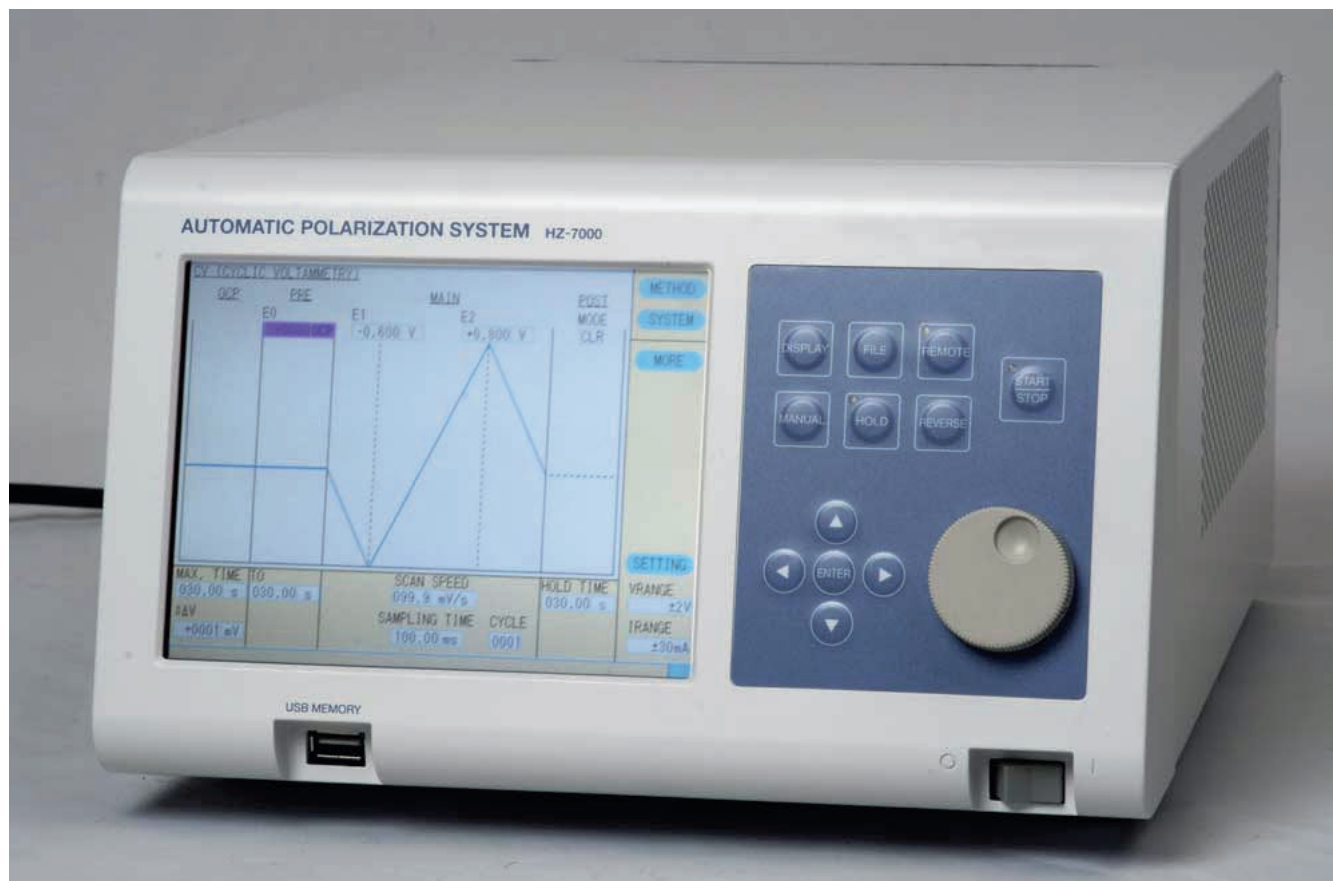


# ELECTROCHEMICAL MEASUREMENT SYSTEM

N600-HZ-7000



## 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.JL031416



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The N600-HZ-7000 is a compact and high performance potentiostat / galvanostat which is equipped with an LCD monitor and includes data memory function. It can perform electrochemical measurements of different varieties.

## FEATURES:

HZ-7000 is a compact and high performance potentiostat / galvanostat which is not only remote-controlled by PC via Ethernet, but also capable of basic measurement in stand-alone mode. The N600-HZ-7000 offers to various measurement techniques so it can be used widely from basic research to applied research.

- HAGI232m : remote-control only
- HAGI232mP : remote-control / stand-alone
- Basic measurement can be performed in stand-alone mode:  
(OCP, LSV, CV, CA, CP, NPV, DPV, IR, SCV, OSWV)
- Saving the data and measurement condition to USB memory, and loading the measurement condition from USB memory.
- The potential of RE/CE and CE/WE is measured simultaneously.
- Minimum current range : 30nA : capable of low current control and measurement
- Arbitrary waveform control up to 99steps.
- Function can be extended by adding option board. (bi-potentiostat.EIS,QCM.etc.)

## SPECIFICATIONS:

<b>Control Output</b>	Maximum output voltage	$\pm 12V$
	Maximum Current	$\pm 300mA$
	Potential Control Range	$\pm 10V(\pm 10V . -5V \sim +15V . 0V \sim +20V$ : with potential shift function)
	Potential control resolution	66 $\mu V$ (2V range)
	Current control resolution	0.004% of Full Scale Range
	Potential control accuracy	$\pm 0.05\%$ of setting $\pm 1mV$
	Current control accuracy	$\pm 0.2\%$ of Full Scale Range
	Response speed	< 2 $\mu sec$
<b>Potential / Current Measurement</b>	Potential ranges	2V.10V.AUTO ( $\pm 10V.-5V \sim +15V.0V \sim +20V$ . with potential shift function)
	Potential measurement accuracy	$\pm 0.05\%$ of reading $\pm 1mV$
	Potential measurement resolution	0.003% of Full Scale Range. Minimum 66 $\mu V$ (2Vrange)
	Current ranges	30nA $\sim$ 300mA (8 ranges).AUTO
	Current measurement accuracy	$\pm 0.2\%$ of Full Scale Range
	Current measurement resolution	0.004% of Full Scale Range, Minimum 1.1 pA (30nA range)
	Input impedance	>1T $\Omega$ .
	Input bias current	<10pA
	Data sampling interval	10 $\mu s \sim 1800s$ (There are some limitation depending on method)
<b>General</b>	Dimensions	HAGI232mP: 165 x 260 x 342mm / HAGI232m: 165 x 260 x 335mm
	Weight	5.8kg
	Power Requirements	AC100 $\sim$ 240V. 70VA
	PC	WinXP Pro. Win Vista Business, Win7 Pro (32bit)

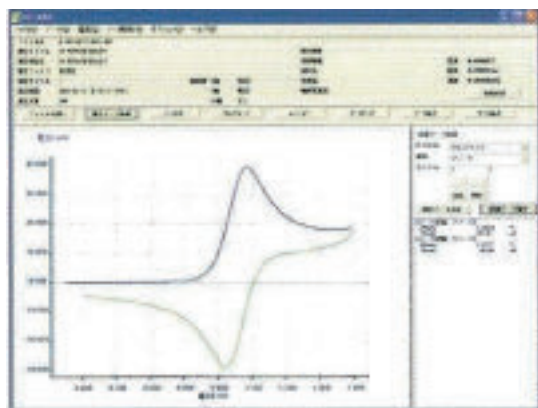
**SOFTWARE: Measurement Software**

Techniques implemented in basic software	Remote	Stand-alone	Remarks
Open Circuit Potential - OCP (OCV)	0	0	–
Linear Sweep Voltammetry - LSV	0	0	–
Cyclic Voltammetry - CV	0	0	–
Chronoamperometry - CA	0	0	–
Chronopotentiometry - CP	0	0	–
Chronocoulometry - CC	0	0	–
Bulk Electrolysis - BE	0	0	–
IR Drop Compensation - IR	0	0	–
Sine curve Voltammetry - SCV	0	–	0
Corrosion Potential - REST	0	–	0
Normal Pulse Voltammetry - NPV	0	0	–
Differential Pulse Voltammetry - DPV	0	0	–
Linear Sweep Stripping Voltammetry- LSSV	0	–	0
Differential Pulse Stripping Voltammetry - DPSV	0	–	0
Zero Resistance Ammeter - ZRA	0	0	–
Osteryoung Square Wave Voltammetry - OSWV	0	0	–
Charge Discharge Cycle - CDC (Max 4 steps)	0	0	–
Potential Electrochemical Impedance Spectroscopy - PEIS	0	0	Requires FRA Board
Galvanic Electrochemical Impedance Spectroscopy - GEIS	0	0	Requires FRA Board
Constant Voltage 8 steps	0	Δ (4 steps)	–
Constant Current 8 steps	0	Δ (4 steps)	–
Potential Arbitrary function	0	–	–
Galvanic Arbitrary function	0	–	–

Optional Techniques	Remote	Remarks
Tafel Plot- TAFEL	0	Corrosion Option
Electrochemical Potentiokinetic Reactivation - EPR	0	Corrosion Option
Pitting Potential - PITTING	0	Corrosion Option
Protection Potential - PROTEC	0	Corrosion Option
Anodic Polarization - AP	0	Corrosion Option
Repassivation Potential for Crevice - ER	0	ER Option

Features implemented in basic software	Remote	Stand-alone	Remarks
Automatic Execution (Combination measurement)	0	–	–
Data saving to USB memory	–	0	–
Setting Upload from USB Memory - Only for Stand-Alone	–	0	–
Bi-Potentiostat (max 30 mA for Ring electrode)	0	0	Requires Additional PGS board
Rotating Disk Electrode control	0	0	Requires (HR300.HR500)
QCM control	0	0	Requires QCM board
AI.DI.DO (8 ch each) min. sampling rate : 100 ms	0	–	Require AI. DIO cable (*)

(\*) AI cable and DIO cable are available for custom order. It is necessary to consult the specification.

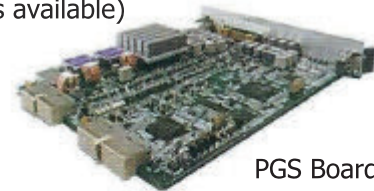


Measurement Settings	
Reference electrode	Ag/AgCl
Sample	$1 \times 10^{-3} \text{ mol dm}^{-3} \text{ Ru}(\text{bpy})_3^{2+}$
Working electrode	Boron Doped Diamond electrode
Electrolyte Solution	$1 \text{ mol dm}^{-3} \text{ KCl}$
Sweep Rate	$100 \text{ mV sec}^{-1}$

Main Features	Analysis Features	Processing Features
Data plotting and export	Zoom in / Zoom out	Smoothing
Text data export	Display pointed data	Background subtraction
	Display coordinate value	Manual compensation
	Coulomb value	Constant value compensation
	Peak Finding	
	E 1 / 2	
	Measurement length	

**PERIPHERAL EQUIPMENT (Optional):**

- Adding functionality by inserting optional board to designated slot. (only one slot is available)
  - PGS board (HZA-PGS1): Expand the HZ-7000 to bi-potentiostat
  - FRA board (HZA-FRA1): capable of simultaneous EIS measurement of WE/RE and CE/RE  
frequency range: 10Hz - 500kHz
- QCM board (HZA-QCM1): for EQCM  
Minimum resolution: 0.1 Hz (at 10ms sampling)  
Available mass sensor: HQ-304, HQ-305, HQ-306, HQ-601DK, HQ-601PK
- Rotating disk electrode (HR-300, HR-500)  
Setting from PC: start, stop and rotation speed of the motor.  
Rotating ring-disk electrode is also available by adding optional PGS board.



PGS Board



FRA Board

**Specifications:**

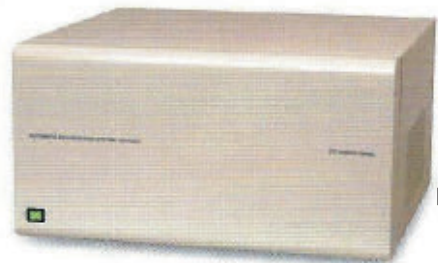
<b>HZA-FRA1</b>	
Frequency Range	10 $\mu$ Hz ~500kHz
Frequency resolution	10 $\mu$ Hz for under 1Hz 0.01 %/decade for over 1Hz
Amplitude	1 mVdc-p ~ 1 Vdc-p 0.1% ~50% of the current range
Amplitude Resolution	1mV 0.1% of the current range

<b>HZA-QCM1</b>	
Frequency Range	1MHz~ 20MHz
Gate Time	0.01s/0.1s/1s
Measurement resolution	0.1Hz/0.01Hz/0.001Hz (Gate Time 0.01s/0.1s/1s)
Input Signal	TTL
Input Impedance	767 $\Omega$ $\pm$ 23 $\Omega$
Power Supply for Cell (Oscillator)	DC+5V/30mA
Power Supply for Cell (Driver)	DC+5V/30mA

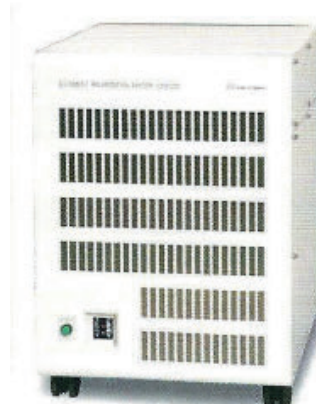
**BOOSTERS (Optional):****Booster Specifications:**

Category	Item	Specification		Remarks
		HZAP3003	HZAP1230	
Control Output	Maximum output voltage	± 30V	± 12V	
	Maximum output current	± 3A	± 30A (*)	(*) ±20A when potential shift function is used
	Control potential	±10V	±10V,-5V~15V,0V~20V	
	Control potential resolution	0.06mV		at 2V range
	Control potential accuracy	±0.05% of setting ±1mV		
Potential / Current Measurement	Input bias current	< 100pA		
	Input impedance	> 1x10 <sup>11</sup> Ω	> 1x10 <sup>10</sup> Ω	
	Measurement current range	3A,300mA,30mA,3mA,300μA,30μA,3μA,AUTO	30A,3A,300mA,30mA,3mA,300μA,30μA,	AUTO + 7 ranges

Item	Specification		Remarks
	HZAP3003	HZAP1230	
Dimensions	224 x 430 x 408mm (H x W x D)	553 x 430 x 600mm (H x W x D)	Excluding connectors and casters
Weight	17kg	65kg	
Power voltage	AC90V~264V	AC95V~264V	
Power consumption	200VA	1300VA	
Operating temperature	0C~40C		
Operating humidity	< 100pA		No condensation
Accuracy guaranteed temperature range	23C ±5C		



HZAP3003



HZAP1230