

# **NANOCYCLER**

Easy, compact, and absolutely low-cost  
battery charger-discharger  
by NANOBASE



# Higher performance instrument for battery researchers

Although many advanced battery research starts with coin cells, most researchers are forced to use standard battery cyclers designed for testing large cells such as 18650 cells. Responding to researchers' demand of more cost-effective battery cyclers, Nanobase, Inc. has launched NanoCycler, the higher performance battery cycler for research of coin cells. NanoCycler is easy and affordable for any battery researchers in chemistry, chemical engineering, electric engineering.

## Features

### Smooth

Place your standard 2032 coin cells directly into NanoCycler

### Simple

Just connect NanoCycler to PC via USB port for analysis

### Easy

Using in constant temp chambers? Just pair an extender with NanoCycler!

### Expandable

Channel addition available for much more than 8 channels per PC

## Specifications

### Electricity

- 88 ~ 264 VAC or 125 ~ 373 VDC
- 80 W (max.)

### Channels

- 8 independent channels per unit
- Sockets for standard 2032 coin cells
- Unlimited channels per PC (depending on PC specifications and available USB ports)

### Data Recording

- Data recording rate : 1 kHz (max.)
- Data interval :  $\geq 1$  ms

### Voltage

- Range: 0 ~ 5 V
- Accuracy:  $\pm 0.1\%$  FS
- Measurement resolution: 16 bit
- Programming resolution: 14 bit

### Current

- Range: 3 manually selectable ranges (200  $\mu$ A, 2 mA, 20 mA)
- Optional current range : 200 mA
- Accuracy:  $\pm 0.1\%$  FS
- Measurement resolution: 16 bit
- Programming resolution: 14 bit

### Software

- Sequence editor : Step & loop sequences
- Channel monitor & control
- Channel summary
- Plotting function : general plot, cycle plot
- Data export in .csv or .txt format

### Product Size

- 153 × 270 × 107 (mm)

### Optional Products

- Extender for 2032 coin cells for temperature chamber use
- Extender with banana cables for other battery types

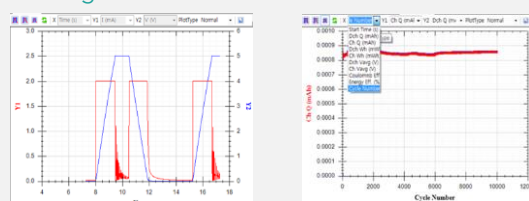
## Software Capabilities

### Channel monitoring and control

Ch #	Label	Control	Real Time	Status	Cycle #	Step #	T	I (mA)	V (V)	Ch.Q (mAh)	Dch.Q (mAh)	Sequence file	Data file
1	Start	STBY	1	3	0:00:00	-0.0005	2 mA	-0.0053	20.28270	0.00000	0.00000	LU_TC_170uAh	NanoCyclerDataChn1.a
2	Stop	CHG	3	1	0:4:28	0.0629	2 mA	0.0046	0.00000	0.00000	0.00000	2200uF_10ms	NanoCyclerDataChn2
3	Stop	CHG	3	2	0:9:14	2.0011	2 mA	2.2271	0.00033	0.00000	0.00000	2200uF_10ms	NanoCyclerDataChn3
4	Stop	CHG	3	1	0:9:12	0.0009	2 mA	0.0061	0.00000	0.00000	0.00000	2200uF_10ms	NanoCyclerDataChn4
5	Stop	CHG	3	1	0:9:10	0.1007	2 mA	0.0003	0.00000	0.00000	0.00000	2200uF_10ms	NanoCyclerDataChn5
6	Start	STBY	10000	5	0:00:00	0.0000	2 mA	0.2677	0.00005	0.00000	2200uF_10ms	NanoCyclerDataChn6	
7	Start	STBY	10000	5	0:00:00	-0.0006	2 mA	-0.0000	0.00007	0.00000	2200uF_10ms	NanoCyclerDataChn7	
8	Start	STBY	10000	5	0:00:00	0.0007	2 mA	0.2620	0.00008	0.00000	2200uF_10ms	NanoCyclerDataChn8	
9	Start	STBY	10000	5	0:00:15	-0.103	20 mA	-0.0063	0.00092	0.00006	2200uF_10ms	NanoCyclerDataChn9	

- Channel Start / Stop control with password protection
- Displays Cycle No., Step No., Elapsed Time, Current, Voltage, Q, Sequence File, and Data File

### Plotting



General Plot

Cycle Plot

### Sequence Editing

Type	I	Unit	V (V)	Cut-off type	Cut-off cond	Cut-off Value	Goto Step	Loop Count	Param 1
Standby	1	C	2.8	StepTime	GreaterT...	10			
Discharge	1	C	2.8	Voltage	Less Than	2.9			
Charge	1	C	4.2	Current	Less Than	0.05			
Charge	1	C	4.2	StepTime	GreaterT...	1			
Loop				Current	Less Than	0.02	-3	50	

- Step types: Charge, Discharge, Standby, Loop, Jump If
- Cut-off types: Voltage, Current, Step Time, Cycle Time, Capacity

### Channel Summarizing

Ch #	Label	Control	Real Time	Status	Cycle #	Step #	T	I (mA)	V (V)	Ch.Q (mAh)	Dch.Q (mAh)	Sequence file	Data file
[1]	Start	STBY	1	3	0:00:00	-0.0005	2 mA	-0.0053	20.28270	0.00000	0.00000	LU_TC_170uAh	NanoCyclerDataChn1.a
[2]	Stop	CHG	3	1	0:4:28	0.0629	2 mA	0.0046	0.00000	0.00000	0.00000	2200uF_10ms	NanoCyclerDataChn2
[3]	Stop	CHG	3	2	0:9:14	2.0011	2 mA	2.2271	0.00033	0.00000	0.00000	2200uF_10ms	NanoCyclerDataChn3
[4]	Stop	CHG	3	1	0:9:12	0.0009	2 mA	0.0061	0.00000	0.00000	0.00000	2200uF_10ms	NanoCyclerDataChn4
[5]	Stop	CHG	3	1	0:9:10	0.1007	2 mA	0.0003	0.00000	0.00000	0.00000	2200uF_10ms	NanoCyclerDataChn5
[6]	Start	STBY	10000	5	0:00:00	0.0000	2 mA	0.2677	0.00005	0.00000	0.00000	2200uF_10ms	NanoCyclerDataChn6
[7]	Start	STBY	10000	5	0:00:00	-0.0006	2 mA	-0.0000	0.00007	0.00000	0.00000	2200uF_10ms	NanoCyclerDataChn7
[8]	Start	STBY	10000	5	0:00:00	0.0007	2 mA	0.2620	0.00008	0.00000	0.00000	2200uF_10ms	NanoCyclerDataChn8
[9]	Start	STBY	10000	5	0:00:15	-0.103	20 mA	-0.0063	0.00092	0.00006	0.00000	2200uF_10ms	NanoCyclerDataChn9

- Charge, Discharge, Standby/Error Status of all channels shown as icons
- Also displays Elapsed Time, Current, and Voltage