

Product Catalog

WBCS3000 Series Battery Cell Test System



For
Battery/Fuel Cell
Supercapacitor/Solar Cell
Corrosion
Material Testing

Battery Charge/Discharge System

- Battery cycle life test
- Fuel cell test
- Supercapacitor test
- Electrochemical experiment
- Potentiostat/Galvanostat circuit
- Various safety functions
- Universal graphic function
- Other application

The **WBCS series** are ideal for battery lifetime testing and its system hardware is designed for easy channel expansion and maintenance. The **WBCS3000L(Le)/S/M1/M2 series** consist of plug-in type modules with independent power supplies per substation, where 8 modules(8 channels) with up to 200 Watt per channel can be installed. The Dual channel module **WBCS3000D series** is for 400Watt application. The **WBCS3000H8 series** channel can be used for powers up to 800Watt per channel and **WBCS3000H12 series** channel was for max 1200Watt per channel. The **WBCS3000HP series** can be designed for powers up to 4kWatt per channel configured inside of rack. The **WBCS3000L32 and WBCS3000Le32** are comprised of 32 modules(32 channels) per substation and channels can be expanded by unit of 16 channels.

For WBCS3000H series and WBCS3000HP series, each of the channels should have its own power supply. WBCS3000D has power supply per 2 channels. If the cyclers system consists of multiple substations or controllers, each substation or controller can be used as independent system with optional Stand Alone Kit. And extra substations can be added for channel expansion. The current range can be configured differently for each channel. These features give users a lot of flexibility in application.

Because these multichannel battery cyler systems provide independent control over each channel, user can test multiple samples simultaneously and independently. The powerful software can give various plots for users to analyze test results easily.

The **WBCS series** are designed with 4 probe type true potentiostat/galvanostat circuit and it can support most various control parameters with various cutoff conditions. Pre-defined techniques for battery test allow user to test their battery so easily even if he/she is a novice for battery testing. And it also provides powerful test schedule function for advanced users. Consequently, user can design experiments with customized schedule with various control parameters.

The **WBCS series** can also support electrochemical techniques such as corrosion test techniques, electro-analytical techniques, cyclic voltammetry, chronoamperometry, and potentiometry, etc. and this feature allows user to perform general Echem experiments.

There are 11 kinds of **WBCS model** depending on channel power or fixed specification.

Low Power Type

- **WBCS3000L**
Voltage range: $\pm 5V$
Max. current: $\pm 10mA$
- **WBCS3000Le**
Voltage range: $\pm 5V$
Max. current: $\pm 100mA$
- **WBCS3000L32**
Voltage range: $\pm 5V$
Max. current: $\pm 10mA$
Plug-in channel type: 32 channel per substation
- **WBCS3000Le32**
Voltage range: $\pm 5V$
Max. current: $\pm 100mA$
Plug-in channel type: 32 channel per substation

Mid Power Type

- **WBCS3000S**
Max. power: 50Watt
Max. current: $\pm 5A$
- **WBCS3000M1**
Max. power: 100Watt
Max. current: $\pm 10A$
- **WBCS3000M2**
Max. power: 200Watt
Max. current: $\pm 20A$

High Power Type

- **WBCS3000D**
Max. power: 400Watt/ch
- **WBCS3000H8**
Max. power: 800Watt
- **WBCS3000H12**
Max. power: 1200Watt
- **WBCS3000HP**
Max. power: <4kWatt

Slave channel type: independent housing and power supply per channel. It needs an 8 channel controller separately.

Features

● Potentiostat/Galvanostat Circuit

- No switching time (charging to discharging, discharging to charging)
- Analog feedback control to keep constant voltage & current
- Capability of electrochemical experiments by controlling voltage versus reference electrode for positive voltage polarity only. (For \pm voltage range application, choose WMPG series multichannel potentiostat/Galvanostat)

● High Precision

- 16 bit(0.0015% full scale) dual ADCs for data recording and DAC per channel for control.
- 0.01% to 0.05% full scale voltage control and reading accuracy depending on models
- 4 current ranges (automatic/manual selection) for WBCS3000S/L/Le /M1/M2 models, 3 current ranges for WBCS3000D/H models and 1 or 3 current ranges for WBCS3000HP models.
 - 5 current range system is also available upon request.
- MOSFET type linear power supply circuit
- Shield cell cable to prevent EMI noise

● Safety

- Unique "Fail check" function
 - : To protect the system and cell itself, the experiment will stop automatically when the measured value is different from control value due to battery failure or wrong cell connection, etc.
e.g. Control value: 1A, Measured value: 500mA
The experiment will stop automatically.
- System safety parameter
 - : If the measured value is over system specification or user defined safety limit condition, the experiment stops automatically.
 - : User defined safety condition setting
User can input safety level depending on chemical properties of reactants in test cell.
- Automatic cell connection check
 - : Before experiment, if the cell voltage value is over than stanby voltage range, program gives the warning message for the operator to check the cell connection.
- If operator presses stop button by mistake, a confirmation message box will appear.
- To prevent over current, a poly-switch is located in each channel. (Low and Mid power model only)
- Watchdog function:
Stop "running channel(s)" when communication failure occurs.
- Even if a PC failure/communication failure happens, the system will work without data loss and will store the data by max. 290,000 data points per control board.
- If the main program is down by unstable operating system, the independent server program keeps the experiment (control & data acquisition) without dead time.
- For high power model, emergency switch is located per channel to activate the cell off when emergency happened

● Maintenance & System Expansion

- Plug-in module configures channels for the system.
 - : Plug-in module can be easily upgraded or can modify voltage/ current range. Also, if one channel is out of order, replacing the problematic channels is the easiest way to clean the problem. Optional modules are also plug-in type. On the other hand, if an 8 channel system consists of only one board, user cannot use all 8 channels when one of channels is out of order.

- Substation add-on type
 - : The channels of WBCS series can be expanded up to 128 channels per system. Users can simply add substations when they want to expand channels. One of modular system's advantages is maintenance. In case one substation is out of order in power supply unit, the other substations still work without dead time.
- A power supply is allocated for every 8 channel substation for WBCS3000S/M1/M2/L system, whereas it is allocated for every 32 channel substation for WBCS3000L32/WBCS3000Le32. WBCS3000D system has two channels per one power supply and WBCS3000H and WBCS3000HP has its own power supply per channel.
- Data automatic backup function
- While one or more channels is working, the calibration for the other channels in rest mode is available.
- Each channel has a poly switch instead of fuse. (Low power and Mid power system only)
- Easy calibration software
- Stable TCP/IP communication
- Automatic firmware upgrade

Options

● Auxiliary voltage & temperature measurement

- User can assign any temperature input or auxiliary voltage input to single or multiple channel(s) data set by his/her demand.
- Customized auxiliary voltage range and temperature range is available.

● Rack mount system available

● Multiple control board configuration available

● Battery jig

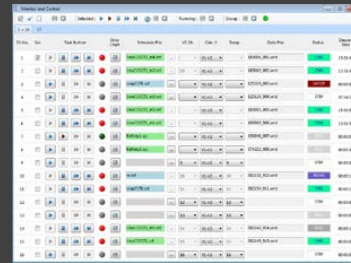
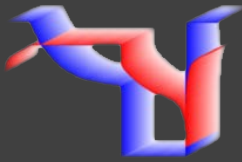
- Universal jig
- Lithium polymer battery jig
- Coin cell holder

Specifications

- Circuit: potentiostat/galvanostat linear circuit
- 4 Kelvin probe type connection
- Maximum channels per PC: 2~128 channels
- Voltage range: unipolar or bipolar
- Current(reading & control) accuracy
 - : 0.01~0.1% f.s. depending on model
- Sampling time^{1)*} varies depending on number of channels.
 - 8~24 channel system: 10msec
 - 25~40 channel system: 20msec^{2)*}
 - 41~128 channel system: 50msec^{2)*}

^{1)*}: The sampling time for WBCS3000L32/WBCS3000Le32 is 20msec.
^{2)*}: The sampling time of 10msec is available as an option.
- Auxiliary voltage measurement range: bipolar(option)
- Temperature measurement type: K type thermocouple(option)

Software (Smart Interface)



Multichannel control panel



Single channel control/monitor panel

- 32bit/64bit OS environment
- TCP/IP communication
- Max. 200 steps
- Max. 10 cutoff(vertex) condition
- Max. 290,000 data point memory on control board
- Single/multichannel control panel
- Various real time plots & universal axis graphs
- Data backup function
- WYSIWYG graphics
- User friendly software

Virtual Control Panel

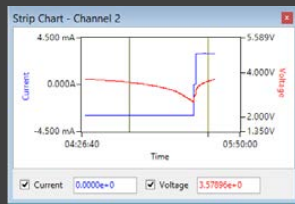
• BCO (Button click operation): User can do any task just by clicking the button: NO MENU SELECTION



- Easy assignment of cycle test condition file to channel with combo box selection at anytime.
- Synchronized changes of cycle test condition for selected multiple channels.
- Real time dual channel(V & I) strip chart displays for selected channel or for all running channels with time scrolling mode or whole window mode.



Multichannel real time graph



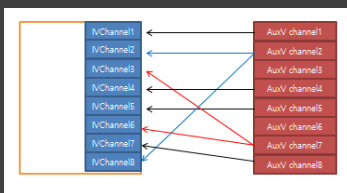
Single channel real time graph

- Status bar displays channel status.
- Various task functions: run, stop, suspend, moving step, etc.



Jump step function

- Assign temperature and AuxV channel on virtual control panel



- Single channel & multichannel control/monitor panel

• VOI(Value of Interest) bar is located in upper side of 'control/monitor' window. The first value on the far left indicates the elapsed time after the experiment starts. The other parameters can be selected or be hidden at user's discretion. The selectable parameters are voltage, current, auxiliary, temperature, load, power, capacity, and energy.

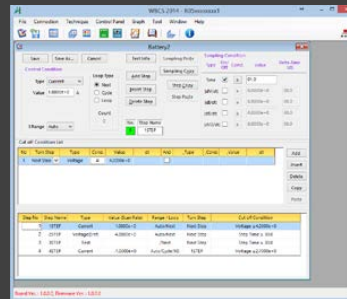
Elapsed Time	Voltage(V)	Current(A)	Power(W)	Auxiliary(V)	Temperature(°C)
00:00:50	1.5m	0.000	0.000	181.3m	0.0

Voltage control

Step Time	Voltage(V)	Current(A)	Power(W)	Auxiliary(V)	Temperature(°C)
00:00:20	3.887	-50.0m	-194.4m	237.4m	0.0

Current control

Schedule Editor



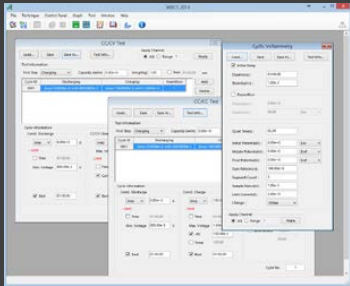
- One stop test condition creation/modification
- Multiple input parameters available
- Max. 200 test steps
- Control parameters
 - Constant voltage, LastV
 - Constant current, LastI
 - Constant power
 - Constant load
 - C-rate
 - Voltage scanning, current scanning
 - Conditioning potential
 - Conditioning current
 - Rest
 - LastVscan
 - CstepV(Staircase Voltage Sweep)
 - CstepI(Staircase Current Sweep)
 - CC/CV, CL/CV, CP/CV, Crate/CV
 - Id, Is control
- Step flow is defined by next step, loop and cycle.
- Cut-off conditions can be set by
 - : step time, voltage, current, dV/dt, dI/dt, cycle time, loop time, capacity, -dV, Whr, Ahr, temperature, Aux voltage, dT/dt, Eoc, stepend

No	Turn Step	Type	Condi.	Value	dt	And	...Type
1	Next Step	Step Time	z	30.00			

Cutoff condition

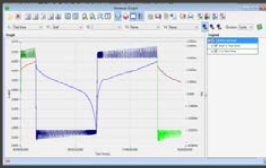
- Data sampling condition by each step : time, dV/dt, dI/dt, dT/dt, dV2/dt
- And/Or logic for cut-off condition settings

Menu Selection (Pre-defined techniques)

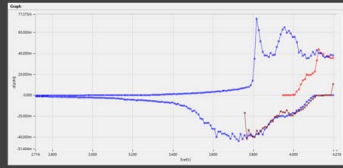


Electro Test

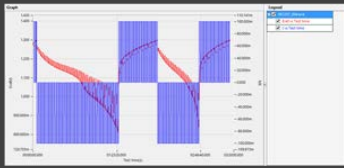
- CC/CV (Lithium battery) test menu
- CC/CC (NiCd(NiMH) battery) test menu
- Steady state CV
- Pstat IV curve
- Gstat IV curve
- EVS (Electrochemical voltage spectroscopy) test
- GITT (Galvanostatic intermittent titration technique) test
- PITT (Potentiostatic intermittent titration technique) test



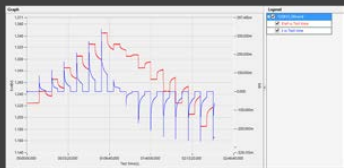
EVS test raw data



EVS graph format (dQ/dV vs. V)



GITT test



PITT test raw data

Electroanalytical Techniques

- Cyclic voltammetry
- Linear sweep voltammetry
- Chrono-amperometry
- Chrono-coulometry
- Chrono-potentiometry

Corrosion Measurement

- Tafel plot
- Potentiodynamic
- Potentiostatic
- Galvanostatic
- Cyclic polarization
- Ecorr vs. time
- Linear polarization resistance

Simple Monitor

Group Number	Channel	Parameter	Value	Status	Unit
Ch-1	Current	0.0000e+0	0.0000	Idle	A
	Voltage	3.0000e+0	3.0000	Charging	V
	Capacity	0.0000e+0	0.0000	Idle	mAh
Ch-2	Current	0.0000e+0	0.0000	Idle	A
	Voltage	3.0000e+0	3.0000	Charging	V
	Capacity	0.0000e+0	0.0000	Idle	mAh

- Real time display: time, voltage, current, channel status
- Channel status color display: charging, discharging, standby, idle, calibration

Grouping

- Classification/grouping channels by user's purpose
- Labeling each group by operator name, chemistries etc.
- Group monitor is available by this setting
- Group control



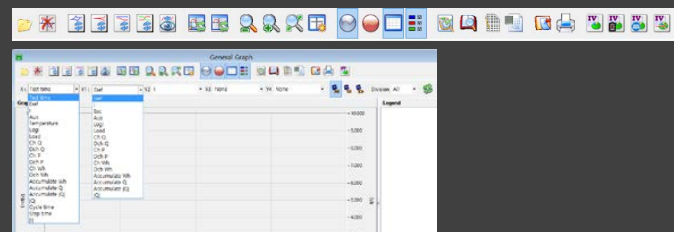
Detailed Monitor

- Displayed test data: status, running time, step number, cycle number, step time, current range, current, voltage, capacity, power, energy, Aux V, Calc V, temp, cycle file name, data file name, and file size.
- Detailed monitor type selection: All channels, running channels only, and grouped channels.
- Activated character only for running channels.

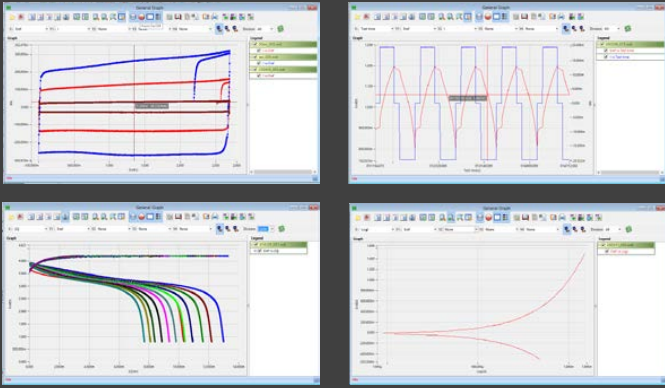
Item / Ch.	1	2	3	4	5	6	7	8
Status	Idle	Charging	Charging	Charging	Charging	Charging	Charging	Charging
Run Time	00:18:52	00:16:12	01:47:28	05:40:41	01:40:41	01:30:39	01:40:41	05:40:41
Step / Cycle	5 / 3	1 / 1	1 / 1	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2
Current Range	30.00e-3	90.16e-3	01.47e-3	00.11e-3	00.11e-3	00.07e-3	00.13e-3	00.06e-3
Current (A)	0.0000e+0	9.01752e-3	9.98727e-4	-1.1822e-3	-1.18795e-3	0.0000e+0	-0.0033e-3	-27.0401e-3
Voltage (V)	3.0000e+0	3.7605e+0	3.8791e+0	-1.8802e-3	-1.12175e-3	1.016805e+0	-1.279e-3	-45.1986e-3
Capacity (mAh)	1.94230e+0	2.03998e+0	1.7999e+0	-1.30345e+0	-0.841407e+0	0.0000e+0	-5.043109e-1	-10.8752e+0
Power (mW)	0.0000e+0	3.74025e+0	3.8791e+0	-1.1206e-3	-2.00109e-3	0.0000e+0	2.47236e-1	1.7107e+0
Energy (mWh)	46.7902e+0	1.00072e+1	4.30076e+0	4.30156e-3	1.21527e-9	0.0000e+0	1.01891e-1	1.03059e+0
Aux (V)	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0
Calc V	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0
Temp (C)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Schedule Name	CV75	CV75	CV75	CV75	CV75	CV75	CV75	CV75
File Name	200803_001	211019_001	194023_001	194023_004	194023_005	194023_006	194023_007	194023_008
File Size	822 Kbytes	771 Kbytes	814 Kbytes	4 Kbytes	4 Kbytes	4 Kbytes	4 Kbytes	4 Kbytes

Graphics

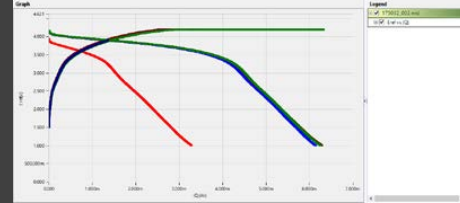
- Multiple plot format
 - General graph
 - Cycle graph
- General graph format



Battery Cell Test System WBCS Series

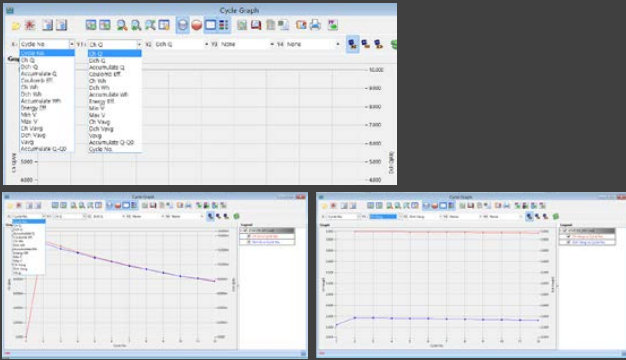


- Parameter change without reloading the data file
- Data set On/Off: Data can be visible or invisible by selecting/deselecting the data set.
- Rest step data hidden function
- Advanced graph setting



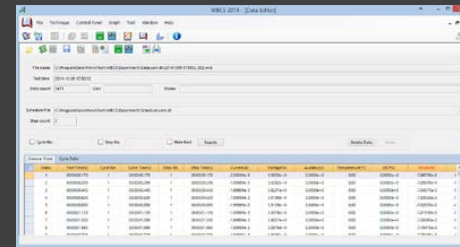
Voltage vs. Capacity graph

• Cycle graph format



• Tools

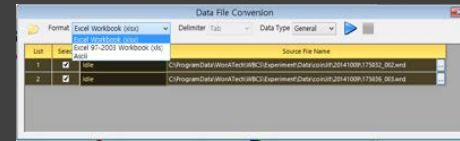
- Data Editor
 - General data report
 - Cycle data report



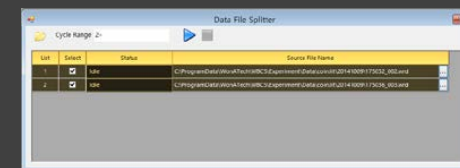
- * Data editing
- * Data filtering

• Data Conversion

- Multiple data conversion(ASCII, Excel)

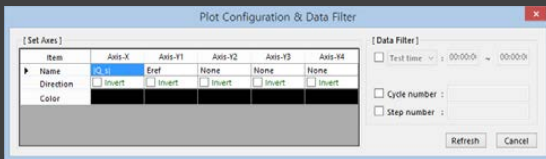


- Data file splitter by cycle number

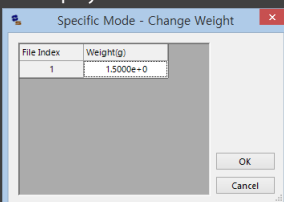


• General Function of Graph

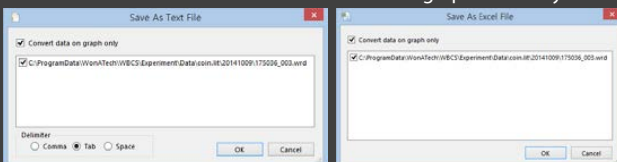
- Multi-parameters
- Plot overlay: max. 20 plot
- Universal graphics: any combination of X,Y1,Y2,Y3,Y4 axis parameters
- Automatic updating plot with reloading button for running channel data
- Automatic/manual scale and polarity selection for each axis



- Cross-hair pointer by mouse click/arrow key displays coordinate values on graph
- Mouse zooming
- Density, specific value display

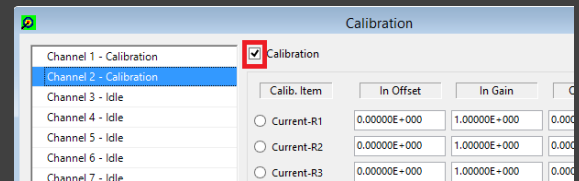


- Copy to clipboard function to use in other application software
- Grid on/off and dot/line selection
- ASCII file conversion or Excel file conversion of graph data only

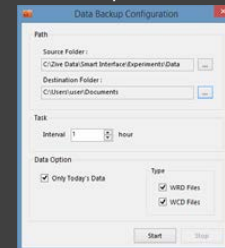


• Calibration

- User can calibrate channel(s) while other channels are running.



• Data backup



Independent Data Analysis Software



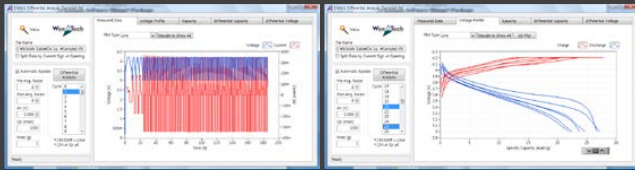
The WBCS data format can be used for independent data analysis software IVMAN™ at free of charge.

- IVMAN™ software package consists of
 - IVMAN software
 - IVMAN differential analysis software
 - IVMAN photo voltaic cell analysis.
 - IVMAN Tafel analysis
 - IVMAN extractor
 - IVMAN peak find module



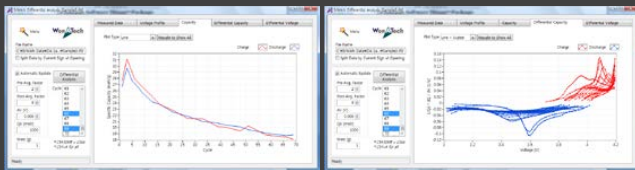
IVMAN DA™ Battery Test Data Analysis Software

- Battery test data analysis
- Electrochemical voltage spectroscopy (dQ/dV vs. V)
- Voltage vs. c capacity analysis (V vs. Q)
- Cycle graph (Q vs. cycle)
- Differential voltage graph (dV/dQ vs. Q)



Measured data

V vs. Q

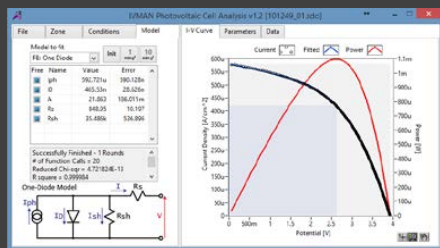


Cycle graph

dQ/dV vs. V



IVMAN™ Photovoltaic Cell Analysis

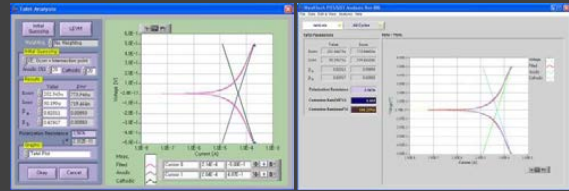


- Automatic analysis of parameters
 - open circuit voltage, open circuit current, max. power, efficiency
 - photo induced current, diode quality factor, series resistance, etc.



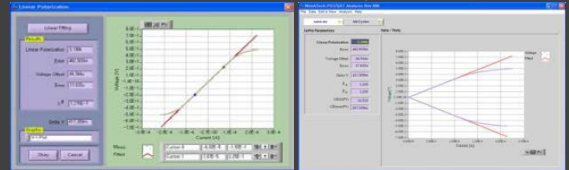
IVMAN™ Main Software

- Electrochemical analysis software
- Ideal for DC corrosion data analysis and electro-analytical data analysis
- Initial guessing function on Tafel analysis
- Automatic Tafel fitting
- Polarization resistance fitting
- 3D graph
- Find peak function
- Interpolation, differentiation, integration, etc.
- Reporting function



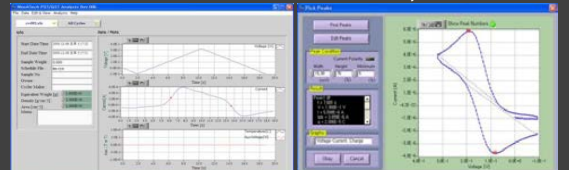
Tafel initial fitting

Tafel analysis result



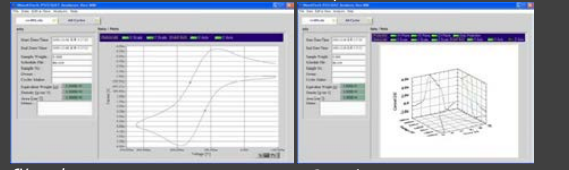
Polarization resistance fitting

Polarization analysis result



Time graph

Find peak menu



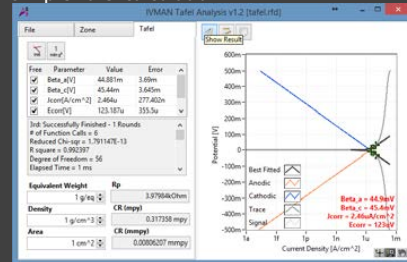
CV graph

3D graph



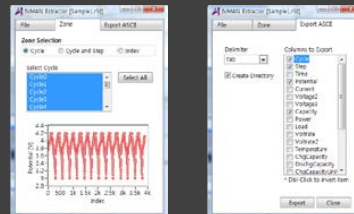
IVMAN™ Tafel Analysis

- Simple Tafel calculation



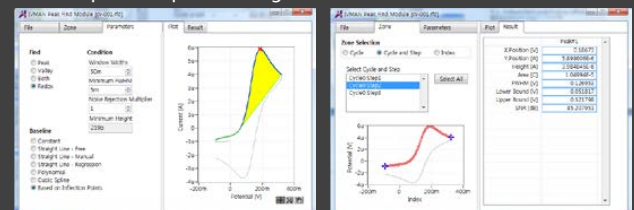
Extractor

- Extracting data by cycle number or step
- Exporting ASCII file



Peak Find Module

- Independent peak finding software



WBCS3000L(Le) Low power Type



WBCS3000L(Le)



WBCS3000L(Le)32

Application

- For low current application
- Micro battery application
- Sensor application
- Electroanalytical application

The **WBCS3000L(Le)** series are designed for low current applications and can be a best choice for coin cell/micro battery studies. The potential control range is specified depending on customer's specification. Maximum power of each channel is 50mW(WBCS3000L) 500mW(WBCS3000Le) and the system can be configured with custom specification not exceeding 50 or 500mWatt in power range. Up to 8 independent channels can be installed per substation. Additional channels can be added up to a maximum of 128 channels. The **WBCS3000L32** and **WBCS3000Le32** are comprised of 32 modules(32 channels) per substation and channels can be expanded by unit of 16 channels. The system has 4 current ranges. It use a local area network(LAN) for communication with a computer.

Options

- Temperature monitoring
- Auxiliary voltage monitoring
- Coin cell holder
- Battery jig

Specifications

Control voltage range	±5V(standard) *1
Control current range	4 ranges
LED	Run: 1ea
Input impedance	10 ¹² Ohm
Cell connection	4 probe type, alligator clip cables
Max. channel No.	128
Voltage accuracy	±0.01% f.s.
Current accuracy	±0.01% f.s.

Voltage Control/Measurement

Full scale ranges	±5V(standard) *1
Resolution (16 bits)	0.15mV(standard) *1

Current Control/Measurement

Full scale ranges	Depending on system specification Max. 10mA@5V(WBCS3000L/WBCS3000L32) Max. 100mA@5V(WBCS3000Le/WBCS3000Le32)
Resolution	16 bit(0.0015% f.s)
Communication	TCP/IP
Sampling time	- 8~24 channel system : 10msec - 25~40 channel system : 20msec standard, 10msec as an option - 41~128 channel system : 50msec standard, 10msec as an option - WBCS3000L32/WBCS3000Le32 system : 20msec

* 1: User can specify the voltage range within ±10V.
All specifications are subject to change without notice.

WBCS3000S Standard Type(Mid power type)



Application

- Battery cycle life test
- Fuel cell test
- Solar cell test
- Supercapacitor test
- Material test

The **WBCS3000S** is a research grade battery charge/discharge test system in an 8-channel substation and each channel can be used independently or simultaneously. Maximum power of each channel is 50Watt and the system can be configured with custom specification not exceeding 50Watt in power range. The **WBCS3000S** has 4 current ranges, which is suitable for various electrochemical applications. The **WBCS3000S** is designed with a local area network (LAN) for communication with a computer.

Options

- Temperature monitoring
- Auxiliary voltage monitoring
- Coin cell holder
- Battery jig

Specifications

Control voltage range	±5V(standard) *1
Control current range	4 ranges
LED	Run: 1ea, Mode: 2ea
Input impedance	10 ¹² Ohm
Cell connection	4 probe type, alligator clip cables
Max. channel No.	128
Voltage accuracy	±0.02% f.s.
Current accuracy	±0.02% f.s.

Voltage Control/Measurement

Full scale ranges	±5V(standard) *1
Resolution (16 bits)	0.15mV(standard) *1

Current Control/Measurement

Full scale ranges	Depending on system specification Max. 5A
Resolution	16 bit(0.0015% f.s)
Communication	TCP/IP
Sampling time	- 8~24 channel system : 10msec - 25~40 channel system : 20msec standard, 10msec as an option - 41~128 channel system : 50msec standard, 10msec as an option

* 1: User can specify the voltage range within <80V for difference between high and low voltage.
All specifications are subject to change without notice.

WBCS3000M1 100Watt Mid Power Type



WBCS3000M1

Application

- Suitable for power device application
- Battery cycle life test
- Fuel cell test
- Supercapacitor test

The WBCS3000M1 system are designed for energy device application such as battery pack, solar module, and fuel cell stack, etc. The WBCS3000M1 are derived from the standard WBCS series battery cyclers system for higher power application with 4 current ranges and maximum power of each channel is 100Watt. The system can be configured with custom specification not exceeding its maximum power. Up to 8 independent channels can be installed per substation and extra channels can be added up to a maximum of 128 channels.

Options

- Temperature monitoring
- Auxiliary voltage monitoring
- Battery jigs

Specifications

Control voltage range	±5V(standard) *1
Control current range	4 ranges
LED	Run: 1ea, Mode: 2ea
Input impedance	10 ¹² Ohm
Cell connection	4 probe type, alligator clip cables
Max. channel No.	128
Voltage accuracy	±0.02% f.s.
Current accuracy	±0.05% f.s.

Voltage Control/Measurement

Full scale ranges	±5V(standard) *1
Resolution (16 bits)	0.15mV(standard) *1

Current Control/Measurement

Full scale ranges	Depending on system specification Max. 10A@5V for WBCS3000M1
Resolution	16 bit(0.0015% f.s)
Communication	TCP/IP
Sampling time	- 8~24 channel system : 10msec - 25~40 channel system : 20msec standard, 10msec as an option - 41~128 channel system : 50msec standard, 10msec as an option

* 1: User can specify the voltage range within <80V for difference between high and low voltage. All specifications are subject to change without notice.

WBCS3000M2 200Watt Mid Power Type



WBCS3000M2

Application

- Suitable for power device application
- Battery cycle life test
- Fuel cell test
- Supercapacitor test

The WBCS3000M2 system are designed for energy device application such as battery pack, solar module, and fuel cell stack, etc. The WBCS3000M2 are derived from the standard WBCS series battery cyclers system for higher power application with 4 current ranges and maximum power of each channel is 200Watt. The system can be configured with custom specification not exceeding its maximum power. Up to 8 independent channels can be installed per substation and extra channels can be added up to a maximum of 128 channels.

Options

- Temperature monitoring
- Auxiliary voltage monitoring
- Battery jigs

Specifications

Control voltage range	±5V(standard) *1
Control current range	4 ranges
LED	Run: 1ea, Mode: 2ea
Input impedance	10 ¹² Ohm
Cell connection	4 probe type, alligator clip cables
Max. channel No.	128
Voltage accuracy	±0.02% f.s.
Current accuracy	±0.05% f.s.

Voltage Control/Measurement

Full scale ranges	±5V(standard) *1
Resolution (16 bits)	0.15mV(standard) *1

Current Control/Measurement

Full scale ranges	Depending on system specification Max. 20A@5V for WBCS3000M2
Resolution	16 bit(0.0015% f.s)
Communication	TCP/IP
Sampling time	- 8~24 channel system : 10msec - 25~40 channel system : 20msec standard, 10msec as an option - 41~128 channel system : 50msec standard, 10msec as an option

* 1: User can specify the voltage range within <80V for difference between high and low voltage. All specifications are subject to change without notice.

WBCS3000D 400Watt Dual Channel Type



Application

- Power device application
- Battery/Super capacitor test
- Solar cell test, Fuel cell test
- For multichannel application

The **WBCS3000D** system is designed for Mid power application (max 400Watt/ch) such as battery, solar module, fuel cell, supercapacitor etc. The **WBCS3000D** has dual channel in one housing. Each dual channel housing has its own power supply. Customized specification is available. Up to 8 independent channels can be connected to one 8 channel controller. Additional channels can be added up to a maximum of 128 channels.

Typical models for WBCS3000H8 are

- -5V to 5V @ 25Amp WBCS3000H8_525B
- -1V to 10V @ 25Amp WBCS3000H8_1025U
- -1V to 30V @10Amp WBCS3000H8_3010U

Options

- Temperature monitoring
- Auxiliary voltage monitoring

Specifications

Control voltage range	User specification* ¹
Control current range	3 ranges
LED	Run: 1ea, Mode: 2ea, Irange: 3ea
Input impedance	10 ¹² Ohm for <10V
Cell connection	4 probe type, alligator clip cables
Max channel no.	128
Voltage accuracy	±0.05% f.s.
Current accuracy	±0.05% f.s.

Voltage Control/Measurement

Full scale ranges	User specification* ¹
Resolution (16 bits)	0.0015% f.s

Current Control/Measurement

Full scale ranges	Depending on system specification Max. 400Watt
Resolution	16 bit(0.0015% f.s)
communication	TCP/IP

Sampling time	- 8~24 channel system : 10msec - 25~40 channel system : 20msec standard, 10msec as an option - 41~128 channel system : 50msec standard, 10msec as an option
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* 1: User can specify the voltage range within <80V for difference between high and low voltage. All specifications are subject to change without notice.

WBCS3000H8 800Watt Power Channel Type



Application

- Power device application
- Battery/Super capacitor test
- Solar cell test, Fuel cell test
- For multichannel application

The **WBCS3000H8** channel is designed for power application (max 800Watt/ch) such as battery pack, solar module, fuel cell stack, super capacitor, etc. The **WBCS3000H8** has its own power supply in channel module. This requires 8 channel controller. Customized specification is available. Up to 8 independent channels can be connected to one 8 channel controller. Additional channels can be added up to a maximum of 128 channels.

Typical models for WBCS3000H8 are

- -5V to 5V @ 50Amp WBCS3000H8_550B
- -1V to 10V @ 50Amp WBCS3000H8_1050U
- -1V to 30V @20Amp WBCS3000H8_3020U
- -1V to 60V @10Amp WBCS3000H8_6010U

Options

- Temperature monitoring
- Auxiliary voltage monitoring

Specifications

Control voltage range	User specification* ¹
Control current range	3 ranges
LED	Run: 1ea, Mode: 2ea, Irange: 3ea
Input impedance	10 ¹² Ohm for <10V
Cell connection	4 probe type, alligator clip cables
Max channel no.	128
Voltage accuracy	±0.05% f.s.
Current accuracy	±0.1% f.s.

Voltage Control/Measurement

Full scale ranges	User specification* ¹
Resolution (16 bits)	0.0015% f.s

Current Control/Measurement

Full scale ranges	Depending on system specification Max. 800Watt
Resolution	16 bit(0.0015% f.s)
communication	TCP/IP

Sampling time	- 8~24 channel system : 10msec - 25~40 channel system : 20msec standard, 10msec as an option - 41~128 channel system : 50msec standard, 10msec as an option
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* 1: User can specify the voltage range within <80V for difference between high and low voltage. All specifications are subject to change without notice.

WBCS3000H12 1200Watt Power Channel Type



Application

- Power device application
- Battery/Super capacitor test
- Solar cell test, Fuel cell test
- For multichannel application

The **WBCS3000H12** channel is designed for power application (max 1200Watt/ch) such as battery pack, solar module, fuel cell stack, supercapacitor etc. The **WBCS3000H12** has its own power supply in channel module. This requires 8 channel controller. Customized specification is available. Up to 8 independent channels can be connected to one 8 channel controller. Additional channels can be added up to a maximum of 128 channels.

Typical models for WBCS3000H12 are

- -1V to 5V @ 100Amp WBCS3000H12_5100U
- -1V to 10V @ 80Amp WBCS3000H12_1080U
- -1V to 30V @30Amp WBCS3000H12_3030U
- -1V to 60V @15Amp WBCS3000H12_6012U

Options

- Temperature monitoring
- Auxiliary voltage monitoring

Specifications

Control voltage range	User specification ^{*1}
Control current range	3 ranges
LED	Run: 1ea, Mode: 2ea, Irange: 3ea
Input impedance	10 ¹² Ohm for <10V
Cell connection	4 probe type, alligator clip cables
Max channel no.	128
Voltage accuracy	±0.05% f.s.
Current accuracy	±0.1% f.s.
Voltage Control/M Measurement	
Full scale ranges	User specification ^{*1}
Resolution (16 bits)	0.0015% f.s
Current Control/M Measurement	
Full scale ranges	Depending on system specification Max. 1200Watt
Resolution	16 bit(0.0015% f.s)
communication	TCP/IP
Sampling time	- 8~24 channel system : 10msec - 25~40 channel system : 20msec standard, 10msec as an option - 41~128 channel system : 50msec standard, 10msec as an option

* 1: User can specify the voltage range within <80V for difference between high and low voltage. All specifications are subject to change without notice.

WBCS3000HP High Power Type



Application

- For power device application
- Battery/Super capacitor test
- Solar cell test, Fuel cell test
- For multichannel application
- Rack mounted model

The **WBCS3000HP** series is designed for high power application such as battery pack, solar module, fuel cell stack, electroplating, etc. The **WBCS3000HP** is derived from the standard WBCS series battery cycler system for higher power application with 1 or 3 current ranges. The system can be configured to meet customer needs. Customized specification is available. Up to 8 independent channels can be connected to one 8 channel controller. Additional channels can be added up to a maximum of 128 channels.

Options

- Temperature monitoring
- Auxiliary voltage monitoring

Specifications

Control voltage range	User specification ^{*1}
Control current range	3 or 1 range depending on power
LED	Run: 1ea, Mode: 2ea
Input impedance	10 ¹² Ohm
Cell connection	4 probe type, alligator clip cables
Max. channel No.	128
Voltage accuracy	±0.05% f.s.
Current accuracy	±0.1% f.s.
Voltage Control/M Measurement	
Full scale ranges	User specification ^{*1}
Resolution (16 bits)	0.0015% f.s
Current Control/M Measurement	
Full scale ranges	Depending on system specification Max. 400A
Resolution	16 bit(0.0015% f.s)
Communication	TCP/IP
Sampling time	- 8~24 channel system : 10msec - 25~40 channel system : 20msec standard, 10msec as an option - 41~128 channel system : 50msec standard, 10msec as an option

* 1: User can specify the voltage range within <80V for difference between high and low voltage. All specifications are subject to change without notice.

System Configuration Examples 1

Low Power Type

- Max. current range: $\pm 10\text{mA}$ f.s. (L)
Expanded model : $\pm 100\text{mA}@5\text{V}$ (Le)
- Min. current range: $\pm 100\text{nA}$ f.s.

Medium Power Type

- 8 channel system: WBCS3000S(max.50Watt)
- 8 channel system: WBCS3000M1(max.100Watt)
- 8 channel system: WBCS3000M2(max.200Watt)

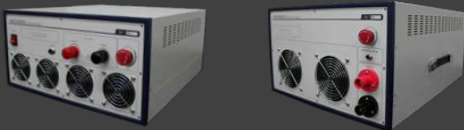
Dual Channel Type

- Dual channel slave style
- Max. power/ch: 400Watt
- 8ch controller or substation is needed.



Power channel Type

- Slave style
- Max. power: 800Watt (WBCS3000H8) or 1200Watt(WBCS3000H12)
- 8ch controller or substation is needed.



High Power Type

- Slave style
- Max. power: 4kWatt
- Rack mount Type
- CCU or substation is needed.

4channel Slave

- Expanding channel on WBCS3000S by using slaves
- Max. current: 5A(for 4 channel slave)
- Difference voltage range for additional channels



Mid power Type & Low power Type – Mixture System

- 8 channel system
: 5V, 1A(5ch) + 10V, 1mA(3ch)
- WBCS3000S substation + channel 5set + Modified channel 3set

Mid power Type & High Power Type - Mixture System

- 8 channel system
: 5V, 1A(4ch) + 10V, 5A(2ch) + 20V, 10A(2ch)
- WBCS3000S substation + channel 4set + extension card 4ea + WBCS3000D 2set



Extension Card for WBCS3000S

High Power Type & Mid Power Type - Mixture System

- 8 channel system
: 20V, 10A(4ch) + 10V, 20A(2ch) + 5V, 10A(2ch)
- 8ch controller + WBCS3000D 4set

Jigs

Battery Jig & Coin Cell Jig

- For cylindrical cell and/or coin cell
- 4 or 2 contact pin depending on models
- Rack type is available



Coin Cell Holder

- It can be directly connected to the WBCS3000S systems.



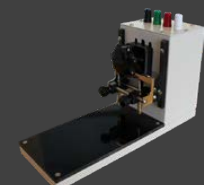
for WBCS3000S series



for WBCS3000L series

Pouch Cell Jig

- It can be directly connected to the WBCS systems.
- Pull down type



System Configuration Examples 2

Mid power Type – Mixture System

- 8 channel system
: 10V, 1A(3ch) + 5V, 2A(1ch) + 7V, 100mA(4ch)
- WBCS3000S substation + channel 8set



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