12th Edition

Product Catalog

WBCS3000 Series
Battery Cell Test System

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

WonATech

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 WBCS3000Ls(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 channelwas for max 1200Watt per channel.
The WBCS3000HP series can be desgined for powers up to 4kWatt per channel configured inside of rack. The WBCS3000Ls32 , WBCS3000Le32 and WBCS3000Lx32 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 cycler system consists of multiple substrations or controllers, each substation or controller can be used as independent system with optional Stand Alone Kit. And extra substrations 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 cycler 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

- **WBCS3000Ls**
  Voltage range: ±5V
  Max. current: ±10mA
- **WBCS3000Le**
  Voltage range: ±5V
  Max. current: ±100mA
- **WBCS3000Ls32**
  Voltage range: ±5V
  Max. current: ±10mA
  Plug-in channel type: 32 channel per substation
- **WBCS3000Le32**
  Voltage range: ±5V
  Max. current: ±100mA
  Plug-in channel type: 32 channel per substation
- **WBCS3000Lx32**
  Voltage range: -1V to +5V
  Max. current: ±1A
  Plug-in channel type: 32 channel per substation

Mid Power Type

- **WBCS3000S**
  Max. power: 50Watt
  Max. current: ±5A
- **WBCS3000M1**
  Max. power: 100Watt
  Max. current: ±10A
- **WBCS3000M2**
  Max. power: 200Watt
  Max. current: ±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.

Battery Cell Test System WBCS Series

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 ± 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.
- 0.02% to 0.1% full scale voltage control and reading accuracy depending on models
- 4 current ranges (automatic/manual selection) for WBCS3000S/Ls /Le/Lx/M1/M2/D/H8 models, 3 current ranges for WBCS3000H12 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
- Digital coulometer is included: Every minimum hardware sampling rate, WBCS calculates capacitance value.

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. 300,000 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 (WBCS3000S/Ls/Le /Lx/M1/M2 models).
  : 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 WBCS3000Ls32/ Le32/Lx32.
  WBCS3000D system has two channels per one power supply and WBCS3000H and WBCS3000HP has its own power supply per channel.
- Automatic data 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

- Coin cell jig
- Universal jig
- Pouch cell jig
- Prismatic cell jig
- Coin cell holder

Specifications

- Circuit: potentiostat/galvanostat linear circuit
- 4 Kelvin probe type connection
- Maximum channels per PC: 128 channels
- Voltage range: unipolar or bipolar
- Current(reading & control) accuracy
  : 0.02~0.1% f.s. depending on model
- Sampling time varies depending on number of channels.
  Without option
  - 1~32 channels system: 10msec
  - 33~40 channels system: 20msec
  - 41~64 channels system: 50msec
  - 65~128 channels system: 50msec

  With option (Aux V and/or Temperature)
  - 1~16 channels system: 10msec
  - 17~40 channels system: 20msec
  - 41~64 channels system: 50msec
  - 65~128 channels system: 50msec
- Auxiliary voltage measurement range: bipolar(option)
- Temperature measurement type: K type thermocouple(option)

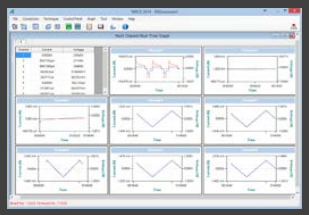
Software (Smart Interface)

- 32bit/64bit OS environment
- TCP/IP communication
- Max. 200 steps
- Max. 10 cutoff(vertex) condition
- Max. 300,000 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

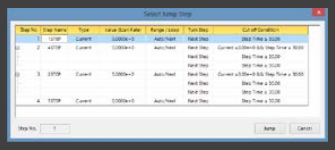
• Easy assignment of cycle test condition file to channel with combo box selection at anytime.
• Synchronized changes of cycle test condition for selected multiple channels.
• Real time dual channel(V & I) strip chart displays for selected channel or for all running channels with time scrolling mode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



Multichannel real time graph

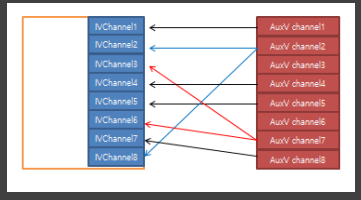
Single channel real time graph

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

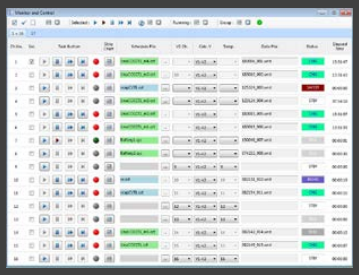


Jump step function

• Assign temperature and AuxV channel on virtual control panel



• Single channel & multichannel control/monitor panel



Multichannel control panel

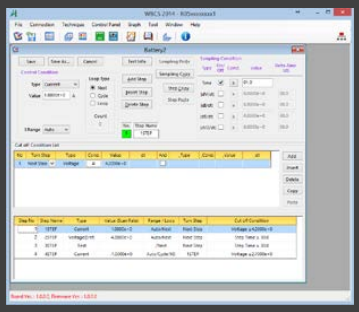
Single channel control/monitor panel

• 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.

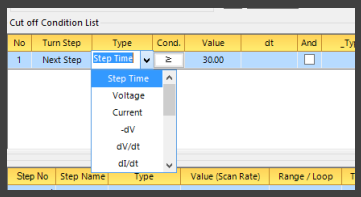
Voltage control

Current control

Schedule Editor



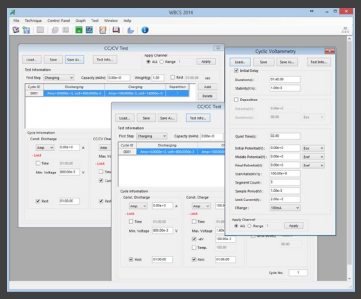
• One stop test condition creation/modification
• Multiple input parameters available
• Max. 200 test steps
• Control parameters
- Constant voltage, LastV
- Constant current, LastI
- Constant power
- Constant load
- C-rate
- Voltage scanning, current scanning
- Conditioning potential
- Conditioning current
- 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



Cutoff condition

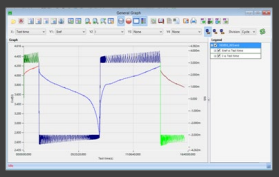
- Data sampling condition by each step
  : time, dV/dt, dI/dt, dT/dt, dV2/dt
- And/Or logic for cut-off condition settings

Menu Selection (Pre-defined techniques)

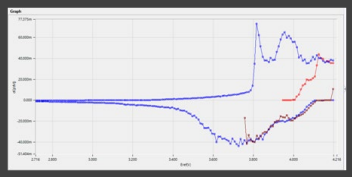


Energy Test

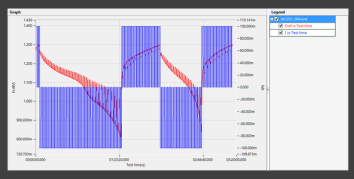
- CC/CV (Lithium battery) test menu
- CC/CC (NiCd(NiMH) battery) test menu
- Steady state CV
- Pstat IV curve
- Gstat IV curve
- EVS (Electrochemical voltage spectroscopy) test
- GITT (Galvanostatic intermittent titration technique) test
- PITT (Potentiostatic intermittent titration technique) test



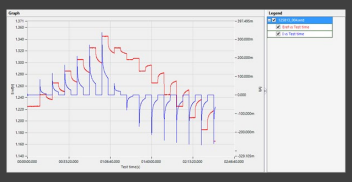
EVS test raw data



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

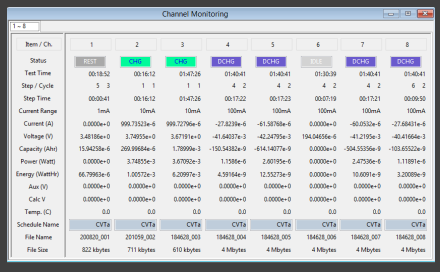
- Real time display: time, voltage, current, channel status
- Channel status color display: charging, discharging, standby, idle, calibration

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

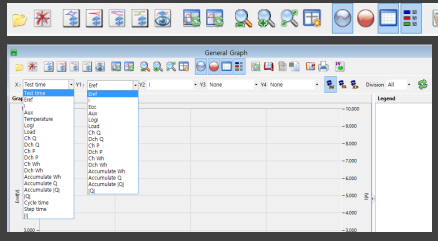
Detailed Monitor

- 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.

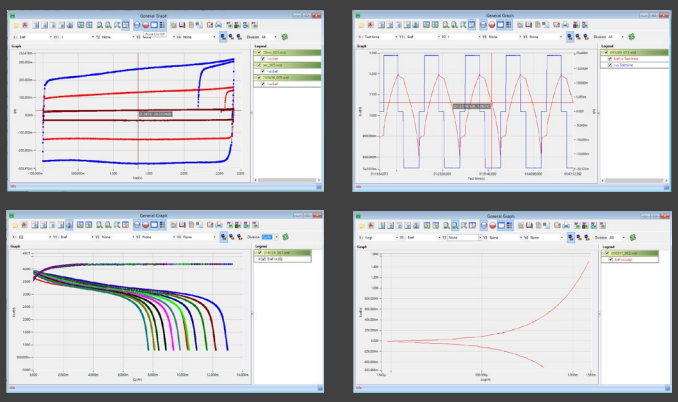


Graphics

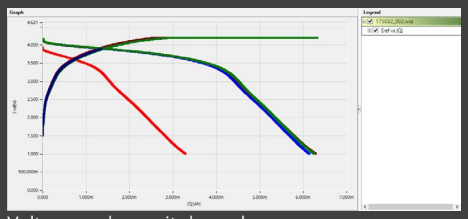
- Multiple plot format
  - General graph
  - Cycle graph
- General graph format



Battery Cell Test System WBCS Series

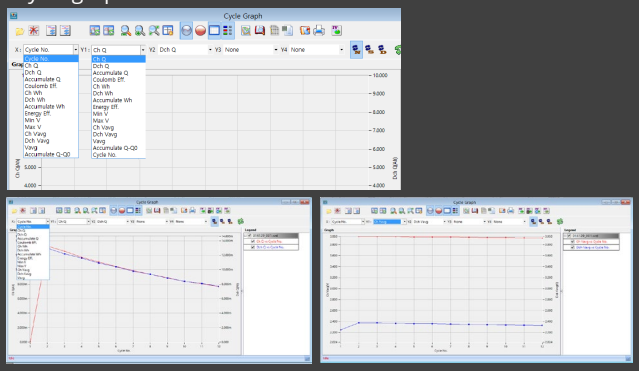


- Parameter change without reloading the data file
- Data set On/Off: Data can be visible or invisible by selecting/ deselecting the data set.
- Rest step data hidden function
- Advanced graph setting



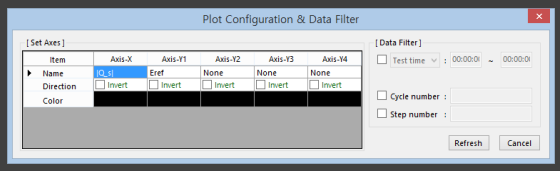
Voltage vs. |capacity| graph

- Cycle graph format

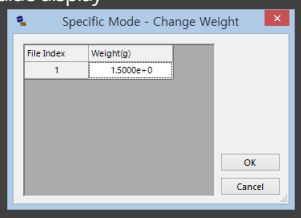


General Function of Graph

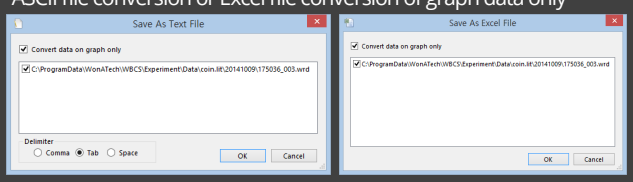
- Multi-parameters
- Plot overlay: max. 20 plot
- Universal graphics: any combination of X,Y1,Y2,Y3,Y4 axis parameters
- Automatic updating plot with reloading button for running channel data
- Automatic/manual scale and polarity selection for each axis



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

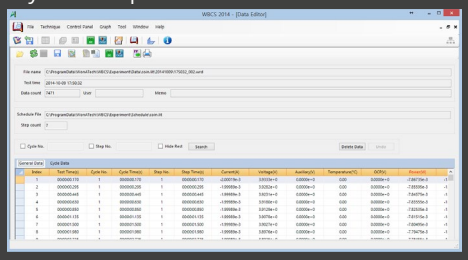


- Copy to clipboard function to use in other application software
- Grid on/off and dot/line selection
- ASCII file conversion or Excel file conversion of graph data only



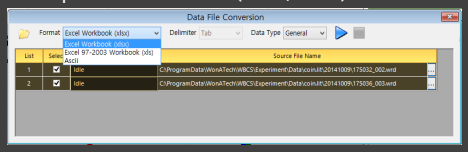
Tools

- Data Editor
  - General data report
  - Cycle data report

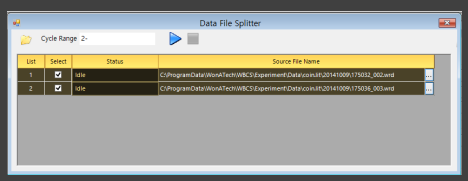


  * Data editing
  * Data filtering

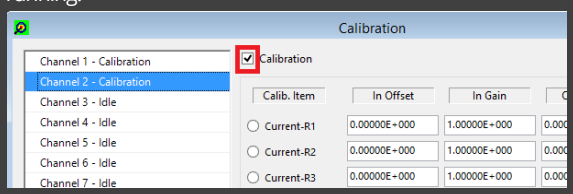
- Data Conversion
  - Multiple data conversion(ASCII, Excel)



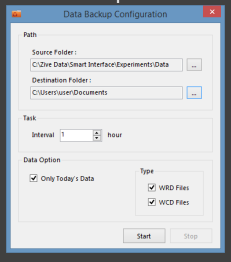
  - Data file splitter by cycle number



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



- Data backup



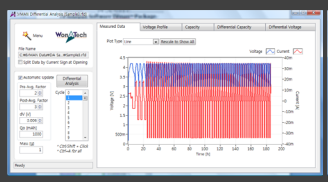
Independent Data Analysis Software

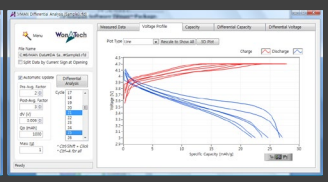
The WBCS data format can be used for independent data analysis software IVMAN™ at free of charge.
IVMAN™ software package consists of

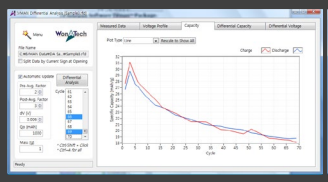
- IVMAN software
- IVMAN differential analysis software
- IVMAN photo voltaic cell analysis.
- IVMAN Tafel analysis
- IVMAN extractor
- IVMAN peak find module

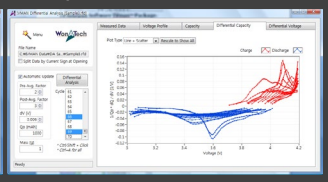
IVMAN DA™ Battery Test Data Analysis Software

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

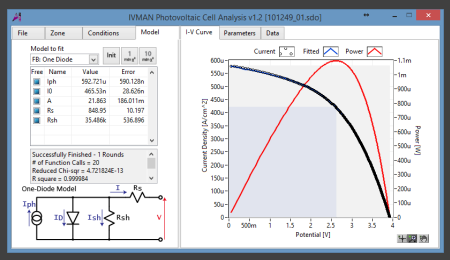

Measured data


V vs. Q


Cycle graph


dQ/dV vs. V

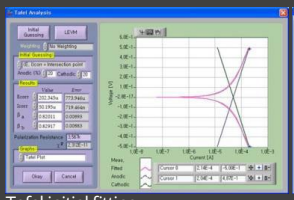
IVMAN™ Photovoltaic Cell Analysis

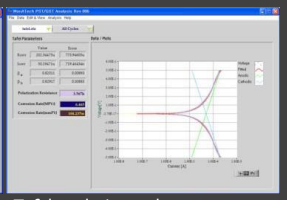


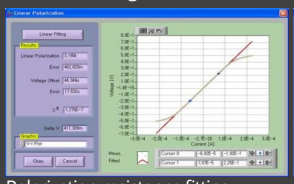
- Automatic analysis of parameters
  - open circuit voltage, open circuit current, max. power, efficiency photo induced current, diode quality factor, series resistance, etc.

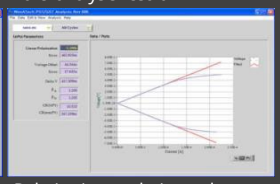
IVMAN™ Main Software

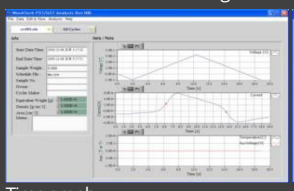
- Electrochemical analysis software
- Ideal for DC corrosion data analysis and electro-analytical data analysis
- Initial guessing function on Tafel analysis
- Automatic Tafel fitting
- Polarization resistance fitting
- 3D graph
- Find peak function
- Interpolation, differentiation, integration, etc.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

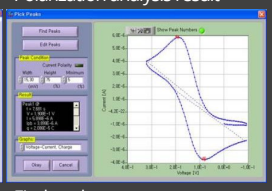

Tafel initial fitting

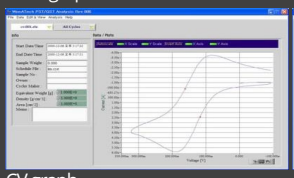

Tafel analysis result

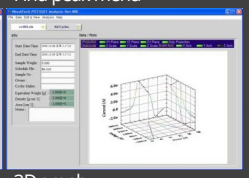

Polarization resistance fitting


Polarization analysis result


Time graph

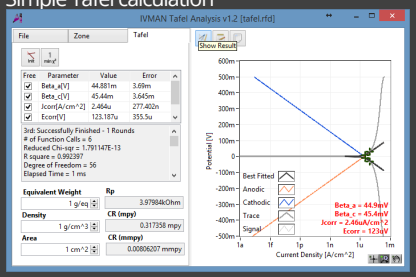

Find peak menu


CV graph


3D graph

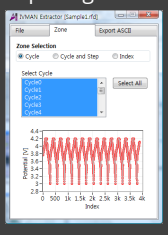
IVMAN™ Tafel Analysis

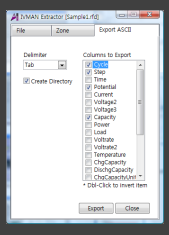
- Simple Tafel calculation



Extractor

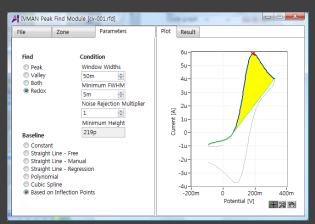
- Extracting data by cycle number or step
- Exporting ASCII file

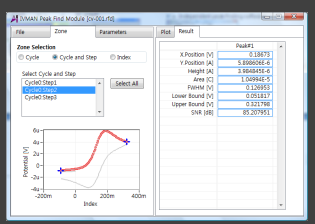




Peak Find Module

- Independent peak finding software





WBCS3000Ls(Le) Low power Type


WBCS3000Ls/Le


WBCS3000Ls/Le32


WBCS3000Lx32

Application

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

The WBCS3000Ls(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. Up to 8 independent channels can be installed per substation. Additional channels can be added up to a maximum of 128 channels.
The WBCS3000Ls32, WBCS3000Le32 and WBCS3000Lx32 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) :WBCS3000Ls(Le)32 -1V to +5V: WBCS3000Lx32
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	±0.02% f.s.
Current accuracy	±0.02% f.s.
Voltage Control/Measurement	
Full scale ranges	±5V(standard) :WBCS3000Ls(Le)32 -1V to +5V: WBCS3000Lx32
Resolution (16 bits)	0.15mV(standard) @±5V
Current Control/Measurement	
Full scale ranges	Max. 10mA@5V(WBCS3000Ls/Ls32) Max. 100mA@5V(WBCS3000Le/Le32) Max. 1A@-1V to +5V(WBCS3000Lx32)
Resolution	16 bit(0.0015% f.s)
Communication	TCP/IP
Sampling time	Without option - 1~32 channel system : 10msec - 33~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec With option (Aux V and/or Temperature) - 1~16 channel system : 10msec - 17~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec
Size	W350.2xD328.1xH84.2mm(WBCS3000Ls/Le) W541xD454.6xH253.8mm(WBCS3000Ls32/Le32) W541xD502xH317.3mm(WBCS3000Lx32)

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@±5V
Resolution	16 bit(0.0015% f.s)
Communication	TCP/IP
Sampling time	Without option - 1~32 channel system : 10msec - 33~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec With option (Aux V and/or Temperature) - 1~16 channel system : 10msec - 17~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec
Size	W447xH196xD454mm

* 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
- Fuel cell test
- Battery cycle life 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 cycler 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
- Battery jigs
- Auxiliary voltage monitoring

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. 100Watt for WBCS3000M1
Resolution	16 bit(0.0015% f.s)
Communication	TCP/IP
Sampling time	Without option - 1~32 channel system : 10msec - 33~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec With option (Aux V and/or Temperature) - 1~16 channel system : 10msec - 17~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec
Size	W447.1xD498.7xH287mm

* 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
- Fuel cell test
- Battery cycle life 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 cycler 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
- Battery jigs
- Auxiliary voltage monitoring

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. 200Watt for WBCS3000M2
Resolution	16 bit(0.0015% f.s)
Communication	TCP/IP
Sampling time	Without option - 1~32 channel system : 10msec - 33~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec With option (Aux V and/or Temperature) - 1~16 channel system : 10msec - 17~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec
Size	W464.7xD625.4xH375.6mm

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

WBCS3000HPC 8channel controller

General

WBCS3000HPC is 8 channel controller for high power channel such as WMPG1000D,H8,H12. This can be used for independent channel without controller.
If the system has optional input (temperature input and/or Auxiliary voltage input), These option is located at this controller.
WBCS3000HPC has power supplies for the parts in channel hardware.

Hardware specification is same in WBCS3000HPC series to control 8channel . This can be extended upto 128channels.
Channel connection between controller and channels is via dsub connector at rear side of the controller.

Optios

- Temperature monitoring
- Auxiliary voltage monitoring

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.

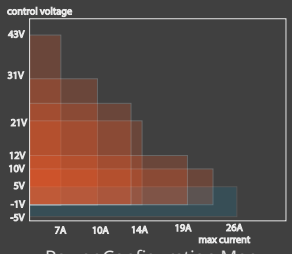
Typical models for WBCS3000D are
- ±5V @ 26Amp WBCS3000D_526B
- -1V to 10V @ 23Amp WBCS3000D_1023U
- -1V to 21V @ 14Amp WBCS3000D_2114U
- -1V to 43V @ 7Amp WBCS3000D_437U

Options

- Temperature monitoring
- Auxiliary voltage monitoring

Specifications

Control current range	4 ranges
LED	Run: 1ea, Mode: 2ea, Irange: 4ea
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.(<10V)
Current accuracy	±0.05% f.s.
Current&Voltage Control/Measurement	
Resolution (16 bits)	0.0015% f.s
Full scale ranges	



Power Configuration Map

Maximum current depending on voltage range
1) Max 26A @ ±5V
2) Max 23A @ -1V~+10V
3) Max 19A @ -1V~+12V
4) Max 14A @ -1V~+21V
5) Max 13A @ -1V~+24V
6) Max 10A @ -1V~+31V
7) Max 7A @ -1V~+43V

Communication	TCP/IP
Sampling time	Without option - 1~32 channel system : 10msec - 33~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec With option (Aux V and/or Temperature) - 1~16 channel system : 10msec - 17~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec
Size	W447xD505xH241mm

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

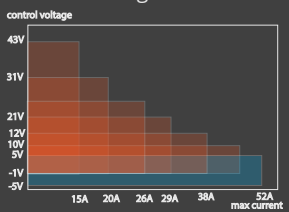
The WBCS3000H8 channel is designed for power application (max 800Watt/ch) such as battery pack, solar module, fuel cell stack, super capacitor, etc. The WBCS3000H8 has its own power supply in channel module . This requires 8 chanel controller.
Customized specification is available. Up to 8 independent 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 @ 52Amp WBCS3000H8_552B
- -1V to 10V @ 46Amp WBCS3000H8_1046U
- -1V to 21V @ 29Amp WBCS3000H8_2129U
- -1V to 43V @ 15Amp WBCS3000H8_4315U

Options

- Temperature monitoring
- Auxiliary voltage monitoring

Specifications

Control current range	4 ranges
LED	Run: 1ea, Mode: 2ea, Irange: 4ea
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.(<10V)
Current accuracy	±0.1% f.s.
Current&Voltage Control/Measurement	
Resolution (16 bits)	0.0015% f.s
Full scale ranges  Power Configuration Map	Maximum current depending on voltage range 1) Max 52A @ ±5V 2) Max 46A @ -1V~+10V 3) Max 38A @ -1V~+12V 4) Max 29A @ -1V~+21V 5) Max 26A @ -1V~+24V 6) Max 20A @ -1V~+31V 7) Max 15A @ -1V~+43V
Communication	TCP/IP
Sampling time	Without option - 1~32 channel system : 10msec - 33~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec With option (Aux V and/or Temperature) - 1~16 channel system : 10msec - 17~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec
Size	W447xD505xH241mm

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

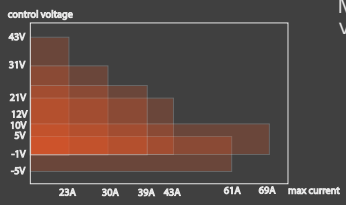
The WBCS3000H12 channel is designed for power application (max 1200Watt/ch) such as battery pack, solar module, fuel cell stack, supercapacitor etc. The WBCS3000H12 has its own power supply in channel module . This requires 8 chanel controller.
Customized specification is available. Up to 8 independent 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 @ 61Amp WBCS3000H12_561B
- -1V to 10V @ 69Amp WBCS3000H12_1069U
- -1V to 21V @ 43Amp WBCS3000H12_2143U
- -1V to 31V @ 30Amp WBCS3000H12_3130U
- -1V to 43V @ 23Amp WBCS3000H12_4323U

Options

- Temperature monitoring
- Auxiliary voltage monitoring

Specifications

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.(<10V)
Current accuracy	±0.1% f.s.
Current&Voltage Control/Measurement	
Resolution (16 bits)	0.0015% f.s
Full scale ranges  Power Configuration Map	Maximum current depending on voltage range 1) Max 61A @ ±5V 3) Max 69A @ -1V~+10V 4) Max 43A @ -1V~+21V 5) Max 39A @ -1V~+24V 6) Max 30A @ -1V~+31V 7) Max 23A @ -1V~+43V
Communication	TCP/IP
Sampling time	Without option - 1~32 channel system : 10msec - 33~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec With option (Aux V and/or Temperature) - 1~16 channel system : 10msec - 17~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec
Size	W464.1xD626xH285.5mm

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

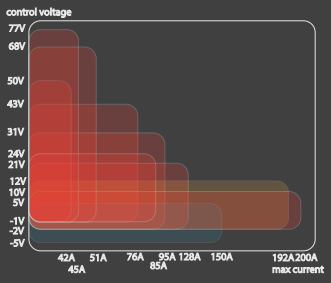
The WBCS3000HP series is designed for high power application such as battery pack, solar module, fuel cell stack, electroplating, etc. The WBCS3000HP is derived from the standard WBCS series battery cycler system for higher power application with 1 or 3 current ranges. The system can be configured to 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 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	±0.1% f.s.
Current accuracy	±0.1% f.s.
Current&Voltage Control/Measurement	
Resolution (16 bits)	0.0015% f.s
Full scale ranges	Maximum current depending on voltage range 1) Max 150A @ ±5V 2) Max 192A @ -2V~+12V 3) Max 200A @ -2V~+10V 4) Max 128A @ -2V~+21V 5) Max 85A @ -1V~+24V 6) Max 95A @ -2V~+31V 7) Max 76A @ -1V~+43V 8) Max 42A @ -1V~+50V 9) Max 51A @ -1V~+68V 10) Max 45A @ -1V~+77V
Communication	TCP/IP
Sampling time	Without option - 1~32 channel system : 10msec - 33~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec With option (Aux V and/or Temperature) - 1~16 channel system : 10msec - 17~40 channel system : 20msec - 41~64 channel system : 50msec - 65~128 channel system : 50msec
Size	W624xD900xH1600mm



Power Configuration Map

All specifications are subject to change without notice.

System Configuration Example

- ***Mid power Type – Mixture System***
  - 8 channel system
    : 10V, 1A(3ch) + 5V, 2A(1ch) + 7V, 100mA(4ch)
  - WBCS3000S substation + channel 8set
- ***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, 25A(2ch) + 21V, 15A(2ch)
  - WBCS3000S substation + channel 4set + extension card 4ea + WBCS3000D 2set
- ***High Power Type & Mid Power Type - Mixture System***
  - 8 channel system
    : 21V, 15A(4ch) + 10V, 25A(2ch) + 5V, 10A(2ch)
  - 8ch controller + WBCS3000D 4set

Jigs

- ***Battery Jig & Coin Cell Jig***
  - For cylindrical cell and/or coin cell
  - 2 pin PCB type or 4 pin Lever type depending on models
  - Rack type is available

- ***Coin Cell Holder***

for WBCS3000S series

for WBCS3000L series

- ***Pouch Cell Jig***
  - It can be directly connected to the WBCS systems.
  - Lever type

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