Product Catalog

WBCS3000 Series
Battery Cell Test System

For
Battery/Fuel Cell
Supercapacitor/Solar Cell
Corrosion
Material Testing
Battery Charge/Discharge System

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 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, chronomperometry, and potentiometry, etc. and this feature allows user to perform general Echem experiments.

There are 15 kinds of **WBCS** model depending on channel power or fixed specification.

**Fixed specification Type** (**8channels only**)

- **WBCS3000LK8 (fixed specification)**
  Same features with WBCS3000L but channel expansion is not available.
  Voltage range: ±5V
  Current range: ±10mA

- **WBCS3000LeK8 (fixed specification)**
  Same features with WBCS3000Le but channel expansion is not available.
  Voltage range: ±5V
  Current range: ±10mA

- **WBCS3000M1K8 (fixed specification)**
  Same features with WBCS3000M1 but channel expansion is not available.
  Voltage range: ±5V
  Max. power: 100Watt
  Max. current: ±10A

**Low Power Type**

- **WBCS3000L**
  Voltage range: ±5V
  Max. current: ±10mA

- **WBCS3000Le**
  Voltage range: ±5V
  Max. current: ±100mA

- **WBCS3000L32**
  Voltage range: ±5V
  Max. current: ±100mA
  Plug-in channel type: 32 channel per substation

- **WBCS3000Le32**
  Voltage range: ±5V
  Max. current: ±100mA
  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.
  - 0.01% 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

- **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 standby voltage range, program gives the warning message for the operator to check the cell connection.
  - System safety parameter
    - 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.
    - User defined power model only
  - Watchdog function
    - Stop “running channel(s)” when communication failure occurs.
    - If any 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.

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

- **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.
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  - 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

- **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: varies depending on number of channels.
    - 8~24 channel system: 10msec
    - 25~40 channel system: 20msec
    - 41~128 channel system: 50msec
    - The sampling time for WBCS3000L32/WBCS3000Le32 is 20msec.
    - The sampling time of 10msec is available as an option.

- **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**

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  - Universal jig
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  - 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.
Battery Cell Test System  WBCS Series

Software (Smart Interface)

- Single channel & multichannel control/monitor panel
- Assign temperature and AuxV channel on virtual control panel
- Status bar displays channel status.
- Various task functions: run, stop, suspend, moving step, etc.
- Assign temperature and AuxV channel on virtual control panel
- Single channel & multichannel control/monitor panel

**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.

**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

**Multichannel control panel**

**Single channel control/monitor panel**

**Jump step function**

**Multichannel real time graph**

**Single channel real time graph**

**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.**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>1.8m</td>
</tr>
<tr>
<td>Current</td>
<td>0.000</td>
</tr>
<tr>
<td>Temperature</td>
<td>0.000</td>
</tr>
<tr>
<td>Power</td>
<td>181.3m</td>
</tr>
<tr>
<td>Capacity</td>
<td>0.0</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>2.867</td>
</tr>
<tr>
<td>Current</td>
<td>-50.0m</td>
</tr>
<tr>
<td>Temperature</td>
<td>-194.4m</td>
</tr>
<tr>
<td>Power</td>
<td>237.4m</td>
</tr>
<tr>
<td>Capacity</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Battery Cell Test System  WBCS Series

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

- **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

- **Menu Selection (Pre-defined techniques)**

- **Electroanalytical Techniques**
  - Cyclic voltammetry
  - Linear sweep voltammetry
  - Chrono-amperometry
  - Chrono-coulometry
  - Chrono-potentiometry

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

- **Cutoff condition**

- **EVS test raw data**
  - EVS graph format (dQ/dV vs. V)

- **GITT test**
  - GITT test raw data
**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

**Tools**
- Data Editor
  - General data report
  - Cycle data report
- Calibration
  - User can calibrate channel(s) while other channels are running.

**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

**Tools**
- Data Editor
  - General data report
  - Cycle data report

- 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. capacity analysis (V vs. Q)
- Cycle graph (Q vs. cycle)
- Differential voltage graph (dV/dQ vs. Q)

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

IVMAN™ Photovoltaic Cell Analysis

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

Extractor

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

Peak Find Module

- Independent peak finding software
Battery Cell Test System  WBCS Series

WBCS3000L(Le) Low power Type

- Application
  - For low current application
  - Micro battery application

- Options
  - Temperature monitoring
  - Auxiliary voltage monitoring

- Specifications
  - Control voltage range: ±5V (standard)
  - 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)
  - Resolution (16 bits): 0.15mV (standard)

  **Current Control/Measurement**
  - Full scale ranges: Depending on system specification
    - Max. 10mAm@5V(WBCS3000L/WBCS3000L32)
    - Max. 100mAm@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, 10msec as an option
    - 41~128 channel system: 50msec standard, 10msec as an option
    - WBCS3000LL32/WBCS3000Le32 system: 20msec

- Application
  - Sensor application
  - Electroanalytical application

- Options
  - Coin cell holder
  - Battery jig

WBCS3000S Standard Type (Mid power type)

- Application
  - Battery cycle life test
  - Fuel cell test
  - Solar cell test

- Options
  - Temperature monitoring
  - Coin cell holder
  - Battery jig

- Specifications
  - Control voltage range: ±5V (standard)
  - 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: ±0.01% f.s.
  - Current accuracy: ±0.01% f.s.

  **Voltage Control/Measurement**
  - Full scale ranges: ±5V (standard)
  - Resolution (16 bits): 0.15mV (standard)

  **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
    - WBCS3000LL32/WBCS3000Le32 system: 20msec

- Application
  - Supercapacitor test
  - Material test

- Options
  - Temperature monitoring
  - Coin cell holder
  - Battery jig

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 WBCS3000LL32 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.

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.

*User can specify the voltage range within ±80V for difference between high and low voltage. All specifications are subject to change without notice.*
## Battery Cell Test System - WBCS Series

### WBCS3000M1 100Watt Mid Power Type

**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 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
- Auxiliary voltage monitoring
- Battery jigs

**Specifications**

<table>
<thead>
<tr>
<th>Control voltage range</th>
<th>±5V(standard) *1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control current range</td>
<td>4 ranges</td>
</tr>
<tr>
<td>LED</td>
<td>Run: 1ea, Mode: 2ea</td>
</tr>
<tr>
<td>Input impedance</td>
<td>1012 Ohm</td>
</tr>
<tr>
<td>Cell connection</td>
<td>4 probe type, alligator clip cables</td>
</tr>
<tr>
<td>Max. channel No.</td>
<td>128</td>
</tr>
<tr>
<td>Voltage accuracy</td>
<td>±0.02% f.s.</td>
</tr>
<tr>
<td>Current accuracy</td>
<td>±0.05% f.s.</td>
</tr>
</tbody>
</table>

**Voltage Control/Measurement**

<table>
<thead>
<tr>
<th>Full scale ranges</th>
<th>±5V(standard) *1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution (16 bits)</td>
<td>0.15mV(V standard) *1</td>
</tr>
</tbody>
</table>

**Current Control/Measurement**

<table>
<thead>
<tr>
<th>Full scale ranges</th>
<th>Depending on system specification Max. 10A@5V for WBCS3000M1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>16 bit(0.0015% f.s)</td>
</tr>
</tbody>
</table>

**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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### WBCS3000M2 200Watt Mid Power Type

**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 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
- Auxiliary voltage monitoring
- Battery jigs

**Specifications**

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<td>Max. channel No.</td>
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<td>±0.02% f.s.</td>
</tr>
<tr>
<td>Current accuracy</td>
<td>±0.05% f.s.</td>
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</tbody>
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<th>±5V(standard) *1</th>
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<tbody>
<tr>
<td>Resolution (16 bits)</td>
<td>0.15mV(V standard) *1</td>
</tr>
</tbody>
</table>

**Current Control/Measurement**

<table>
<thead>
<tr>
<th>Full scale ranges</th>
<th>Depending on system specification Max. 20A@5V for WBCS3000M2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>16 bit(0.0015% f.s)</td>
</tr>
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</table>

**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.

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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.
Battery Cell Test System  WBCS Series

**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 to 5V @ 25Amp  WBCS3000D_525B
- -1V to 10V @ 25Amp  WBCS3000D_1025U
- -1V to 30V @10Amp  WBCS3000D_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
  - 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.

**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  ±0.01% 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
  - 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.
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_8080U
- -1V to 30V @30Amp  WBCS3000H12_3030U
- -1V to 60V @15Amp  WBCS3000H12_6012U

- Options
  - Temperature monitoring
  - Auxiliary voltage monitoring

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

WBCS3000H12  1200Watt Power Channel Type

- Specifications
  - Control voltage range: User specification*1
  - Control current range: 3 ranges
  - LED: Run: 1ea, Mode: 2ea, Irange: 3ea
  - Input impedance: 10^1 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. 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

- Options
  - 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

- Specifications
  - Control voltage range: User specification*1
  - Control current range: 3 or 1 range depending on power
  - LED: Run: 1ea, Mode: 2ea
  - Input impedance: 10^1 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/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. 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: ±10mA f.s. (L)
  - Expanded model: ±100mA@5V/Le
  - Min. current range: ±100nA 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

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

- **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

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.

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