

**We Adapt  
So You Don't Have To!**

WMPG1000 series  
Multichannel Potentiostat/Galvanostat

*Product Catalog*



**WonA**Tech  
Since 1991

## Multichannel Potentiostat/Galvanostat

- Corrosion Test
- Sensor application
- Electro-analytical application
- Battery/Fuel cell Test
- Electroplating, Electro-synthesis
- Electrochemical permeation
- 5 current ranges(WMPG1000S) &  
3 current ranges(WMPG1000H/L/M2)
- Customize specification available

System hardware was designed for stable and accurate instrument furthermore for easy expansion and maintenance. So WMPG series choose plug-in type module with independent power suppliers per 8ch substation. Each substation can be used as independent system with optional "StartUp Kit" or can be built up integrated system as add-on. These give flexibility to users application.

### For stable and accurate target

- 4 probe type true potentiostat/galvanostat circuit
- High resolution 16 bit ADC/DAC: WMPG provides 0.0015% f.s resolution in control and acquisition both.
- Channel isolation: To prevent any noise from the other channel, each channel is designed for isolation.
- Multiple current ranges (WMPG1000S: 5 ranges, WMPG1000H/L/M2: 3 ranges): This improves the resolution and accuracy in control and measurement of current. Auto/manual selection

### For easy expansion/maintenance target

- ☞ Channel Plug-in module: Plug-in module is easily upgradeable or modifying voltage/current range. Also if one channel is out of order, Just replacement is easiest way to clean the problem. Option module is plug-in type too. It means upgrade is very easy. For one board type per 8 channels, if one channel is out of order, user cannot use all 8 channels.
- ☞ Substation add-on type: WMPG series can expand the channels up to 64 channels per system. When the user wants to expand the channels, he/she just adds the substation. One of modular system's advantages is maintenance. If one substation is out of order in power supplier's part, the other substations can be run without dead time.

## Software

- ☞ Application
  - ✓ Cyclic voltammetry (Technique Menu)
  - ✓ Linear Sweep Voltammetry (Technique Menu)
  - ✓ Square Wave Voltammetry (Technique Menu: Option)
  - ✓ Chrono-amperometry (Technique Menu)
  - ✓ Chrono-coulometry (Technique Menu)
  - ✓ Chrono-potentiometry (Technique Menu)
  - ✓ Tafel Plot (Technique Menu)
  - ✓ Potentiodynamic (Technique Menu)
  - ✓ Cyclic Polarization (Technique Menu)
  - ✓ Ecorr vs. time (Technique Menu)
  - ✓ Galvanodynamic
  - ✓ OCV measurement
  - ✓ Zero resistance Ammeter(option)
  - ✓ Linear polarization resistance (Technique Menu)
  - ✓ Rp-Ec trend
  - ✓ Charge/discharge Battery test
  - ✓ Electrochemical Voltage Spectroscopy (EVS)
  - ✓ Electrochemical Permeation
  - ✓ User defined techniques

### 32bit multi-tasking

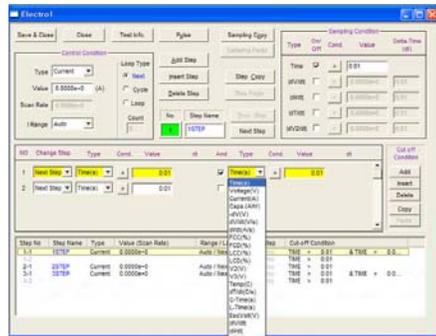
### Tool bar: quick access for easy operation

### WYSIWYG graphics

### User friendly software

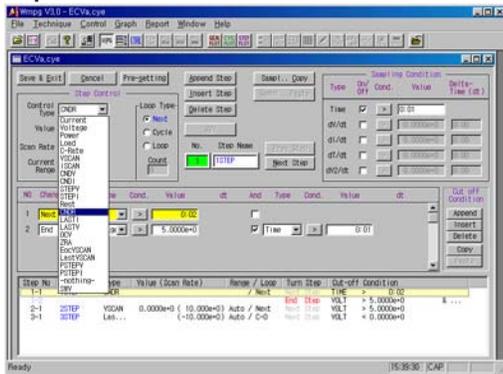
### Virtual control panel

- BCO (Button click operation); User can do any task with just clicking the button: **NO MENU SELECTION**
- Easy assignment of cycle test condition file to channel with combo box selection at anytime.
- Synchronized change function of cycle test condition file for selected multiple channels.
- Real time dual channel (V & I) strip chart display for selected channel or for all running channels with time scrolling mode or whole window mode.
- Status bar displays channel status.
- Booking running channel stop function by time, cycle number, step etc.
- Various task function: run, stop, suspend, moving step etc.
- Spying the contents of test program which assigned to channel
- Assign temperature, AuxV and CalcV channel on virtual control panel

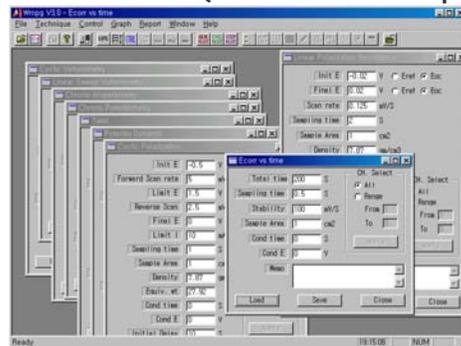


- Data sampling condition by each step: time,  $dV/dt$ ,  $dI/dt$ ,  $dT/dt$ ,  $dV^2/dt$
- And/Or logic in cut-off condition setting

### Experiment editor



### Menu Selection (Pre-defined techniques)



- One stop test condition creation/modification
- Parameter mixed input system
- Unlimited number of test steps
- Control parameters are
  - Constant voltage
  - Constant current
  - Constant power
  - Voltage scanning
  - Current scanning
  - Conditioning potential
  - Voltage step
  - Current step
  - OCV
  - EocVscan
  - PstepV
  - PstepI
  - Etc.
- Step flow are defined by next step, Loop and cycle
- Cut-off conditions can be set by;
- Time, voltage, current,  $dV/dt$ ,  $dI/dt$ , percentage capacity (FCC, FCD, LCC, LCD), cycle time, capacity,  $-dV$ , power, temperature, Aux voltage, Calc voltage,  $dT/dt$ , OCV

- Electroanalytical techniques
  - ✓ Cyclic voltammetry
  - ✓ Linear Sweep Voltammetry
  - ✓ Chrono-amperometry
  - ✓ Chrono-coulometry
  - ✓ Chrono-potentiometry
  - ✓ Squarewave Voltammetry (Option)
  - ✓ Staircase voltammetry
  - ✓ Stripping voltammetry
- Corrosion Measurement
  - ✓ Tafel Plot
  - ✓ Potentiodynamic
  - ✓ Potentiostatic
  - ✓ Cyclic polarization
  - ✓ Ecorr vs. Time
  - ✓ Linear polarization Resistance
  - ✓  $R_p / E_c$  trend
  - ✓ Galvanic corrosion (Option)
- Battery Test
  - ✓ Li(Lithium battery) test
  - ✓ CC test

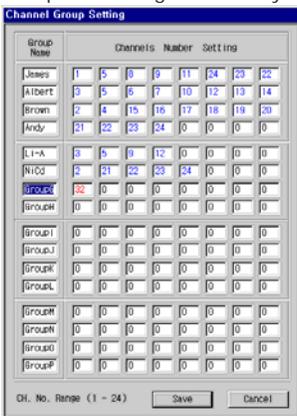
### Simple Monitor



- Real time display: time, voltage, current, channel status
- Channel status color display: charging, discharging, standby, idle, calibration
- Always activated window (This window does not hidden)
- Can be located outside of main program window.

### Grouping

- Classification/Grouping each channels by users purpose
- Labeling each group by operator name, chemistries etc.
- Group monitoring available by this setting



### Detailed monitor

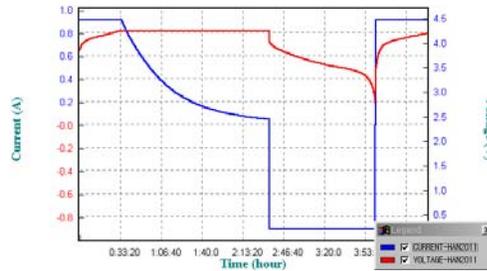
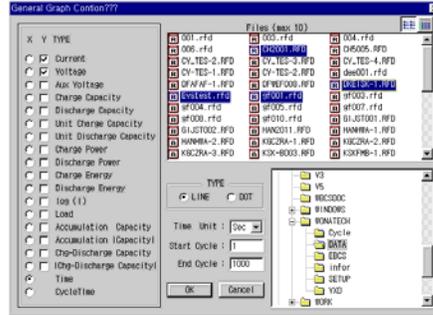


- Displayed test data: status, running time, step number, cycle number, step time, current range, current, voltage, capacity, power, energy, Aux V, Calc V, temp, cycle file name, data file name, file size.
- Detailed monitor type selection: All channels, running channels only, grouped channels
- Activated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

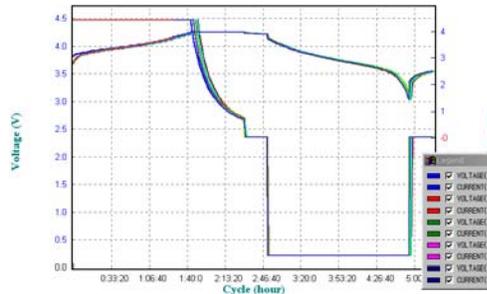
### Graphics

- Multiple plot format
  - General graph
  - Cycle graph
  - Step Graph

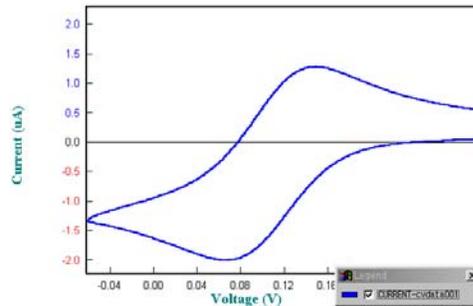
### General graph format



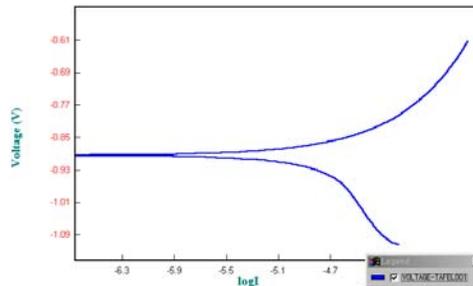
Current-Voltage vs. time graph



Current-voltage vs. cycle time graph

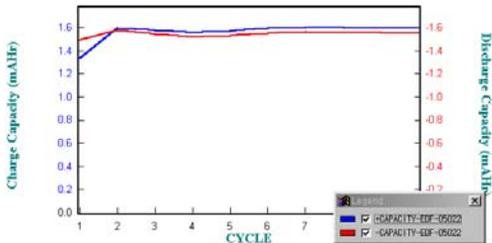
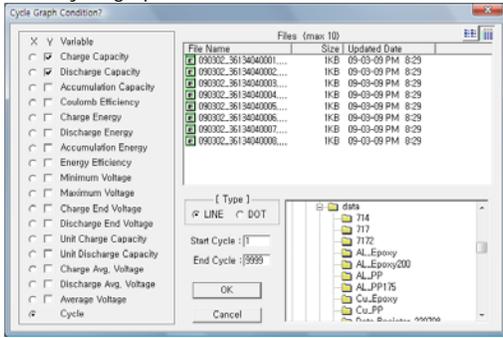


Cyclic voltammogram



Tafel graph

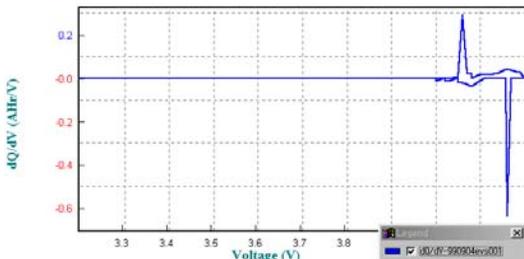
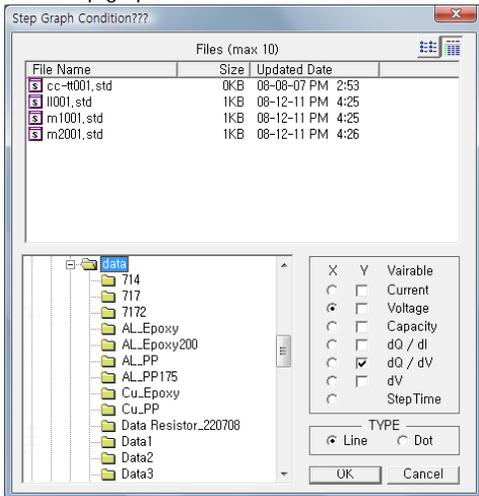
● Cycle graph format



charging capacity-discharging capacity vs. cycle number graph

- Real time plotting

● Step graph format

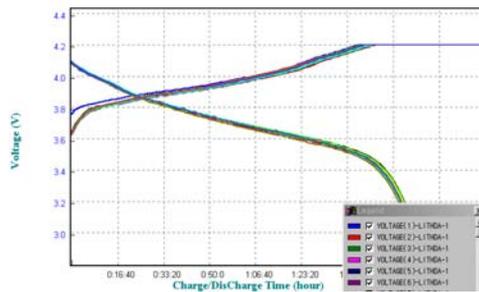


dQ/dV vs. Voltage graph(EVS)

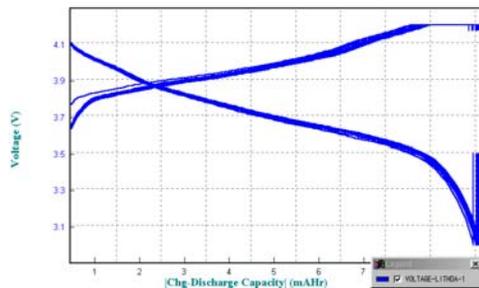
General Function of Graph

- Multi-Parameters
- Plot overlay: Max. 10 plot
- Universal Graphics: Any combination of X,Y,Y1 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
- Mouse zooming
- Text insertion on graph
- Copy to Clipboard for usage in other application software
- Slope calculation
- Grid On/Off and dot/line selection
- ASCII file conversion of graph data only
- Parameter change without reloading the data file
- Data set On/Off: Data can be visible or invisible by selecting/deselecting the data set.



Voltage vs. charging-discharging time graph



Voltage vs. |charging-discharging capacity| graph

Reporting

- General data report
- Cycle data report
- Step data report
- Capacity data report

Calibration



## WMPG1000S Standard type



### Application

- Corrosion Test
- Sensor application
- Electro-analytical application
- Battery/Fuel cell Test
- Electrochemical permeation
- 5 current ranges

Each channel potentiostat/galvanostat can be used independent or synchronized. Maximum power of each channel is 50Watt. Within this power, system can be configured with custom specification. Also each channel can be configured differently. 5 current ranges multichannel system will fit various electrochemical application

### For stable and accurate target

- 4 kelvin probe type true potentiostat/galvanostat circuit to minimize voltage drop
- High resolution 16 bit ADC/DAC: WMPG1000S provides 0.0015% f.s resolution in control and acquisition both.
- Channel isolation: To prevent any noise from the other channel, each channel is designed for isolation.
- Multiple current ranges: 5 ranges. Auto/manual selection

### For easy expansion/maintenance target

- ☞ Channel Plug-in module: Plug-in module is easily upgradeable or modifying voltage/current range. Also if one channel is out of order, Just replacement is easiest way to clean the problem. Option module is plug-in type too. It means upgrade is very easy. For one board type per 8 channels, if one channel is out of order, user cannot use all 8 channels.
- ☞ Substation add-on type: WMPG series can expand the channels up to 64 channels per system. When the user wants to expand the channels, he/she just adds the substation. One of modular system's advantages is maintenance. If one substation is out of order in power supplier's part, the other substations can be run without dead time.

### Option

- Temperature monitoring.
- Auxiliary Voltage Monitoring
- USB interface

### Specification

Control voltage range	±10V(standard) or customer specified range
Compliance Voltage	±12V(standard) or customer specified voltage
Control Current range	5 ranges
LED	Run: 1ea Mode: 2ea
Input impedance	10 <sup>10</sup> Ohm
Cell Connection	4 probe type, alligator clip cables
Voltage Accuracy	<0.01% f.s
Current Accuracy	<0.01% f.s
Voltage Control/Measurement	
Full Scale Ranges	±10V(Standard)
Resolution (16 Bits)	0.3mV(Standard)
Current Control/Measurement	
Full Scale Ranges	Depending on system specification Max. 5Amp
Resolution	16 bit(0.0015% f.s)
Sampling time	>100msec



## WMPG1000M2 Middle power type



### Application

- Power device application
- Electrosynthesis/Electrolysis
- Battery Test
- Solar cell test
- Fuel Cell test (DMFC etc)
- For multichannel application

This System was designed for energy device application such as battery pack, solar module, fuel cell stack etc. The hardware is based on standard WMPG series potentiostat/galvanostat for higher power application. Customize specification is available within 200Watt per channel.

Current range is 3 ranges.

### For stable and accurate target

- 4 kelvin probe type true potentiostat/galvanostat circuit to minimize voltage drop
- High resolution 16 bit ADC/DAC: WMPG1000HP provides 0.0015% f.s resolution in control and acquisition both.
- Channel isolation: To prevent any noise from the other channel, each channel is designed for isolation.
- Multiple current ranges: 3 ranges. Auto/manual selection

### For easy expansion/maintenance target

- ☞ Channel Plug-in module: Plug-in module is easily upgradeable or modifying voltage/current range. Also if one channel is out of order, Just replacement is easiest way to clean the problem. Option module is plug-in type too. It means upgrade is very easy. For one board type per 8 channels, if one channel is out of order, user cannot use all 8 channels.
- ☞ Substation add-on type: WMPG series can expand the channels up to 64 channels per system. When the user wants to expand the channels, he/she just adds the substation. One of modular system's advantages is

maintenance. If one substation is out of order in power supplier's part, the other substations can be run without dead time.

### Option

- Temperature monitoring.
- Auxiliary Voltage Monitoring

### Specification

Control voltage range	±20V(standard) or customer specified range
Compliance Voltage	±24V(standard) or customer specified voltage
Control Current range	3 ranges
LED	Run: 1ea Mode: 2ea Current range: 3ea
Input impedance	10 <sup>10</sup> Ohm
Cell Connection	4 probe type, alligator clip cables
Voltage Accuracy	<0.01% f.s
Current Accuracy	<0.01% f.s
Voltage Control/Measurement	
Full Scale Ranges	±20V(Standard)
Resolution (16 Bits)	0.6mV(Standard)
Current Control/Measurement	
Full Scale Ranges	Depending on system specification
Resolution	16 bit(0.0015% f.s)
Sampling time	>100msec



## WMPG1000L Low current type



### Application

- Low current application
- Sensor application
- Electroanalytical application
- Micro battery application
- Compact size
- Multi working electrodes, single reference & single counter electrode
- Max. 64channel control per PC
- And more...

System hardware is based on WMPG series multichannel potentiostat/galvanostat. The system contains independent channel controller, a multiplexed data acquisition circuitry. This system can provide two mode (General mode: general multichannel potentiostat/galvanostat with eight working electrodes, eight reference electrodes and eight counter electrodes or Sensor mode: a multi-potentiostat with eight working electrodes, one common reference electrode and one common counter electrode). The sensor mode is designed so that eight working electrodes are in the same electrochemical cell. The potential control range is following customer specification. Each electrode can be individually controlled, including on/off control, potential and current range settings..

Each substation can be used as independent system with optional "StartUp Kit" or can be built up integrated system as add-on. These give flexibility to users application.

### For stable and accurate target

- 4 probe type true potentiostat/galvanostat circuit
- High resolution 16 bit ADC/DAC: WMPG provides 0.0015% f.s resolution in control and acquisition both.
- Channel isolation: To prevent any noise from the other channel, each channel is designed for isolation.
- Multiple current ranges: 3 ranges. Auto/manual selection

### Virtual control panel

- BCO (Button click operation); User can do any task with just clicking the button: **NO MENU SELECTION**
- Easy assignment of cycle test condition file to channel with combo box selection at anytime.
- Synchronized change function of cycle test condition file for selected multiple channels.
- Real time dual channel (V & I) strip chart display for selected channel or for all running channels with time scrolling mode or whole window mode
- Status bar displays channel status. Booking running channel stop function by time, cycle number, step etc.



with coulometer option

### Specification

Control voltage range	±10V(standard) or customer specified range
Compliance Voltage	±12V(standard) or customer specified voltage
Control Current range	3 ranges(5mA,50uA,500nA)
LED	Run: 1ea
Input impedance	10 <sup>10</sup> Ohm
Cell Connection	4 probe type, alligator clip cables
Voltage Accuracy	<0.01% f.s
Current Accuracy	<0.01% f.s
Voltage Control/Measurement	
Full Scale Ranges	±10V(Standard)
Resolution (16 Bits)	0.3mV(Standard)
Current Control/Measurement	
Full Scale Ranges	± 5mA, ± 50uA, ± 500nA
Resolution	16 bit(0.0015% f.s)
Sampling time	>100msec

## FieldStat Portable multichannel potentiostat



### Application

- For Field Application
- Sensor application
- Electroanalytical application
- Micro battery application
- Field Corrosion measurement
- Solar cell test
- Max. 8channel system
- Notebook PC is not included

System hardware is based on WMPG series multichannel potentiostat/galvanostat. The system contains independent channel controller, a multiplexed data acquisition circuitry. This system was designed for field usage. Customize specification is available within 2Watt per channel.

This system is true multichannel potentiostat/Galvanostat so each channel works independently.

Standard function is based on general multichannel potentiostat/galvanostat with eight working electrodes, eight reference electrodes and eight counter electrodes but multi-working electrode system for Sensor application (a multi-potentiostat with eight working electrodes, one common reference electrode and one common counter electrode) is available. Please contact with your regional distributor. The sensor mode is designed so that eight working electrodes are in the same electrochemical cell. The potential control range is following customer specification. Each electrode can be individually controlled, including on/off control, potential and current range settings...

### For stable and accurate target

- 4 probe type true potentiostat/galvanostat circuit
- High resolution 16 bit ADC/DAC: WMPG provides 0.0015% f.s resolution in control and acquisition both.
- Channel isolation: To prevent any noise from the other channel, each channel is designed for isolation.
- Multiple current ranges: 3 ranges. Auto/manual selection

### Virtual control panel

- BCO (Button click operation); User can do any task with just clicking the button: **NO MENU SELECTION**
- Easy assignment of cycle test condition file to channel with combo box selection at anytime.
- Synchronized change function of cycle test condition file for selected multiple channels.
- Real time dual channel (V & I) strip chart display for selected channel or for all running channels with time scrolling mode or whole window mode
- Status bar displays channel status. Booking running channel stop function by time, cycle number, step etc.

### Option

- DC/AC convertor for power supply.
- Notebook PC
- Low current version for sensor application is available

### Specification

Control voltage range	±10V(standard) or customer specified range
Compliance Voltage	±12V(standard) or customer specified voltage
Control Current range	3 ranges(1A, 10mA, 100uA)
LED	Run: 1ea
Input impedance	10 <sup>10</sup> Ohm
Cell Connection	4 probe type, alligator clip cables
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	± 1A, ± 10mA, ± 100uA
Resolution	16 bit(0.0015% f.s)
Sampling time	>100msec

**System configuration**

Max. Channel number: 64ch/PC; 16ch/PC (pulse mode)

1) Standard type

- Max. Power: 50Watt
- Max. Current range: +/-5A f.s @ 5V
- Min. current range: +/-10uA f.s
- Max. Voltage range: +40V @500mA



16channel system

WMPG1000M2(Max200Watt per channel)

2) Low current type

- Max. Current range: +/-5mA f.s
- Min. current range: +/-100nA f.s
- Max. Voltage range: +/-10V



3) Medium Power type

- 8channel System:WMPG1000M2(Max200Watt)
- 2channel Slave(Max 400Watt)



Dual channel Slave

4) High Power type

- Slave Style
- Max Power: 4KWatt
- Max. Current range: +/-200A
- Max. Voltage range: +/-40V
- CCU or Substation is needed.



⌘ **System configuration example**

1) Standard type mixing

- 8channel system: 10V, 1Amp 3ch + 5V, 2A 1ch, 7V, 100mA 4ch
- Standard Substation + standard PIG 8set

2) Standard type & Low current type mixing

- 8channel system: 5V 1Amp 5ch, 10V, 1mA 3ch
- Standard Substation + standard PIG 5set + Low current PIG 3set

3) Standard type, Medium Power type and High power type mixing

- 8channel system: 5V 1Amp 4ch, 10V, 5A 2ch, 20V, 10A 2ch
- Standard Substation + standard PIG 4set + Extension card 4ea + High Slave 2set + dual Slave 1set



4) High Power type & Medium Power type mixing

- 8channel system:  
20V 10Amp 4ch, 10V, 20A 2ch, 5V, 10A 2ch
- CCU controller + High Slave 6set + dual Slave 1set



8 channel CCU controller





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