

WMPG Series Multichannel Potentiostat/Galvanostat











For

10th Edition

Corrosion Material Testing Sensor/Bioelectrochemistry Battery/Fuel Cell Supercapacitor/Solar Cell



Multichannel Potentiostat/Galvanostat

- Corrosion test
- Sensor application
- Electro-analytical application
- Battery/Fuel cell test
- Electroplating, Electro-synthesis
- 5 current ranges(WMPG1000L/S/M/D/H8), 4 current ranges(WMPG1000H12) & 3 or 1 range (WMPG1000HP)

The system hardware was designed for stable and accurate instrument for easy expansion and maintenance. To serve this purpose, the choose plug-in type module with independent power suppliers per 8ch substation(standard type). Each substation can be used as an independent system with optional "StartUp Kit" or can be integrated into a system by adding substations. Consequently it gives flexibility to user's experiments.

For Stable and Accurate Target

- 4 Kelvin probe type true Potentiostat/Galvanostat circuit
- High resolution 16 bit ADC/DAC: WMPG provides 0.0015% f.s. resolution in both control and acquisition.
- Multiple current ranges(auto/manual selection)
- for high resolution and accuracy in both current control and measurement(auto/manual selection). - designed for long term test
- Shield cell cable to prevent EMI noise
- Stable TCP/IP communication
- Automatic firmware upgrade

• For Safety & Maintenance

• 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 value due to battery failure or wrong cell connection, etc. e.g. Control value: 1A, Measured value: 500mA
- Then the channel 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 the range of setting value, program gives the warning message for the operator to check the cell connection.

- If operator presses the stop button by mistake, a confirmation message box will appear.
- If main program is down by unstable operating system, the independent server program keeps the experiment (control & data acquisition) without dead time. • Easy calibration with verification function

For Easy Expansion/Maintenance Target

• Channel plug-in module

: Plug-in module is easily upgradeable or modifies 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 plug-in type too. It means the system can be upgraded very easily. On the other hand, if a 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 channel of WMPG series can be expanded up to 64 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.

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 upon request.
- Cell Kit





Corrosion Cell Kit

Flat Cell Kit





Plate Test Cell







H-Tvne Cel

• Flag Type Pt Counter Electrode - active area(Pt plate) : 5, 9, 16, 25cm²



• Battery Jigs

- Universal jig - Coin cell jig



- Lithium polymer battery jig

• Universal Electrode Holder - electrode and glass vial are not included.



Software (Smart Interface)

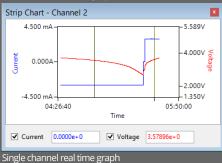
- 32bit/64bit OS environment
- TCP/IP communication
- Max. 200 steps
- Max. 10 cutoff(vertex) condition
- Max. 300,000 data point memory on control board Single/Multichannel control panel
- Various real time plots & universal axis graphs
- Data backup function
- WYSIWYG graphics
- User friendly software

• 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



- Status bar displays channel status.
- Spying the contents of test program which assigned to channel
 Assign temperature, AuxV and CalcV channel on virtual control panel
- Single channel & multichannel control/monitor panel



Single channel control/monitor panel

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3		*	II	-	H		181		CVTale					C/ProgramData/Wo	CHG	01:37
				10	H	٠	189		CVTall					C//Pregramflate/We	(96)	01:31
5		*	ii.	-	M	•	181		CVTall					C/ProgramData/Wo	CHG	01.31
4			•	39	н	٠	H		CVTalif					C/PregramData/Wo		01:30
7		*		34	M	٠	HØ		CVTAIR	ē.e				C/IPregramData/Wo	CHG	01:11:
8				10		٠	HA I		CVTalit					C/ProgramData/Wo	CHG	01:31

Multichannel control panel

Schedule Editor

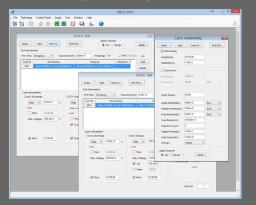
					B	attery2							-
Save	Save A		Cancel		Test Info	Sampling	Paste	Sample					
Control	Condition					Sampling	Conv	Type	On'	Cond.	Value	Oeita-Tie	
74	Current	~	Loop 1		ädd Step			Time			01.0		
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			Cos					(dt/dt)			0.0000e+0	00.77	
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Next	Step 🤟 🕇	(oltage	2	6.2000e+0		0						Ins Del	ert eta PV
Next Inp No	Step Name	Typ		Value Scan		Range / Loop	Turn St				t off Condition	ins Del Fa	ert eta PV
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- One stop test condition creation/modification
- Parameter mixed input system
- Max 200 test steps
- Control parameters are
- Constant voltage
- Constant current
- Constant power Constant load
- C-rate
- Voltage scanning Conditioning potential
- Conditioning current
- Rest - LastVscan
- CstepV (Staircase Voltage Sweep) - Cstepl (Staircase Current Sweep)
- CC/CV, CL/CV, CP/CV, C-rate/CV
- Id, Is control
- Step flow are defined by next step, loop and cycle
- Cut-off conditions can be set by; step time, voltage, current, dV/dt, dl/dt, cycle time, loop time, capacity, -dV, Whr, temperature, Aux voltage, dT/dt

Cut o	ff Cor	dition Li	st									
No	Tur	n Step	Туре		Con	d.	Value	d	t	And		Ту
1	Nex	d Step	Step Time	~	≥		30.00					
			Step T	ime	^							
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Step	No	Step Na	ime	Туре		1	Value (Scan	Rate)	Rang	je / Lo	ор	Т

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

• Menu Selection (Pre-defined techniques)



- Electroanalytical Techniques
 - Cyclic voltammetry
 - Linear sweep voltammetry

 - Chrono-amperometry
 Chrono-coulometry
 Chrono-potentiometry

Corrosion Measurement

- Tafel plot
- Potentiodynamic
- Potentiostatic
- GalvanostaticCyclic polarizationEcorr vs. time
- Linear polarization resistance

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

Simple Monitor

Simple Monitor					
Ch - 1 : CHG Elapsed: 13:54:04 Voltage: 3.84689e+0 Current: 9.98535e-3 Capacity: 8.8819e-3	Ch - 2 : CHG Elapsed: 13:53:59 Voltage: 2:5769e+0 Current: 4:97345e-3 Capacity: 4:05669e-3	Ch - 3 : SAFETY Elapsed: 00:00:00 Voltage: 420.8374e-3 Current: 0.0000e+0 Capacity: 0.0000e+0	Ch - 4 : STBY Elapsed: 37:54:18 Voltage: 1.62354e+0 Current: 0.0000e+0 Capacity: 0.0000e+0	Ch - 5 : CHG Elapsed: 13:53:54 Voltage: 561.21826e-3 Current: 4.96643e-3 Capacity: 69.02739e-3	
Ch - 6 : CHG Elapsed: 13:53:50 Vollage: 536.04126e-3 Current: 9.98335e-3 Capacity: 138.71993e-3	Ch - 7 : ID1E Elapsed: 00:00:01 Voltage: 1.83105e-3 Current: 0.0000e-0 Capacity: 0.0000e-0	Ch - 8 : IDLE Elapsed : 00:00:30 Voltage : -2:13623e-3 Current : 0.0000e=0 Capacity : 0.0000e=0	Ch - 9 : STBY Elapsed: 00:00:00 Voltage: 14.19067e-3 Current: 0.0000e+0 Capacity: 0.0000e+0	Ch - 10: DCHG Elapsed: 00:02:35 Voltage: 147:24731e-3 Current: -179:44336e-4 Capacity: -8:7975e-6	
Ch - 11 : CHG Elapsed: 00:02:32 Voltage: 310.05859e-3 Current: 647.88818e-6 Capacity: 51.16538e-6		Ch - 13 : IDLE Elapsed : 00:00:00 Voltage : -610.35156e4 Current : 0.0000e+0 Capacity : 0.0000e+0	Ch-14: DCHG Elapsed: 00:02:27 Voltage: 958:55713e-3 Current: 4:94934e-3 Capacity: -116:7771e-6	Ch - 15 : REST Elapsed : 00:02:24 Voltage : 1.18439e+0 Current : 0.0000e+0 Capacity : 687.61944e-6	
Ch - 16 : STBY Elapsed : 00:00:00 Voltage : 99:79248e-3 Current : 0.0000e+0 Capacity : 0.0000e+0	Ch - 17 : IDLE Elapsed : 00:00:00 Voltage : 9:51304+3 Current : 0.0000e+0 Capacity : 0.0000e+0				

• 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

Selected :		►		₩	N	2		
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Detailed Monitor

			Channel Mor	nitoring			[
1 ~ 8								
Item / Ch.	1	2	3	4	5	6	7	8
Status	REST	CHG	CHG	DCHG	DCHG		DCHG	DCHG
Test Time	00:18:52	00:16:12	01:47:26	01:40:41	01:40:41	01:30:39	01:40:41	01:40:41
Step / Cycle	5 3	1 1	1.1	4 2	4 2	4 2	4 2	6 2
Step Time	00:00:41	00:16:12	01:47:26	00:17:22	00:17:23	00:07:19	00:17:21	00:09:50
Current Range	1mA	10mA	10mA	100mA	100mA	100mA	100mA	100mA
Current (A)	0.0000e+0	999.73523e-6	999.72796e-6	-27.8239e-6	-61.58768e-6	0.0000e+0	-60.0532e-6	-27.68431e-6
Voltage (V)	3.48186e+0	3.74955e+0	3.67191e+0	-41.64037e-3	-42.24795e-3	194.04656e-6	-41.2195e-3	-40.41664e-3
Capacity (Ahr)	15.94258e-6	269.99684e-6	1.78999e-3	-150.54382e-9	-614.14077e-9	0.0000e+0	-504.55356e-9	-103.65522e-9
Power (Watt)	0.0000e+0	3.74855e-3	3.67092e-3	1.1586e-6	2.60195e-6	0.0000e+0	2.47536e-6	1.11891e-6
Energy (WattHr)	66.79963e-6	1.00572e-3	6.20997e-3	4.59164e-9	12.55273e-9	0.0000e+0	10.6091e-9	3.20089e-9
Aux (V)	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0
Calc V	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0	0.0000e+0
Temp. (C)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Schedule Name	CVTa	CVTa	CVTa	CVTa	CVTa	CVTa	CVTa	CVTa
File Name	200820_001	201059_002	184628_003	184628_004	184628_005	184628_006	184628_007	184628_008
File Size	822 kbytes	711 kbytes	610 kbytes	4 Mbytes	4 Mbytes	4 Mbytes	4 Mbytes	4 Mbytes

• 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.

Detailed Monitor

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

				General Graph			
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		Y1: Eref	• Y2 1	 Y3 None 	- Y4 None	. 🕵 📲 🖁	Division All 🔹 😵
Grap	Test time Eref	Eret					Legend
	l Aux	Eoc				- 10.000	
	Temperature Logi Load	Logi Load Ch Q				-9.000	
	Ch Q Dch Q	Dch Q Ch P				-8.000	
	Ch P Dch P	Dch P Ch Wh				-7.000	
	Ch Wh Dch Wh	Dch Wh Accumulate Wh				-7,000	
	Accumulate Wh Accumulate O	Accumulate Q Accumulate (Q)				-6.000	
(ref)	Accumulate (Q)	101				- 5.000	8
	Cycle time						-
	Step time					-4.000	
	3.000 -					- 3.000	

Cycle graph format

			_				_	_
2				Cy	cle Graph			
8	* 📓	🐯 🔀 🔍	🔍 💢 🖽	❷ 🔵 🗖 💵	🔯 🖾 🗎 🕇	🗋 🕼 🚔 🖺		
	Cycle No. • Cycle No.	V1: Ch Q	• Y2 Dch C	• Y3 No	ne v4	None •	5 [™] 5 [™] 5 [™] 5	8
Grap	Ch Q	Dch Q						
	Dch Q Accumulate Q Coulomb Eff.	Accumulate Q Coulomb Eff. Ch Wh					- 10.000	,
	Ch Wh Dch Wh	Dch Wh Accumulate Wh					- 9.000	
	Accumulate Wh Energy Eff. Min V	Energy Eff. Min V Max V					- 8.000	
	Max V Ch Vavg	Ch Vavg Dch Vavg					- 7.000	
	Dch Vavg Vavg Accumulate Q-Q0	Vavg Accumulate Q-Q Cycle No.	10				- 6.000	
(internet	5.000 -	coyere into:					- 5.000	Dch QAN
5	4.000 -						- 4.000	pq

Multichannel Potentiostat/Galvanostat WMPG Series

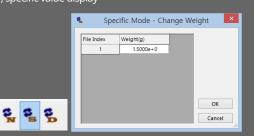
General Function of Graph

- Multi-parameters

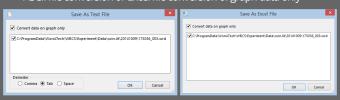
- Plot overlay: max. 20 plots
 Universal graphics: any combination of X,Y1,Y2,Y3,Y4 axis parameters
 Automatic updating plot with reloading button for running channel data
- Automatic/Manual scale and polarity selection for each axis



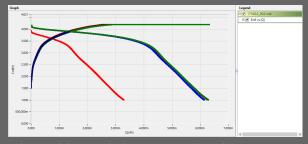
- Cross-hair pointer by mouse click/arrow key displays coordinate values on graph
- Mouse zooming
- Density, specific value display



- 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



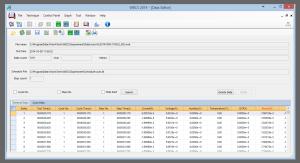
- Parameter change without reloading the data file
- Data set On/Off: Data can be visible or invisible by selecting/deselecting the data set.
- Rest step data hidden function
- Advanced graph setting



Voltage vs. | charging-discharging capacity | graph

Tools

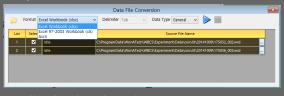
- Data Editor
 - General data report
 - Cycle data report



- * Data editing
- * Data filtering

Data Conversion

- Multiple data conversion(ASCII, Excel)



- Data file splitter by cycle number

			Data File Splitter	2
2	Cycle Ran	ge 2-		
List	Select	Status	Source File Name	
		ldle	C\ProgramData\WonATech\WBCS\Experiment\Data\coin.lit\20141009\175032_002.wrd	
2	_	ldle	C//ProgramData\WonATech\WBCS\Experiment\Data\coinJit\20141009\175036_003.wrd	
		,		

Calibration

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

2	2		Calibration		
	Channel 1 - Calibration	Calibration			
	Channel 2 - Calibration				_
	Channel 3 - Idle	Calib. Item	In Offset	In Gain	q
	Channel 4 - Idle	O Current-R1	0.00000E+000	1.00000E+000	0.000
	Channel 5 - Idle	O Current-R2	0.00000E+000	1.00000E+000	0.000
	Channel 6 - Idle][_
	Channel 7 - Idle	Current-R3	0.00000E+000	1.00000E+000	0.000

Data backup

	Data Backup Configuration	
P	Path	
	Source Folder :	
	C:\Zive Data\Smart Interface\Experiments\Data	
	Destination Folder :	
	C:\Users\user\Documents	
_ ⊺ ™	ask	
	Interval 1 🗘 hour	
	Data Option	
	Туре	
	Only Today's Data WRD Files	
	VCD Files	
	WCD THES	
	Start Stop	
		_

Independent Data Analysis Software



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

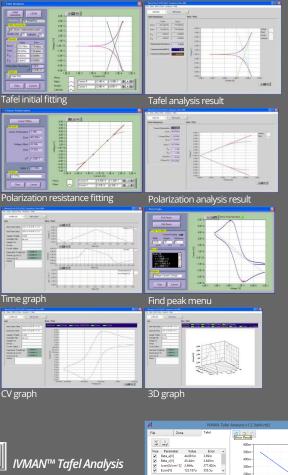
- IVMAN software
- IVMAN differential analysis software
- IVMAN photo voltaic cell analysis
 IVMAN Tafel analysis
 IVMAN Tafel analysis
 IVMAN extractor

- IVMAN peak find module

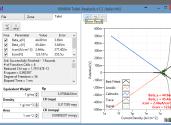


™ IVMAN™ Main Software

- 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

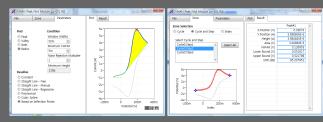


• Simple Tafel calculation



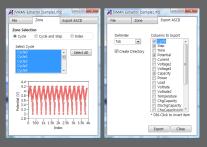


• Independent peak finding software



Extractor

- Extracting data by cycle number or step
 Exporting ASCII file





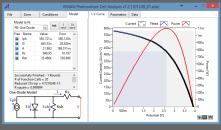
IVMAN DA™ Battery Test Data Analysis Software

- 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.

WMPG1000L Low Current Type



Application

- Low current application
- Sensor application
- Electroanalytical application
- Micro battery application

The WMPG1000L series are designed for low current applications and can be a best choice for sensor/micro battery studies. The potential control range is specified depending on customer's specification. The maximum power of each channel is 500mWatt and the system can be configured with custom specification not exceeding 500mWatt in power range. The WMPG1000L series have 5 current ranges with compact size. It use a local area network(LAN) for communication with a computer. Up to 8 independent channels can be installed per substation. Additional channels can be added up to a maximum of 64 channels.

Specifications

Control voltage range	±10V(standard)*1
Control current range	5 ranges
LED	Run: 1ea
Input impedance	10 ¹² Ohm
Cell connection	4 probe type, alligator clip cables
Max. channel no.	64
Voltage accuracy	±0.02% f.s.
Current accuracy	±0.02% f.s.
Voltage Control/Measurer	ment
Full scale ranges	±10V(standard)*1
Resolution (16 Bits)	0.3mV(standard)*1
Current Control/Measure	ment
Full scale ranges	Depending on system specification Max. 10mA@10V(WMPG1000Ls) Max. 100mA@10V(WMPG1000Le)
Resolution	16 bit(0.0015% f.s)
Communication	TCP/IP
Sampling time 16channels/SIF	- Without option (Max 64 channels) : 10msec - With option (AuxV and/or Temperature input) (Max 32 channels): 10msec
Size	W350.2xD328.1xH83.6mm

* 1: User can specify the voltage range within ±40V. All specifications are subject to change without notice.

WMPG1000S Standard Type



Application

- Corrosion test
- Sensor application
- General electrochemistry
- Battery/Super capacitor/Fuel cell test
- Material test

The WMPG1000S is a research grade multichannel potentiostat system in a 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 WMPG1000S has 5 current ranges, which is suitable for various electrochemical applications. The WMPG1000S is designed with a local area network(LAN) for communication with a computer.

• Option

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

Specifications

Control voltage range	±10V(standard) *1
Control current range	5 ranges
LED	Run: 1ea, Mode: 2ea
Input impedance	10 ¹² Ohm
Cell connection	4 probe type, alligator clip cables
Max. channel no.	64
Voltage accuracy	±0.02% f.s.
Current accuracy	±0.02% f.s.
Voltage Control/Measurer	nent
Full scale ranges	±10V(standard) *1
Resolution (16 Bits)	0.3mV(standard) *1
Current Control/Measurer	ment
Full scale ranges	Depending on system specification Max. 5A
Resolution	16 bit(0.0015% f.s)
Communication	TCP/IP
Sampling time 16channels/SIF	- Without option (Max 64 channels): 10msec - With option (AuxV and/or Temperature input) (Max 32 channels): 10msec
Size	W446.7xD454.4xH196.3mm

 \star 1: User can specify the voltage range within $\pm 40V.$ All specifications are subject to change without notice.

WMPG1000M1 Mid Power Type



• Application

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

The WMPG1000M1 system is designed for energy device application such as battery pack, solar module, and fuel cell stack, etc. The WMPG1000M1 is derived from the standard WMPG series potentiostat/galvanostat for higher power application with 3 current ranges. The maximum power of each channel is 100Watt and the system can be configured with custom specification not exceeding 100Watt in power range. Customized specification is available. Up to 8 independent channels can be installed per substation. Additional channels can be added up to a maximum of 64 channels.

Options

- Temperature monitoring
- Auxiliary voltage monitoring
- Battery jigs

Specifications

Control voltage range	±10V(standard) *1
Control current range	5 range
LED	Run: 1ea, Mode: 2ea
Input impedance	10 ¹² Ohm
Cell connection	4 probe type, alligator clip cables
Max channel no.	64
Voltage accuracy	±0.02% f.s.
Current accuracy	±0.05% f.s.
Voltage Control/Measurem	nent
Full scale ranges	±10V(standard) ^{*1}
Resolution (16 bits)	0.3mV(standard) ^{*1}
Current Control/Measuren	nent
Full scale ranges	Depending on system specification Max. 5A
Resolution	16 bit(0.0015% f.s)
Communication	TCP/IP
Sampling time 16channels/SIF	- Without option (Max 64 channels) : 10msec - With option (AuxV and/or Temperature input) (Max 32 channels): 10msec
Size	W446.7xD498.7xH285.9mm

* 1: User can specify the voltage range within ±40V. All specifications are subject to change without notice

WMPG1000M2 Mid Power Type



Application

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

The WMPG1000M2 system is designed for energy device application such as battery pack, solar module, and fuel cell stack, etc. The MPG1000M2 is derived from the standard WMPG series potentiostat/galvanostat for higher power application with 3 current ranges. The maximum power of each channel is 200Watt and the system can be configured with custom specification not exceeding 200Watt in power range. Customized specification is available. Up to 8 independent channels can be installed per substation. Additional channels can be added up to a maximum of 64 channels.

Options

- Temperature monitoring
- Auxiliary voltage monitoring
- Battery jigs

Specifications

Control voltage range	±10V(standard) *1
Control current range	5 range
LED	Run: 1ea, Mode: 2ea
Input impedance	10 ¹² Ohm
Cell connection	4 probe type, alligator clip cables
Max channel no.	64
Voltage accuracy	±0.02% f.s.
Current accuracy	±0.05% f.s.
Voltage Control/Measurer	
Full scale ranges	±10V(standard) ^{*1}
Resolution (16 bits)	0.3mV(standard) ^{*1}
Current Control/Measurer	nent
Full scale ranges	Depending on system specification Max. 10A
Resolution	16 bit(0.0015% f.s)
Communication	TCP/IP
Sampling time 16channels/SIF	- Without option (Max 64 channels) : 10msec - With option (AuxV and/or Temperature input) (Max 32 channels): 10msec
Size	W446.7xD625.4xH374.5mm

* 1: User can specify the voltage range within ±40V. All specifications are subject to change without notice.

WMPG100HPC 8channel controller





• General

WMPG1000HPC 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.

WMPG1000HPC has power supplies for the parts in channel hardware.

Hardware specification is same in WMPG1000 series to control 8channel. This can be extended upto 64 channels.

Channel connection between controller and channels is via dsub connector at rear side of the controller.

Optios

- Temperature monitoring
- Auxiliary voltage monitoring



WMPG1000D Dual Channel Type



Application

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

The WMPG1000D channel is designed for Mid power application (max 400Watt/ch) such as electroplaing, battery pack, electrosynthesis, electrolysis, solar module, fuel cell stack, etc. The WMPG1000D 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 64 channels.

- Typical models for WMPG1000D are
- ±10V @ 16Amp WMPG1000D_1016BC10
- ±20V @ 8Amp WMPG1000D_208BC21

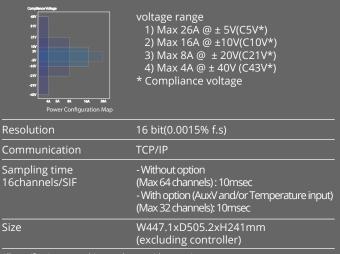
• Options

- Temperature monitoring
- Auxiliary voltage monitoring

Specifications

Control current range	5 ranges
LED	Run: 1ea, Mode: 2ea, Irange: 5ea
Input impedance	10 ¹² Ohm
Cell connection	4 probe type, alligator clip cables
Max channel no.	64
Voltage accuracy	±0.05% f.s. (<10V)
Current accuracy	±0.05% f.s.
Current / Voltage Contro	l/Measurement

Resolution (16 bits) 0.0015% f.s



All specifications are subject to change without notice.

WMPG1000H8 800Watt Power channel Type



• Application

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

The WMPG1000H8 power channel is designed for Mid power application(Max 800Watt) such as electroplaing, battery pack, electrosynthesis, electrolysis, solar module, fuel cell stack, etc. The 8 is derived from the standard WMPG series potentiostat/galvanostat for higher power application with 5 current ranges. 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 64 channels.

Typical models for WMPG1000H8 are

- ± 10V @ 32Amp WMPG1000H8_1032BC10
- ± 20V @ 16Amp WMPG1000H8_2016BC21
- ± 40V @ 8Amp WMPG1000H8_408BC43

• Options

Temperature monitoring

Auxiliary voltage monitoring

Specifications

Control current range	5 ranges
LED	Run: 1ea, Mode: 2ea, Irange: 5ea
Input impedance	10 ¹² Ohm
Cell connection	4 probe type, alligator clip cables
Max channel no.	64
Voltage accuracy	±0.05% f.s. (<10V)
Current accuracy	±0.1% f.s.

Current / Voltage Contro	
Resolution (16 bits)	0.0015% f.s
Complement Voltage 497 207 207 207 207 207 207 207 20	Maximum current depending o voltage range 1) Max 52A @ ± 5V(C5V*) 2) Max 32A @ ± 10V(C10V*) 3) Max 16A @ ± 20V(C21V*) 4) Max 8A @ ± 40V(C43V*) * Compliance Voltage
Communication	TCP/IP

Sampling time 16channels/SIF	- Without option (Max 64 channels) : 10msec - With option (AuxV and/or Temperature input) (Max 32 channels): 10msec
Size	W447.1xD505.2xH241mm

All specifications are subject to change without notice.

WMPG1000H12 1200Watt Power Channel Type



Application

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

The WMPG1000H12 power channel is designed for Mid power application(Max 1200Watt) such as electroplaing, battery pack, electrosynthesis, electrolysis, solar module, fuel cell stack, etc. The WMPG1000H12 is derived from the standard WMPG series potentiostat/galvanostat for higher power application with 4 current ranges. Up to 8 independent channels can be connected to one 8 channel controller. Additional channels can be added up to a maximum of 64 channels.

- Typical models for WMPG1000H12 are
- ± 10V @ 50Amp WMPG1000H12_1050BC10
- ± 20V @ 25Amp WMPG1000H12_2025BC21
- ± 40V @ 12Amp WMPG1000H12_4012BC43

Options

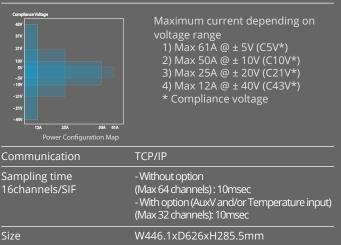
- Temperature monitoring
- Auxiliary voltage monitoring

Specifications

Control current range	4 ranges
LED	Run: 1ea, Mode: 2ea, Irange: 4ea
Input impedance	10 ¹² Ohm
Cell connection	4 probe type, alligator clip cables
Max channel no.	64
Voltage accuracy	±0.05% f.s. (<10V)
Current accuracy	±0.1% f.s.
Current (Maltana Cantus	

Resolution (16 bits)

0.0015% f.s



All specifications are subject to change without notice.

WMPG1000HP High Power Type



• Application

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

The WMPG1000HP system is designed for high power application such as battery pack, solar module, fuel cell stack, electroplating, etc. The WMPG1000HP is derived from the standard WMPG series potentiostat/galvanostat for higher power application with 3 or 1 current ranges. The maximum power of each channel is 4kWatt and the system can be configured with custom specification not exceeding 4kWatt in power range. 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 64 channels.

• Options

- Temperature monitoring
- Auxiliary voltage monitoring

Specifications

Resolution (16 bits)

Control current range	3 ranges 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.	64
Voltage accuracy	±0.1% f.s.
Current accuracy	±0.1% f.s.

0.0015% f.s

av 217 217 217 217 217 217 217 217	Maximum current depending on voltage range 1) Max 200A @ ± 5V (C7V*) 2) Max150A @ ± 10V (C10V*) 3) Max 76A @ ± 10V (C10V*) 4) Max 76A @ ± 20V (C21V*) 5) Max 72A @ ± 24V (C24V*) 6) Max 46A @ ± 30V (C31V*) 7) Max 38A @ ± 40V (C43V*) * Compliance voltage
communication	TCP/IP
Sampling time 16channels/SIF	- Without option (Max 64 channels): 10msec - With option (AuxV and/or Temperature input) (Max 32 channels): 10msec

All specifications are subject to change without notice.

System Configuration Examples

- Mid power Type & Low power Type Mixture System

 - 8 channel system : 10V, 1A(5ch) + 10V, 1mA(3ch)
 - WMPG1000S substation + channel 5set + Modified channel 3set
- Mid power Type & High Power Type
 - Mixture System

 - 8 channel system : 10V, 1A(4ch) + 10V, 5A(2ch) + 20V, 10A(2ch)
 - WMPG1000S substation + channel 4set + extension card 4ea + WMPG1000D 2set



Extension Card for WMPG1000S

• High Power Type & Mid Power Type

- Mixture System
- 8 channel system : 20V, 10A(4ch) + 10V, 20A(2ch) + 10V, 10A(2ch) 8ch controller + WMPG1000D 4set

Accessoreis

Cell kits



Battery Jig & Coin Cell Holder



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