



## **EChem Accessory**

# **ACCESSORY CATALOG**

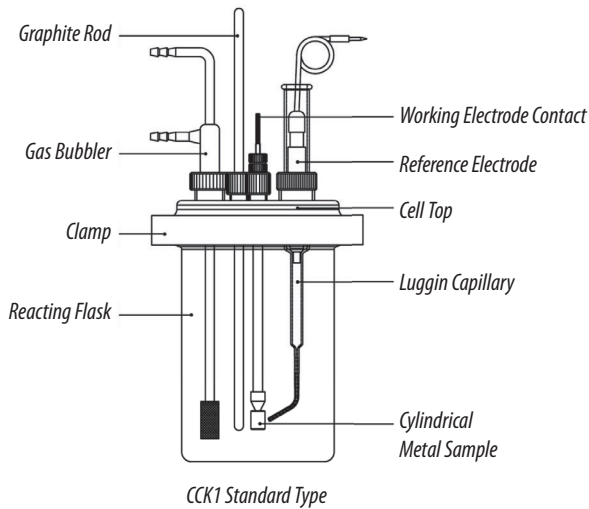
## **For Electrochemical Experiments**

# Contents

Corrosion Cell Kit .....	3
Flat Cell Kit .....	4
Plate Cell Kit .....	5
H-Type Cell Kit .....	6
Permeation Cell Kit .....	7
Photo Echem Cell Kit .....	7
Power Booster .....	8
Battery Jig .....	9
Battery Jig / Coin Cell Jig / Pouch Cell Jig / Coin Cell Holder	
Redox Flow Battery Test System .....	11
Membrane Conductivity Cell .....	12
Through-Plane Conductivity Jig .....	13
Fuel Cell Hardware Fixture & MEA .....	14
Cell Voltage/Temperature Monitoring System .....	15
Faraday Cage .....	16
Black Box .....	16
Others .....	17
Pt Plate Electrode / Pt Gauze Electrode / Universal Electrode Holder / Flat Specimen Holder	
Softwares .....	19
ZMAN / IVMAN / SIM4U / LoadRunner / Solution Mixer	

# Corrosion Cell Kit

The CCK series corrosion cell kit is based on a standard glass reaction flask, 1 liter or 100ml. All wetted parts are made of chemically resistant materials such as Teflon, Pyrex and SUS 316. The standard cell configuration consists of a cylindrical metal sample working electrode, a graphite rod, a counter electrode, a gas bubbling tube, and a reference electrode in a Luggin capillary. A graphite rod as counter electrode, a reference electrode and a flat specimen holder could be ordered separately as an option. The water-jacketed type corrosion cell kit and alkaline resistance cell kit made with Teflon are also available.



## Specifications

Vial volume (depending on model))	CCK series : 100 ml to 1 liter WCCK series : 500 ml & 1 liter
Cylindrical sample holder material	
Tube	Pyrex®, 6.35 mm dia.
Compression gasket	Teflon®
Cylindrical metal sample	Steel
Chemical compatibility	
Wetted materials	Pyrex®, Teflon®
Non-wetted materials	Above, plus stainless steel and Viton®
Reference electrode(option)	
Type	SCE or Ag/AgCl reference electrode
Size	9 mm diameter OD, 110 mm long
Counter electrode(option)	
Graphite rod	6 mm diameter, 30 cm long
Pt flag counter electrode	active area : Pt plate type : 5cm <sup>2</sup> , 9cm <sup>2</sup> , 16cm <sup>2</sup> , 25cm <sup>2</sup> Mesh type : 25cm <sup>2</sup>
Flat specimen holder(option)	
Specimen diameter	FSH2 : 15.5 mm ~ 22 mm FSH15 : 18.5 mm ~ 25 mm dia.
Specimen thickness	0.3 ~ 5.8 mm

All specifications are subject to change without notice.

## Parts Included

For CCK1 & WCCK1

Cell vial	Pyrex®, 1L, 103x157mm(ODxH)
Cylindrical metal sample & tube	Steel / Pyrex®, 6.35mm dai. x 4.35mm dia.
Cell clamp	Stainless steel
Luggin capillary	Pyrex®
Gas bubbler	Pyrex®
Cell Top	Teflon®
Other miscellaneous parts such as stopper / O-ring	MC Nylon® / Viton®

Please contact us for other replacement parts.

## Ordering Guide

Standard type	
1 liter volume	CCK1
500 ml volume	CCK05
200 ml volume	CCK02
100 ml volume	CCK01
100 ml volume, alkaline resistant cell	CCK01T
Water-jacketed type	
1 liter volume	WCCK1
500 ml volume	WCCK05

Components can vary depending on the type of cells.

## Optional Items

Flat specimen holder	
Active area : 11.28 mm dia.	FSH2
Active area : 15 mm dia.	FSH15
Counter electrode	
Graphite rod, 150mm long	GR002H
Graphite rod, 300mm long	GR002
Pt plate type	PFL1/PFL4/PFL5/PFL9/PFL16/PFL25
Pt mesh type, 80mesh	PFL1M/PFL4M/PFL5M/PFL9M/ PFL16M/PFL25M
Reference electrode	
Saturated calomel reference electrode	WA1001
Ag/AgCl reference electrode	WA1004



# Flat Cell Kit

The flat cell kit was designed to evaluate plate material such as metal(coupons), semi-conducting plate, etc. A sample plate will be placed one sample holder by fixing knob and maximum 300ml sample volume is acceptable. A water jacketed version is also available. A graphite plate which is placed in one side of the cell is supplied with a cell and can be used as a counter electrode. A Luggin capillary is also included while a reference electrode should be purchased separately. Instead of graphite plate, a platinum wire can be also used as counter electrode by putting through either of the ports on cell body. You can select PTC1 or PTC2 plate test cell kit for small solution volume, which is explained on next page.



*FCK2 Standard Type*



*WFCK2 Water-Jacketed Type*

## Features

- Ideal for testing of flat specimen
- Easy to use
- Fast and easy disassembly
- Detachable counter electrode
- Two opening areas

## Specifications

Sample test area	
One side	1 cm <sup>2</sup>
The other side	5 cm <sup>2</sup> , normally for counter electrode or 1 cm <sup>2</sup> , upon request
Sample thickness	Up to 10 mm
Cell volume	up to 300 ml
Material	
Cell body	Pyrex®
Cell end	Polycarbonate
O-ring	Viton®

All specifications are subject to change without notice.

## Parts Included

Graphite plate	GR001
Luggin capillary	LGFCCK

Please contact us for other replacement parts.

## Applications

- Polarization test
- Galvanic corros
- Electrochemical noise measurement
- EIS measurement
- Cyclic voltammetry

## Ordering Guide

Standard type	FCK2
Water-jacketed type	WFCK2

## Optional Items

Reference electrode	
Saturated calomel reference electrode	WA1001
Ag/AgCl reference electrode	WA1004

# Plate Cell Kit

The plate test cell kit, PTC1, is designed to evaluate plate material such as metal(coupons), semi-conducting plate, etc. In evaluation, a sample plate will be placed between two cell blocks. A counter electrode (graphite rod or Pt wire type) and a reference electrode should be ordered separately.

- PTC1 has a electrode holder part, a solution block part, a bottom block part and a thickness adjustment dial knob.
- The active area, which is to be exposed to electrolyte, can be selected by O-ring's position.



PTC1



Active area will be determined by O-ring's position.

## Specifications

Sample test area	width: >15mm, thickness: 0.1~10mm
Materials	Teflon®
Active area	
Using small O-ring	1 cm <sup>2</sup>
Using large O-ring	5 cm <sup>2</sup>

All specifications are subject to change without notice.

## Ordering Guide

Plate test cell	PTC1
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# Plate Cell Kit

The plate test cell, PTC2, is a simple cell for electrochemical testing of coated samples. Also it can be a perfect choice for measuring EIS(Electrochemical Impedance Spectroscopy) of painted metal specimens. The PTC2/PCT015 are very easy to assemble.



PTC2

PTC015

## Specifications

Sample	
Size	PTC015 : 29x29mm or more PTC2 : 60x60mm or more
Thickness	PTC015 : >3mm PTC2 : >7mm
Dimensions	
Base	PTC015 : 50x70x8mm(WxDxH) PTC2 : 131x890x90mm(WxDxH)
Cell body	
- internal diameter & length	PTC015 : 17mm, 46mm long PTC2 : 30mm, 80mm long
Hole diameter	PTC015 : none PTC2 : 9.3mm dia. & 6.5mm dia.

All specifications are subject to change without notice.

## Parts Included

Cell body	Pyrex®
Base and cell top	Teflon® (glass base for PCT015)
Cell clamp	Stainless steel
O-ring	Viton®

## Ordering Guide

Plate test cell	PTC015
Plate test cell	PTC2

## Optional Items For PTC1 & PTC2

Reference electrode	
Saturated calomel reference electrode	
- 6mm OD, ceramic tip	WA013458
- 9mm OD, KT glass tip	WA1001
Ag/AgCl reference electrode	
- 6mm OD, porous glass tip	WA012167
- 9mm OD, KT glass tip	WA1004
Counter electrode	
Graphite rod	GR002H
- 6mm dia. 15cm long	
Pt wire counter electrode	
- 0.5mm dia. 30mm long	WA115
- 0.5mm dia. 57mm long	WA002222

# H-Type Cell Kit

The H-Type cell consists of two glass cells which can be interconnected by a membrane or a permeation foil (user supply). Each cell chamber may be filled with a different solution and they are linked together by a clamp. The volume of each cell is 1 liter. All wetted parts are made of chemically resistant materials such as Teflon, Pyrex and SUS 316.

The standard cell configuration consists of a flat specimen holder for working electrode, a graphite rod or plate type Pt counter electrode, a reference electrode in a Luggin capillary and a gas bubbling tube.

A graphite rod, a plate type Pt counter electrode, a flat specimen holder and a reference electrode should be ordered separately.



HCELL1 H-Type Cell  
with optional flag type Pt counter electrode

## Specifications

Dimensions	
Cell vial volume	1 liter x 2 ea
Sample volume	About 750ml / each vial
Size	Approximately 14cm diameter by 30cm high including electrodes and adapters
Cylindrical sample holder material	
Tube	Pyrex, 6.35mm dia.
Compression gasket	Teflon®
Metal sample	Steel
Chemical Compatibility	
Wetted materials	Pyrex®, Teflon®
Non-wetted materials	Above, plus stainless steel and Viton®

All specifications are subject to change without notice.

## Parts Included

Cell vial	Pyrex®, 1L, 103x157mm(ODxH), 2ea
Cell clamp	Stainless steel
Clamp for connecting the half cells	Stainless steel
Luggin capillary	Pyrex®
Gas bubbler	Pyrex®
Cell top	Teflon®
Cylindrical metal sample & tube	Steel, 6mm OD Quartz tube, 4.35mm OD
Other miscellaneous such as stopper / O-ring	MC Nylon® / Viton®

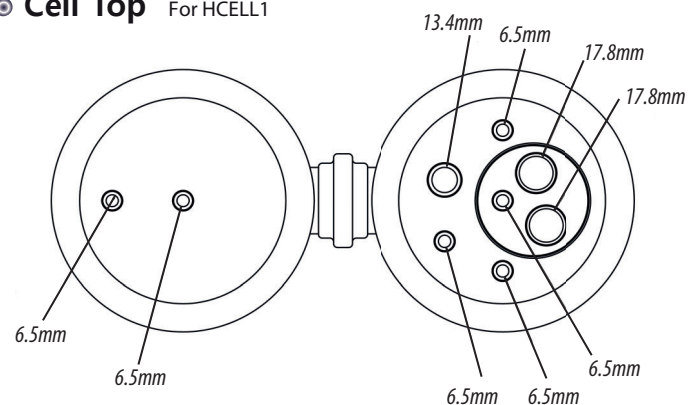
## Ordering Guide

1liter vial x 2ea	HCELL1
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## Optional Items

Flat specimen holder	FSH2
Active area : 11.28mm dia.	
Sample size : 15.5mm ~ 22mm dia.	
Sample thickness : 0.3~5.8mm	
Flat specimen holder	FSH15
Active area : 15mm dia.	
Sample size : 18.5mm ~ 25mm dia.	
Sample thickness : 0.3~5.8mm	
Counter electrode	
Graphite rod, 150mm long	GR002H
Graphite rod, 300mm long	GR002
Pt plate type	PFL1/PFL4/PFL5/PFL9/PFL16/PFL25
Pt mesh type, 80mesh	PFL1M/PFL4M/PFL5M/PFL9M/PFL16M/PFL25M
Reference electrode	
Saturated calomel reference electrode	WA1001
Ag/AgCl reference electrode	WA1004

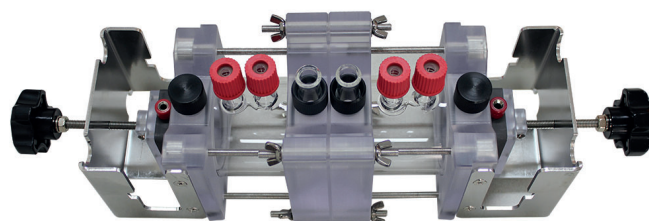
## Cell Top For HCELL1



# Permeation Cell Kit

The permeation cell kit, PMC1, is a spinoff of flat specimen cell kit, FCK2 series, and is designed for permeation test. A membrane or a permeation foil can be placed between two glass half cells.

Two graphite plates which can be used as counter electrode and two Luggin capillary are included as standard. Membrane and reference electrode should be ordered separately.



Permeation Cell Kit

## Specifications

Sample test area	
Middle	1 cm <sup>2</sup>
Both ends	5 cm <sup>2</sup>
Dimensions	
Cell vial volume	150ml x 2 ea
Size	396 x 100 x 127mm (WxDxH)
Chemical Compatibility	
Wetted materials	Pyrex®, Polycarbonate

All specifications are subject to change without notice.

## Ordering Guide

Permeation Cell Kit	PMC1
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# Photo Echem Cell Kit

The photoelectrochemical cell having a wide optical window is designed to characterize electrode material under lighting condition. The 2 or 3 electrode test is available. Based on a standard model, PCELL1, the attachments are interchangeable between cells according to user's applications. It is a gas tight sealed cell.



PCELL1 - Standard Model

## Specifications

Materials	cell body: PEEK optical window: quartz glass others: SUS 304, Viton O-ring	
Dimensions	optical window dia. 18mm cell dimensions 74.3x40x110mm(WxDxH) (PCELL1)	
Electrolyte volume	max. 6ml (PCELL1)	
Sample size	for PCELL1&2 width: >25mm height: 25~62mm	for PCELL3 width: <18mm height: <22mm
Counter electrode	coiled Pt wire (included)	
Reference electrode	6mm OD electrode available (option)	

All specifications are subject to change without notice.

## Ordering Guide

PCELL1 - Standard	<ul style="list-style-type: none"> <li>standard type</li> <li>one optical window mounted in front of electrolyte chamber</li> </ul>	
PCELL2	<ul style="list-style-type: none"> <li>two optical windows arranged to face each other</li> <li>suitable for absorbance measurement with a transparent electrode</li> </ul>	
PCELL3	<ul style="list-style-type: none"> <li>cell kit with a specimen holder</li> <li>small sample can be fixed inside the electrolyte chamber</li> </ul>	

# Power Booster

The ZIVE ZB series boosters are a new generation of single or multi-channel high current instrumentation and they are designed to increase the maximum current and/or maximum voltage of ZIVE series potentiostat/galvanostat.

The ZIVE ZB series boosters have full dc capabilities and are ideal for a wide range of electrochemical applications including high speed voltage/current pulse techniques. And impedance analysis techniques such as single- and multi-sine and HFR test, etc. are also available. Wide frequency ranges covering 10uHz to 1kHz(10kHz) depending on system power enables user to characterize energy storage devices and electrochemical cells over their full frequency range.

This ZIVE ZB series boosters are designed as stand alone type or rack mounted type and have multiple booster modules placed inside it. The power capability can be growing by adding module units to the existing system(factory configuration).

## Specification

Control & Measurement	
Maximum Voltage	40V
Maximum Current	200A
Minimum Frequency	10uHz
Maximum Frequency	1kHz ~ 10kHz (depending on power)
Current Range	single
Voltage Range	single
Input Impedance	$10^{13}$ Ohm
Accuracy	0.05% ~ 0.1% f.s. (depending on power)
Resolution	16 bit
Rise Time	5usec ~ 500usec (depending on power)
Cooling Method	forced air flow
Data Acquisition	>50usec

\* This booster needs ZIVE workstation

The specifications are subject to change without notice.



ZB3 & ZB2 Series

- ⦿ **For high voltage/high current application**
- ⦿ **Modular type design**
- ⦿ **EIS capability**
- ⦿ **Sine wave simulation available**
- ⦿ **Simple operation and accurate result**
- ⦿ **Safety features for user and instrument itself**

## Ordering Guide

Housing	Model	Max. V	Max. I (>-2V)	Max. I (Bipolar)	Power Dissipation(Watt)
ZB1	ZB530B	5V		30A	450
	ZB1020B	10V		20A	480
	ZB2015U/2010B	20V	15A	10A	435/480
	ZB409U/405B	40V	9A	5A	477/480
ZB2	ZB560B	5V		60A	900
	ZB1040B	10V		40A	960
	ZB2030U/2020B	20V	30A	20A	870/960
	ZB4020U/4010B	40V	20A	10A	900/960
ZB3	ZB590B	5V		90A	1,350
	ZB1060B	10V		60A	1,440
	ZB2050U/2030B	20V	50A	30A	1,450/1,440
	ZB4025U/4015B	40V	25A	15A	1,325/1,440



# Power Booster

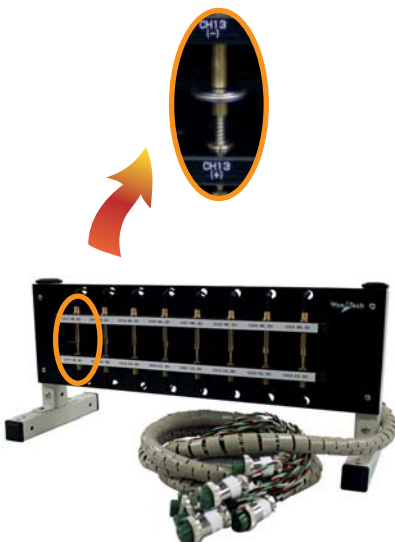
Housing	Model	Max. V	Max. I (>-2V)	Max. I (Bipolar)	Power Dissipation(Watt)
ZB4	ZB5120B	5V		120A	1,800
	ZB1080B	10V		80A	1,920
	ZB2060U/2040B	20V	60A	40A	1,740/1,920
	ZB4035U/4020B	40V	35A	20A	1,855/1,920
ZBR2	ZB5200B	5V		200A	3,000
	ZB10160B	10V		160A	3,840
	ZB20120U/2080B	20V	120A	80A	3,480/3,840
	ZB4070U/4040B	40V	70A	40A	3,710/3,840
ZBR3	ZB20180U/20120B	20V	180A	120A	5,220/5,760
	ZB40100U/4060B	40V	100A	60A	5,300/5,760
ZBR4	ZB20160B	20V		160A	7,680
	ZB40150U/4080B	40V	150A	80A	7,950/7,680
Rack	Consists of several ZB2, ZB3 or ZB4 models. Max. 200A, Max. 40V				

Model Name \*\*\*\*B is for bipolar type, \*\*\*\*U is for unipolar type (minimum voltage -2V).

# Battery Jig

## Battery & Coin Cell Jig

- easy to hold cylindrical cell and/or coin cell
- wide contact point with gold coated contact area
- 4 contact point type(Kelvin probe) is available to minimize voltage drop.
- individual channel operation is available.
- rack type is available.



### CCJ8F2

- jig for 8 channel coin cells
- 2 probe type coin cell jig for WBCS series battery cyclers
- gap between the pins cannot be adjustable.

## Specification & Ordering Guide

Contact Type	Gap <sup>1)</sup> Adjustment	Battery Type	Part No.
For WBCS Series Battery Cell Test System			
4 probe type	available	cylindrical cell / coin cell	UCJ* <sup>2)</sup>
4 probe type	unavailable	coin cell	CCJ*F4 <sup>2)</sup>
4 probe type	unavailable	coin cell, for high temp.	CCJ*F4H <sup>2)</sup>
2 probe type	unavailable	coin cell	CCJ*F2 <sup>2)</sup>
2 probe type	unavailable	coin cell, for high temp.	CCJ*F2H <sup>2)</sup>
For ZIVE Series <sup>4)</sup> , General Battery Cell Test System & Potentiostat <sup>5)</sup>			
4 probe type	available	cylindrical cell / coin cell	UCJ*Z <sup>2)</sup>
4 probe type	unavailable	coin cell	CCJ*FZ4 <sup>2)</sup>
2 probe type	unavailable	coin cell	CCJ*FZ2 <sup>2)</sup>
For WBCS & ZIVE Series, General Battery Cell Test System & Potentiostat <sup>4)</sup>			
4 probe type	available	cylindrical cell / coin cell	UCJ1 <sup>3)</sup>

1) gap between pins 2) \* : number of channels 3) for single cell  
4) for ZIVE MP2, MP5 & MP5H models 5) general battery cycler and potentiostat having banana connector



### Rack Type

- rack type for multichannel systems
- front panel type which can be attached to a battery cycler directly is also available.

# Battery Jig



## CCJ8FZ2

- jig for 8 channel coin cells
- 2 probe type coin cell jig for ZIVE series, general battery cyler and potentiostat having banana connectors
- gap between the pins cannot be adjustable.



## UCJ1

- jig for a single coin cell
- easy to hold a coin cell by pulling the lever
- banana connector type

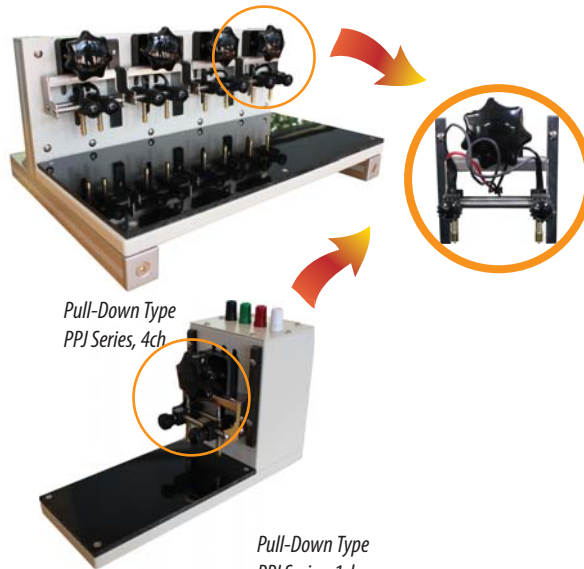
## Pouch Cell Jig

### PPJ Series

- pull-down contact type
- 4 contact point type(Kelvin probe)

### APJ Series

- alligator clip contact type



Pull-Down Type  
PPJ Series, 4ch

Pull-Down Type  
PPJ Series, 1ch



Alligator Clip Type  
APJ Series, 64ch

### Ordering Guide

Contact Type	Part No.
pull-down contact type	PPJ* <sup>1)</sup>
alligator contact type	APJ* <sup>1),2)</sup>

1) \*: number of channels, 2) \*: minimum order channel for APJ series : 64 channel

## Coin Cell Holder

### For WPG/WMPG/WBCS Series

- direct connect to cell connector
- for 2016, 2025, 2032 coin cell  
- please specify coin cell size when ordering.



CCH2L

CCH2

### For ZIVE Series

- D-SUB connector type
- for ZIVE SP1, SP2, MP1, MP2, and BP2 model



CCH3 with ZIVE SP1



CCH3 with ZIVE MP2

### Ordering Guide

Description	Part No.
For low current model - WMPG1000L, WBCS3000L, WBCS3000L32, & WBCS3000Le32 series	CCH2L
For standard current model - WPG, WMPG1000S, & WBCS3000S series	CCH2

### Ordering Guide

Description	Part No.
For 20mm dia. coin cell	CCH3-20
For 24mm dia. coin cell	CCH3-24

# Redox Flow Battery Test System

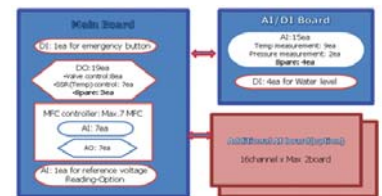
The redox flow battery test system, WFBTS, is an integrated system including ZIVE SP5 electrochemical workstation, cell, jig and electrolyte flow control device. High-current and multi-range ZIVE SP5 operates in current- or voltage-controlled operation and can conduct EIS and HFR measurement during charge, discharge or between charge/discharge steps and at OCV. A dual channel, high performance peristaltic pumps with variable flow control including forward and reverse flow has a flow rate up to 200ml/min.

## Redox Flow Battery Test System

- for charge/discharge test of a single cell
- impedance measurement available
- temperature control and measurement
- electrolyte flow control with a dual channel peristaltic pump
- max. 4 channel control with a PC
- support various safety functions
- system configuration :  
ZIVE SP5 Electrochemical workstation + RFC1 flow cell controller



ZIVE SP5

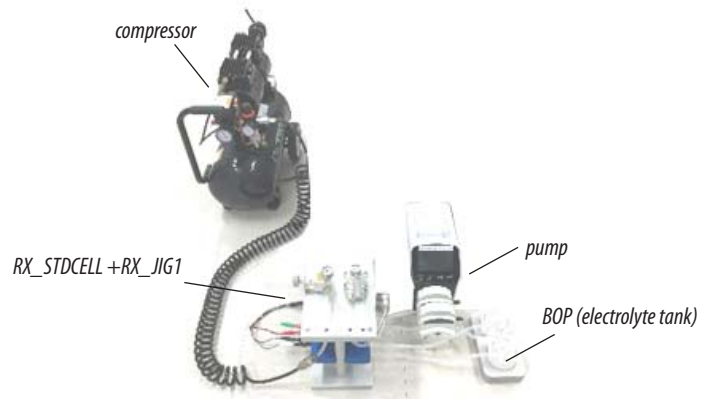


RFC1 flow cell controller

\* Please contact us for more detailed information about ZIVE SP5.

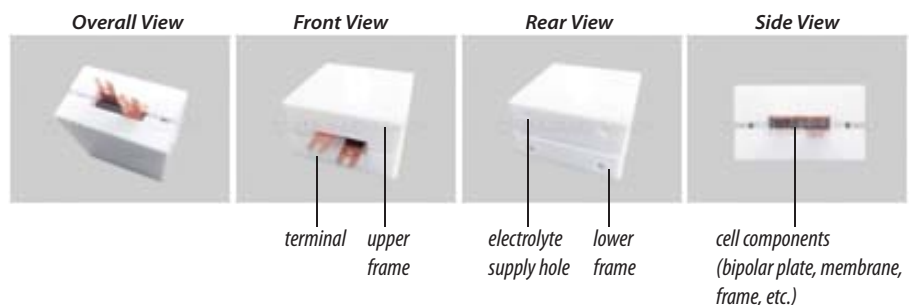
## Cell & Jig

- manual flow control
- pump
  - for electrolyte circulation
  - 3 roller pump, 2-channel pump head
  - flow rate : max. 200ml/min
  - touch screen interface
- BOP(electrolyte tank)
  - consists of : electrolyte tank, tube(Viton), one touch tube connector
  - material : PTFE body, PMMA head
  - volume : < 80ml
- compressor for jig
  - max. 8 bar
- electrolyte : Vanadium 1.7M, 3.5+



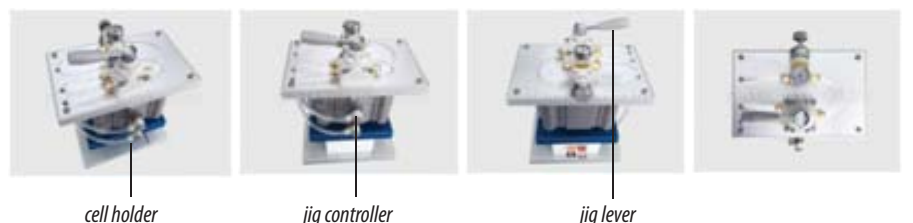
## Redox Flow Battery Cell, RX\_STDCELL

- easy to assemble/disassemble
- various active area : max. 70x70mm(49cm<sup>2</sup>)
- material : PTFE



## Jig for Test Cell, RX-JIG1

- for preventing electrolyte leakage
- needs an air compressor

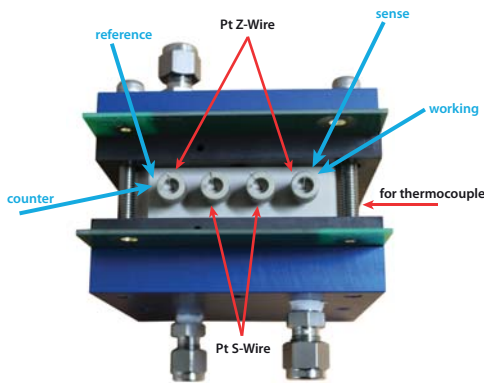
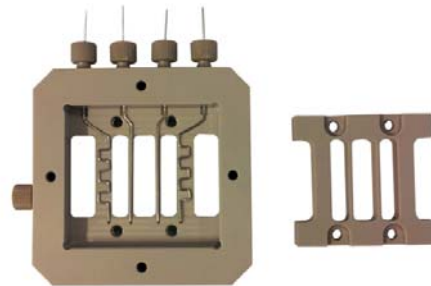


# Membrane Conductivity Cell

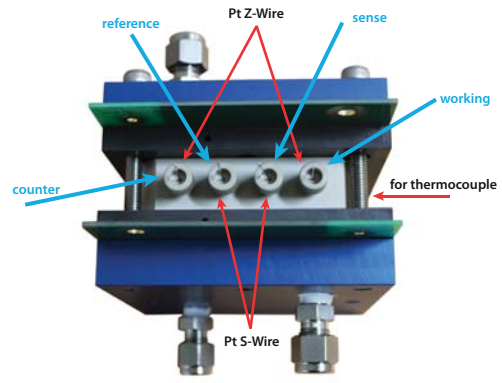
The membrane conductivity cell, MCC, is designed to measure ionic conductivity by simply loading a membrane into cell hardware. The MCC adopts 4 point probe for measuring conductivity. By passing current through two outer electrodes and measuring the voltage through the inner electrodes, it allows the measurement of the conductivity. In the 4-electrode configuration, there is virtually no current flow at the inner voltage sensing electrodes. Therefore, polarization does not occur. The second benefit of the 4-electrode sensor is its tolerance of electrode coating. Since the 4-electrode technique measures potential drop rather than resistance, the measurement remains accurate, despite minor coating. The 2 probe measurement is also available by attaching the working and sensing electrical connections to the cathode side while attaching the counter and reference electrical connections to the anode side. Please see the below configuration.

By placing the conductivity cell between the anode and cathode conduction plate, you can simply assemble the conductivity cell into your fuel cell hardware.

- supports 2 or 4 electrode measurement
- material
  - cell body : PEEK
  - wire : platinum
- operating temperature : to 130°C
- fuel cell hardware available
  - : 5, 9 and 25 cm<sup>2</sup> fuel cell test hardware (not included, provided by WonATech)
- easy to assemble



Connecting for a 2-electrode measurement



Connecting for a 4-electrode measurement

## Specifications

<b>Material</b>	
Cell, clamp & nut	PEEK
Electrode(S-wire/Z-wire)	Platinum
<b>Dimensions</b>	
Conductivity cell	76.2x76.2x20 mm(WxHxD)
Conductivity clamp	48x50x7 mm(WxHxD)
S-wire (inner electrodes)	84 mm long x 1.0 mm dia.
Z-wire (outer electrodes)	120 mm long x 1.0 mm dia.
<b>Access</b>	
Voltage measurement (S-wire)	two, inner ports
Current measurement (Z-wire)	two, outer ports
Temperature measurement	one, side port

All specifications are subject to change without notice.

## Ordering Guide

Membrane conductivity cell	MCC
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# Through-Plane Conductivity Jig

Because the conductivity of a material is directly linked with ohmic losses, the measurement of ionic conductivity is crucially important in order to evaluate the performance of a newly synthesized material such as ion exchange membrane(IEM) and proton exchange membrane(polymer electrolyte membrane, PEM).

Today ion exchange membranes are receiving considerable attention and are successfully applied for desalination of sea and brackish water and for treating industrial effluents. And proton exchange membrane(PEM) is one of the key components for various consumer related applications for fuel cells, e.g. automobiles, back-up power, portable power etc. For example, in PEMs, protons can transport in two directions, across the membrane and through the membrane. This results in two conductivities, in-plane conductivity and through-plane conductivity. For PEM fuel cells, through-plane conductivity measurement is more meaningful than in-plane because proton transfer occurs in the through-plane direction.

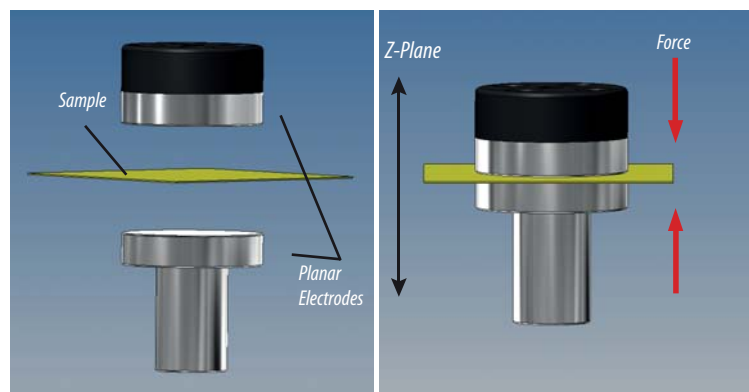
The conductivity of the membrane can be calculated based on the measured resistance by the following equation:

$$\sigma = \frac{L}{RWT}$$

where  $\sigma$  is the membrane conductivity(S/cm), L is the length between the electrodes, R is the measured resistance, W is the membrane width, and T is the membrane thickness.



MCJ1 (Through-Plane Conductivity Test)



The MCJ1 Through-plane conductivity test jig helps user to setup a 2-probe electrochemical cell consisting of 2 stainless steel probes that sandwiches the membrane to measure through-plane conductivity of membranes. The MCJ1 is designed to hold a membrane by pulling a lever.

Normally, a number of galvanostatic alternating current(AC) electrochemical impedance spectroscopic (EIS) techniques or DC techniques are used to estimate the membrane conductivity. User can set up a perfect system with one of ZIVE series Electrochemical Workstation with MCJ1 conductivity test jig for through-plane conductivity measurements.

## ● Specifications

Sample size	>30mm diameter
Sample thickness	max. 40mm
Sample contact material	304 stainless steel
Overall dimensions	70 x 135 x 174mm(WxDxH)
Connection	4mm banana plug

All specifications are subject to change without notice.

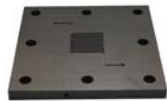
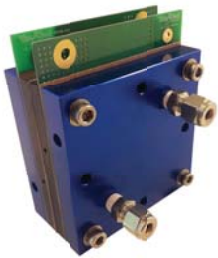
## ● Ordering Guide

Through-plane conductivity jig	MCJ1
--------------------------------	------

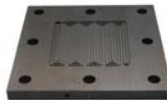
# Fuel Cell Hardware Fixture & MEA

## Fuel Cell Hardware Fixture

- For PEMFC, DMFC
- Max.operating temperature : 120°C or 180°C
- Active area : 5, 9, 25, 50, 100cm<sup>2</sup>
- Components  
: serpentine flow pattern, cartridge heater(2), current collector(2), cell graphite(2), end plate(2), connector
- Thermal Jacket is available as an option.
- MEA is not included.



• single serpentine  
for SCFC5 & SCFC9



• triple serpentine  
for SCFC25

### Ordering Guide

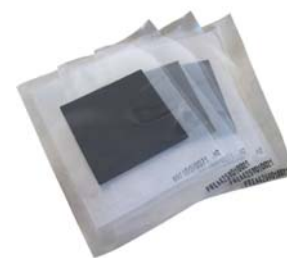
Active Area	Max. Temp.	Part No.
5cm <sup>2</sup>	120°C	SCFC5
9cm <sup>2</sup>	120°C	SCFC9
25cm <sup>2</sup>	120°C	SCFC25
50cm <sup>2</sup>	120°C	SCFC50
100cm <sup>2</sup>	120°C	SCFC100
5cm <sup>2</sup>	180°C	SCFC5H
9cm <sup>2</sup>	180°C	SCFC9H
25cm <sup>2</sup>	180°C	SCFC25H
50cm <sup>2</sup>	180°C	SCFC50H
100cm <sup>2</sup>	180°C	SCFC100H

## Membrane Electrode Assembly (MEA)

- active area : 25cm<sup>2</sup> (5x5cm)
- reactants : hydrogen/oxygen or air
- Pt charge anode/cathode : 0.2/0.4mg/cm<sup>2</sup>
- gas diffusion layers included, hot bonded to MEA
- subgasket included for easy handling
- formulated for testing under dry conditions  
(no external humidification of reactant gases)
- external size : 92 x 72mm (cut to fit ClearPak dimensions)
- cell temperature : 70°C

### Ordering Guide

pcs/pk	Part No.
2	MEA2
5	MEA5
10	MEA10





# Faraday Cage

The Faraday cage, Farad2, is an essential item for electroanalytical experiments. It is well designed to block out external EMI noise and firmly enclose all the components of electrochemical cell (electrodes, vials, etc.). The spacious interior allows you to set up electronic components or systems easily.



## Specifications

Material	
Exterior	powder-coated steel
Interior	powder-coated steel with Teflon®-coated bottom
Window	fine SUS mesh embedded in acryl plates
Access	
Number of holes	2
Size	30mm dia.
Position	right hand side and back side
Dimensions	
Overall	318 x 311 x 409mm(WxDxH)
Window	100x300mm(WxH)

All specifications are subject to change without notice.

## Ordering Guide

Faraday cage	Farad2
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# Black Box

The black box, BB series, are designed for photo- and spectro-electrochemical experiments. It features a spacious interior which can easily hold various-sized instruments.



Black Box, BB1



Black Box, BB1S

## Specifications

Dimensions	
BB1	603x300x330mm(WxDxH)
BB1S	297x245x250mm(WxDxH)
Material	
	powder-coated steel 1.2mm thickness
Access	
Number of holes	2ea, 40mm dia.
Position	
BB1	bottom, both sides
BB1S	both sides

All specifications are subject to change without notice.

## Ordering Guide

Black box, standard size	BB1
Black box, compact size	BB1S



## Pt Plate Electrode

The Pt plate electrode is made up with a supporting rod with a suitable sized piece of Pt foil or Pt mesh at the end. The rod is shielded by a glass tube. This Pt electrode can be served as working electrode or counter electrode.



### Specifications

Pt foil / Pt mesh	
Active area	1cm <sup>2</sup> , 4cm <sup>2</sup> , 5cm <sup>2</sup> , 9cm <sup>2</sup> , 16cm <sup>2</sup> , 25cm <sup>2</sup> depending on model
Pt plate thickness	0.2mm
Pt mesh	80 mesh
Rod	
Material	stainless steel
Isolated glass tube	6mm dia.
Length	250mm(rod + contact pin) exclusive Pt foil / Pt mesh part

All specifications are subject to change without notice.

### Ordering Guide

active area	Pt plate / Pt mesh
1cm <sup>2</sup>	PFL1 / PFL1M
4cm <sup>2</sup>	PFL4 / PFL4M
5cm <sup>2</sup>	PFL5 / PFL5M
9cm <sup>2</sup>	PFL9 / PFL9M
16cm <sup>2</sup>	PFL16 / PFL16M
25cm <sup>2</sup>	PFL25 / PFL25M

## Pt Gauze Electrode

The Pt gauze electrode is normally used for a bulk electrolysis experiment which requires large surface area working electrodes in order to increase the rate of electrolysis. It is a cylinder 50 mm high and 40 mm diameter with a 50 mm connecting wire.



### Specifications

Material	Pt
Cylinder	
Diameter	40mm
Height	50mm
Pt wire diameter	0.5mm
Mesh	50
Connecting wire	
Length	50mm
Diameter	1.0mm

All specifications are subject to change without notice.

### Ordering Guide

Pt gauze electrode	PGE
--------------------	-----

## Universal Electrode Holder

The universal electrode holder, UEH1, is designed to hold various sizes of electrode. The UEH1 has 4 holes to hold electrodes and three of them have a screw to adjust its hole size. The hole size is available from 1.6mm to 10mm. The material of plate is Teflon®, which has high resistance to chemicals and its white color helps user to recognize a tiny change of samples during experiments.

### Specifications

Holes	
Number of holes	4
Hole size	1.6mm dia. x 1ea 6.2mm dia. x 1ea 9.6mm dia. x 1ea 10mm dia. x 1ea
Thickness	0.2mm
Rod	
Material	stainless steel
Isolated glass tube	6mm diameter
Length	220mm

All specifications are subject to change without notice.



Universal electrode holder, UEH1,  
with optional electrodes and glass vial

### Ordering Guide

Universal electrode holder	UEH1
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## Flat Specimen Holder

The FSH series are sample holders to accommodate flat specimens.

- Pyrex® tube : 6.3mm dia.

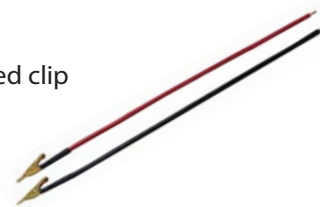


### Ordering Guide

Flat Specimen Holder	FSH2
Active area : 11.28mm dia.	
Sample size : 15.5mm~22mm dia. / 0.3~5.8mm thickness	
Flat Specimen Holder	FSH15
Active area : 15mm dia.	
Sample size : 18.5mm~25mm dia. / 0.3~5.8mm thickness	

## Specimen Holder

- copper rod with Au or Cu plated clip
- length : 25cm

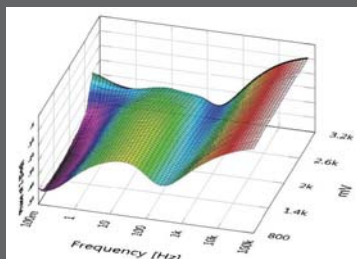


### Ordering Guide

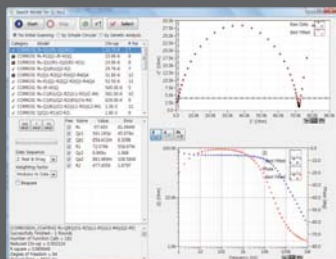
Cu rod with Au plated clip	CUAU
Cu rod with Cu plated clip	CUCU

## EIS Data Analysis Software, ZMAN™

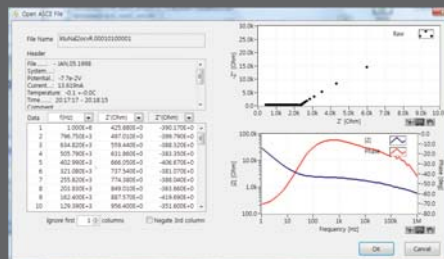
- model simulation and fitting
- 2D- and 3D-Bode- and Nyquist plots
- automatic equivalent circuit model search function
- project concept to handle multiple EIS data analysis
- parameter plot from fitted elements value
- compatible with data format from Zahner, Gamry, Ametek etc. (License code is needed)
- various weighting algorithm
- model library and user model
- KK plot
- batch fitting for project data
- impedance parameter simulation
- interpolate bad data
- Black-Nichols plot
- 3D graph setting option
- improved model editor
- application model library for automatic searching
- parameter simulation of model
- genetic algorithm option for initial guessing
- automatic initial guessing
- trace movie function on fitting
- free for ZIVE's data format(\*.seo, \*.wis) analysis (no license code required)
- circle fitting
- data editing available (insert, delete, edit)
- add/subtract element parameters
- add/subtract model parameters
- impedance, Z in polar, admittance, Y in Polar, modulus, M in polar, dielectric constant, E in polar. data display
- empty cell capacitance calculation
- find file function
- data replacement by formula function
- cursor data display
- model finding result automatic sorting by Chi square value
- R, C R, L R, Q preview & graphic
- ZHIT function
- Mott-Schottky analysis
- donor density vs. Vfb graph
- C vs. voltage graph



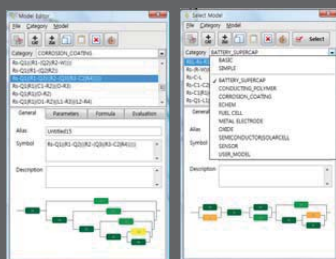
3D Bode plot for series measurement



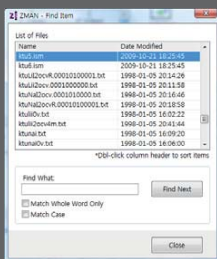
Automatic model searching



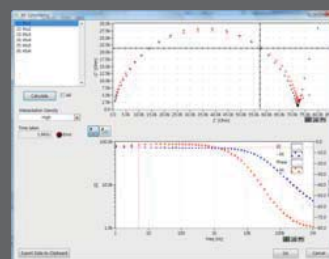
Importing 3rd parties ASCII data file



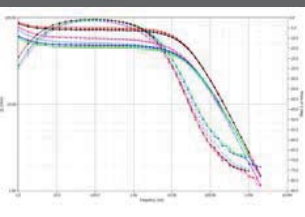
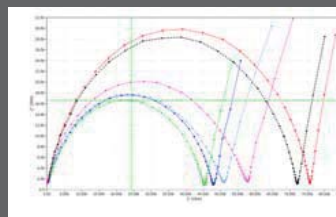
Model editor & model library



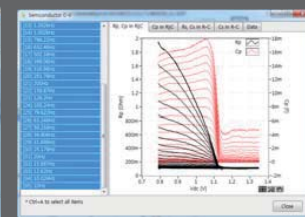
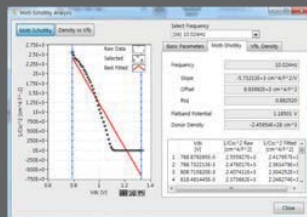
Finding data file menu



KK consistency



Mott-Schottky analysis window



C/R-V graph

# Software

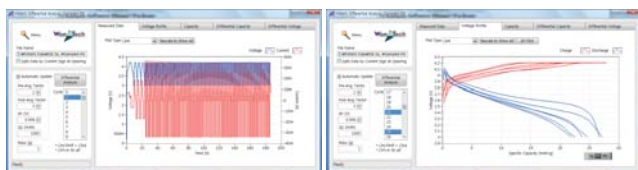
## DC Data Analysis Software, IVMAN™

IVMAN™ software package consists of

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

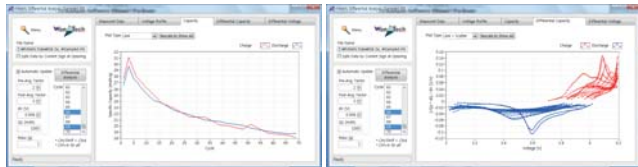
### IVMAN DA™ Battery Test Data Analysis Software

- 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)



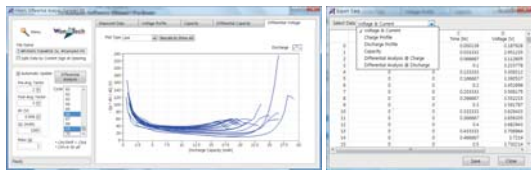
Measured data

V vs. Q



Cycle graph

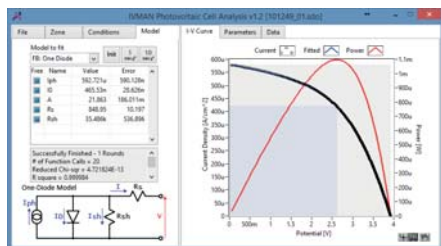
dQ/dV vs. V



dV/dQ vs. Q

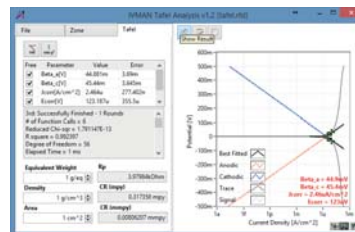
Export ASCII file

### IVMAN™ Photovoltaic Cell Analysis



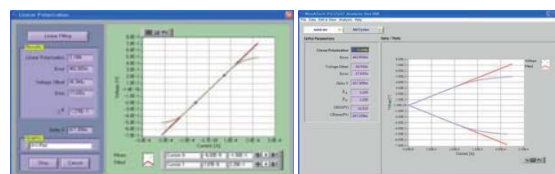
### IVMAN TA™ Tafel Analysis

- Simple Tafel calculation



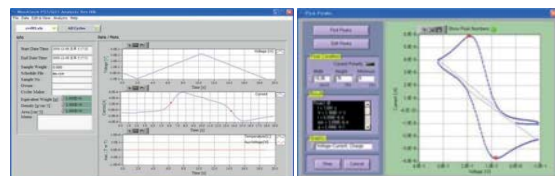
### IVMAN™ Main Software

- Ideal for DC corrosion data analysis and electro-analytical data analysis
- Initial guessing function on Tafel analysis etc.



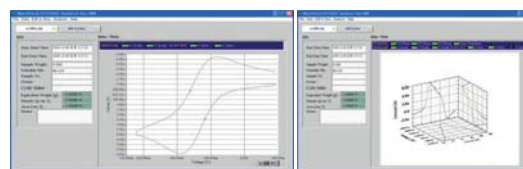
Polarization resistance fitting

Polarization analysis result



Time graph

Find peak menu



CV graph

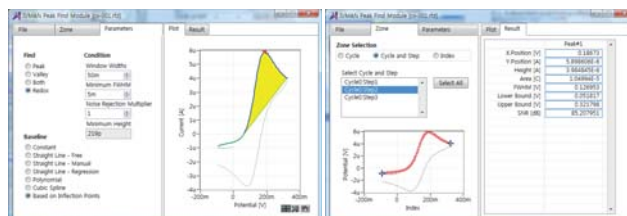
3D graph

### IVMAN EX™ Extractor

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

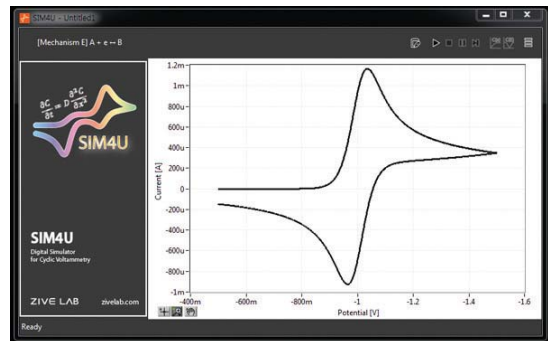
### IVMAN PF™ Peak Find Module

- Independent peak finding software



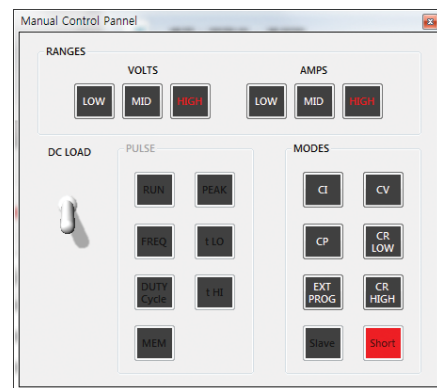
## Simulation Software for Cyclic Voltammetry, SIM4U Freeware

- single or multiple charge transfer steps and first and second-order chemical steps can be used
- cyclic voltammetry method is used for simulation
- 1D simulation of semi-infinite diffusion processes is used
- the pre-equilibrium can be applied before simulation
- the effect of uncompensated resistance and double layer capacitance can be simulated.
- measured data and simulated data can be seen together in the plot



## Dynaload Control Software, LoadRunner

- TDI's dynaload control software
- via IEEE488 & RS232C
- for TDI model RBL488, XBL series
- virtual front panel operation
- schedule file operation
- real time graphic
- excel file conversion
- GPIB card & cable is needed for IEEE488 interface



## Ismatec Pump Control Software, Solution Mixer

- MeOH concentration control for DMFC test
- control mixing pumps(Ismatec's Piston Pump) to generate target concentration
- automatic pump and pump head identification
- simple set-up & easy control
- setting parameters: concentration, flow rate, & dispensing volume



*Designing the Solution for Electrochemistry*



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