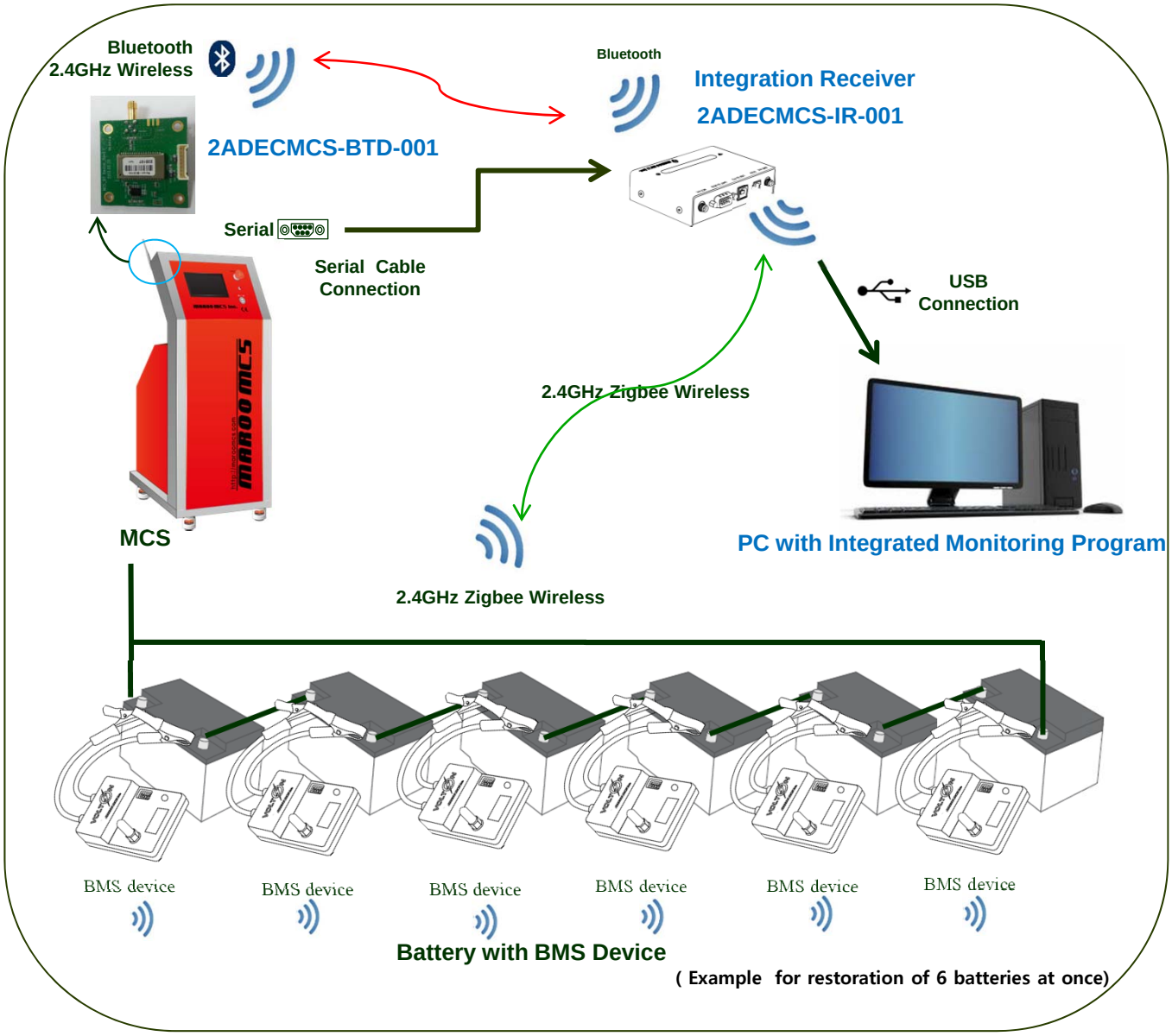
Chapter 1. Battery Management System

1-1 SYSTEM DIAGRAM

Through Battery Management System(BMS) the progress of battery restoration or discharge can be figured out. It is consist of BMS Device, Integration Receiver and Integrated Monitoring Program.
This chapter will be described about BMS Device and Integration Receiver. The next chapter will be described for Integrated Monitoring Program.

[SYSTEM DIAGRAM]



1-2 FCC Certification Requirements

Caution: Any changes or modifications in construction of this device which are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occurin a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

1-2 FCC Certification Requirements

WARNING: This equipment may generate or use radio frequency energy. Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made.

This device complies with Part 15 of the FCC rules. Operation is subject to following two conditions: 1. this device may not cause harmful interference and 2. This device must accept any interference received including interference that may cause undesired Operation of this device.

The changes or modifications not expressly approved by the party responsible for Compliance could void the user's authority to operate the equipment.

To comply with the FCC RF exposure compliance requirements, this device and its antenna must not be co-located or operating to conjunction with any other antenna or transmitter, except if installed in compliance with FCC Multi Transmitter procedures.

To inherit the modular approval, the antennas for this transmitter must be installed to provide a separation distance of 20cm from all persons and must not be co-located or operating in Conjunction with any other antenna or transmitter.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, Pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable Protection against harmful interference in a residential installation. This equipment generates Uses and can radiate radio frequency energy and, if not installed and used in accordance With the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference, Will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an Outlet on a circuit different from that to which the receiver is connected

1-2 FCC Certification Requirements

To OEM Installer

1. FCC ID on the final system must be labeled with

"Contains FCC ID: 2ADECMCS-IR-001, 2ADECMCS-BTD-001" and

"Contains transmitter Module FCC ID: 2ADECMCS-IR-001, 2ADECMCS-BTD-001 "

2. In the user manual, final system integrator must ensure that there is no instruction provided in the user Manual to install or remove the transmitter module.

3. Transmitter module must be installed used in strict accordance with the Manufacturer's instructions as described in the user documentation that comes with the product. The user manual of the final host system must contain the following statements: This device complies with Part 15 of the FCC rules. Operation is subject to following

Two conditions: 1. this device may not cause harmful interference and 2. This device Must accept any interference received including interference that may cause undesired operation of this device.

The changes or modifications not expressly approved by the party responsible for Compliance could void the user's authority to operate the equipment.

To comply with the FCC RF exposure compliance requirements, this device and its antenna must not be co-located or operating to conjunction with any other antenna or transmitter, except if installed In compliance with FCC Multi Transmitter procedures.

To inherit the modular approval, the antennas for this transmitter must be installed to provide a Separation distance of at least 20cm from all persons and must not be co-located or operating in Conjunction with any other antenna or transmitter.

Note:

The buyer of the module who will incorporate this module into his host must submit the final product to the Manufacturer of the module and the MANUFACTURER OF THE MODULE WILL VERIFY that the product is incorporated in host equipment in a way that is represented by the testing as shown in the test report.

Note:

The module is used MCS System.

1-2 FCC Certification Requirements

FCC RF Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-locatedor operating in conjunction with any other antenna or transmitter.

"To comply with FCC RF exposure compliance requirements, this grant is applicable to only Mobile Configurations. The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter."

Manual Information to the End User

The OEM integrator has to be aware not to provide information tothe end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

Note:

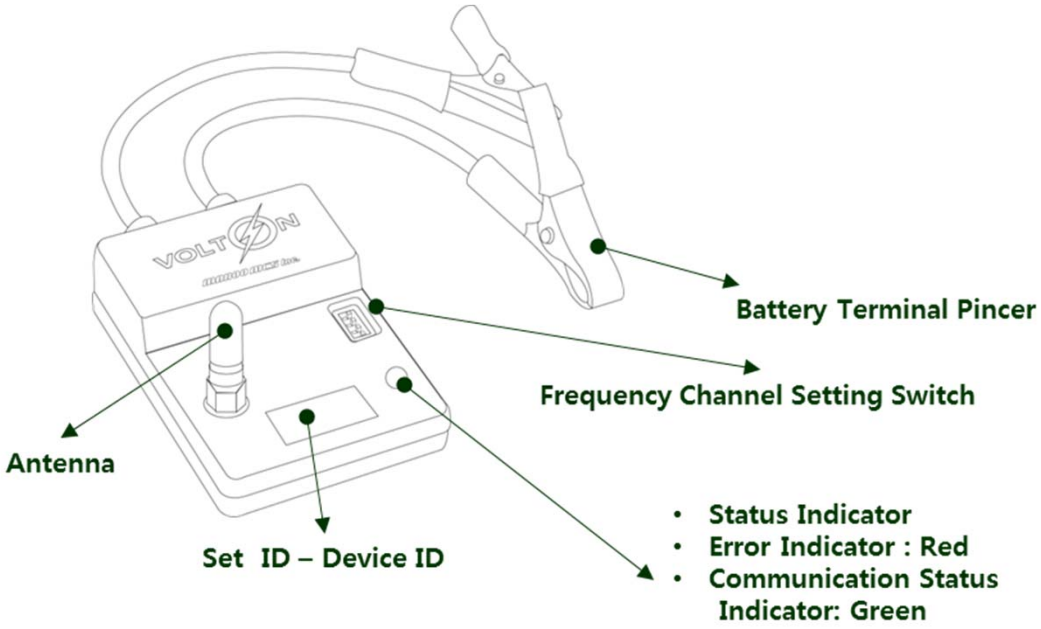
1. The module is limited to OEM installation ONLY.

2. The module is limited to installation in mobile or fixed applications.

3. Separate approval is required for all other operating configurations, including portable configuration with respect to Part 2.1093 and different antenna configuration.

1-3 BMS device(Option)

BMS Device is connected with each battery cell and used for check the progress easily when restoring more than 2 batteries. All data of BMS Device will be collected through Integration Receiver.



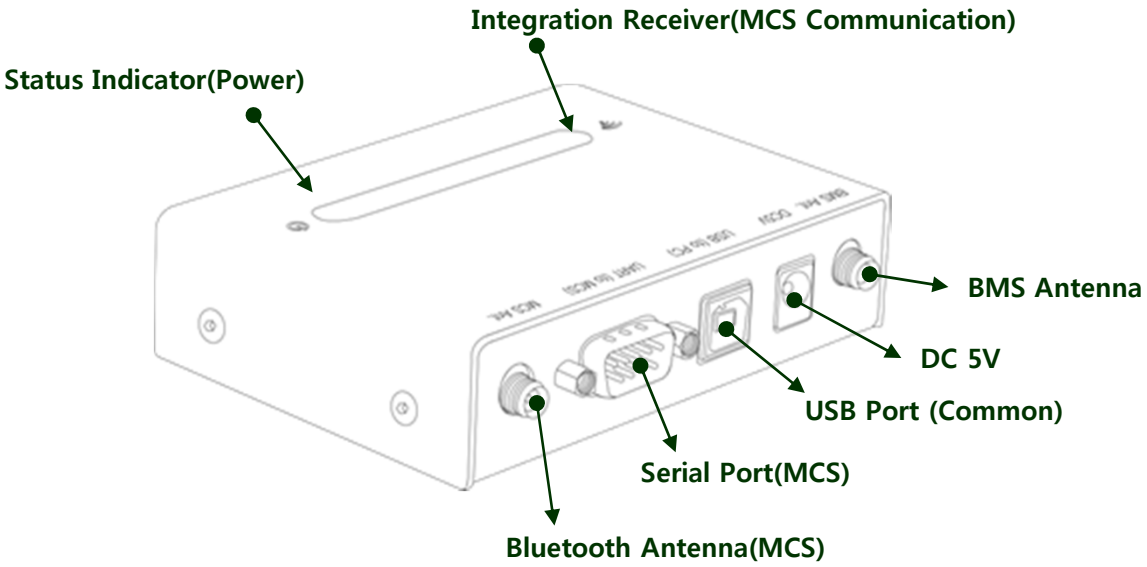
Battery Terminal Pincer	Red Terminal Pincer – Positive(+) pole Black Terminal Pincer – Negative(-) pole
Frequency Channel Switch	Frequency Channel Switch to communicate with Integrated Receiver (2.5GHz Zigbee Communication)
Set ID – Device ID	Identity of Battery
Antenna	Antenna for communicate with Integrated Receiver
Status Indicator	Communication indicator with Integrated Receiver Green ramp – success / Red ramp – Fail

1-3 Integration Receiver

Integration Receiver has 2 functions below.

1 : Send BMS data to PC via Zigbee communication

2 : MCS Control via Bluetooth or Serial communication



BMS Antenna	Zigbee Antenna to communicate Integration Receiver and BMS
DC 5V	Reserve power supply by USB automatically
USB Port (Common)	PC connection
Serial Port(MCS)	Serial communication between Integration Receiver and MCS
MCS Antenna	Bluetooth Antenna between Integration Receiver and MCS
Integration Receiver (MCS Communication)	Blue ramp when Bluetooth connected between Integration Receiver and MCS
Status Indicator(Power)	Display power supply of Integration Receiver from PC

1-4 SPECIFICATION

- 2V BMS Device and Integration Receiver

ITEM		BMS device	Integration Receiver
INPUT POWER(V DC)		2V 1.6~5V	5V
		12 7~18V	
Current Consumption (mA)		Max 150	Max 250
Communication	CPU	MG2470 (18 Bit ADC, 12 Bit DAC)	CANTUS
	Zigbee	MG2470	MG2470
	Interface	2.4GHz Zigbee RF	USB, UART
Antenna		1 dBi Dipole Antenna	4.5 dBi Dipole Antenna
Connector		Banana Jack, Pincer-Cable Ass'y)	USB, 6mm DC JACK, DB9
Inverse voltage		General Diode in a row	N/A
Dimension(W, D, H)		80 X57 X 15 mm	
PC SW	OS	Window XP, Win7	
	RAM	1 GB ~	
	Requirement	.net framework 4.0 ~	
Usage Temperature(℃)		-20 ~ 60	

Chapter 2. PC Integrated Monitor Program

2-1 Integrated Monitor Program

- PC Program, Integrated Monitor is used for these usage with Integration Receiver .

  - MCS Control
  - Simple Data management
  - Check data progress of each battery (Option: when using BMS Device)

- Apply Integrated Monitor Program to control MCS, BMS Device

  ① Control MCS only
  ② Control BMS Device only
  ③ Control MCS and BMS Device together during discharge

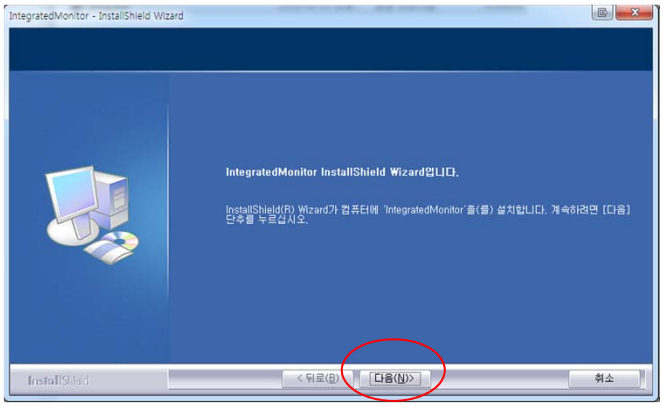
Through PC Monitor Program it is possible to control MCS efficiently and save Log file at PC.

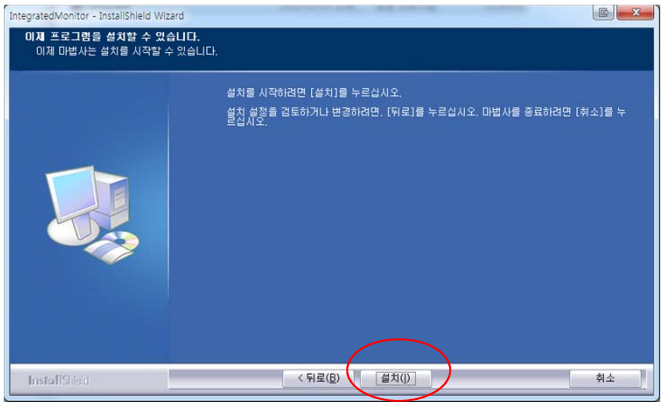
Chapter 2. PC Integrated Monitor Program

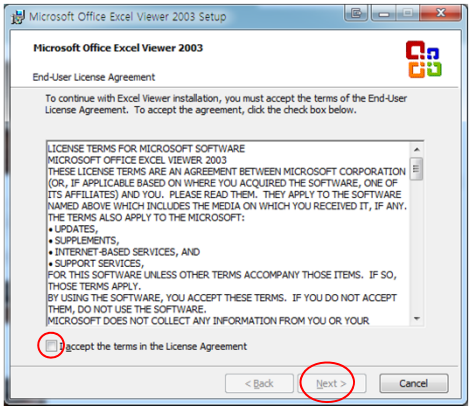
2-2 Program Installation and Start

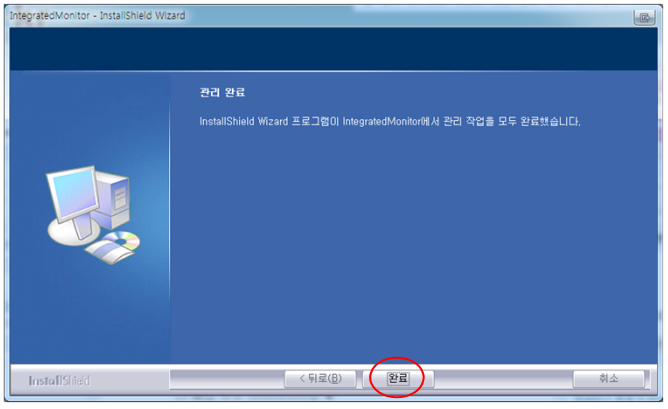
- **Installation**

- **Installation program, “Setup. exe” is included in CD provided with MCS.**









- **Create Icon “Integrated Monitor” at wallpaper**

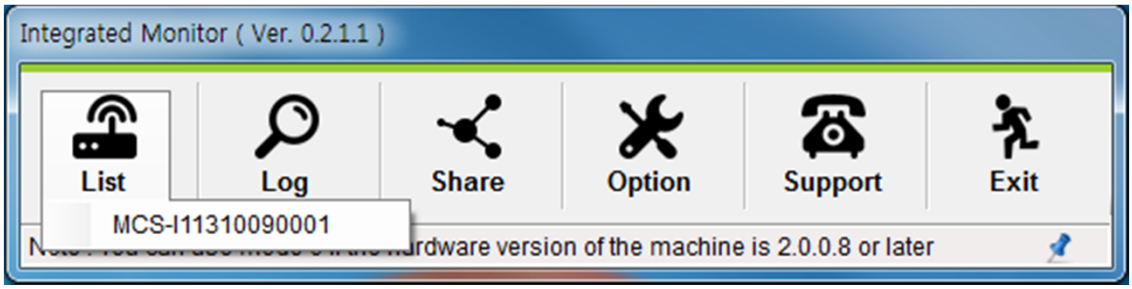
Chapter 2. PC Integrated Monitor Program

2-2 Program Installation and Start

- **Main Window**

Connect with Integrated Receiver

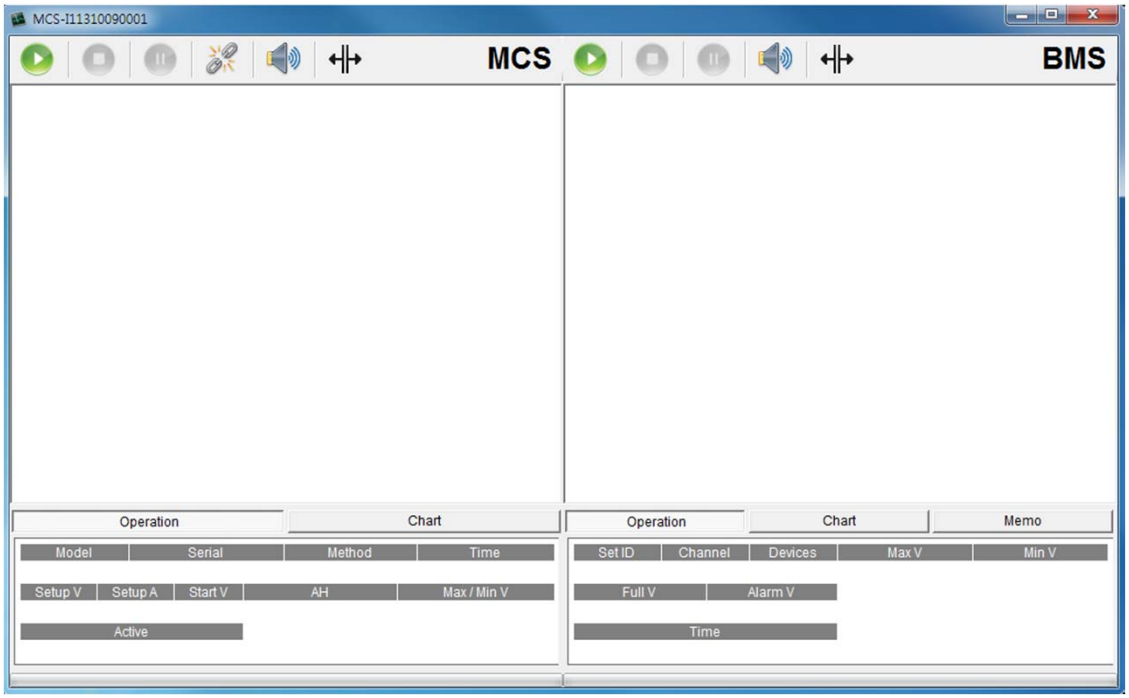
Before using BMS, please connect integrated receiver first.
Click the list button, and choose the product number of integrated receiver.



Chapter 2. PC Integrated Monitor Program

2-2 Program Installation and Start

- **Control Window**



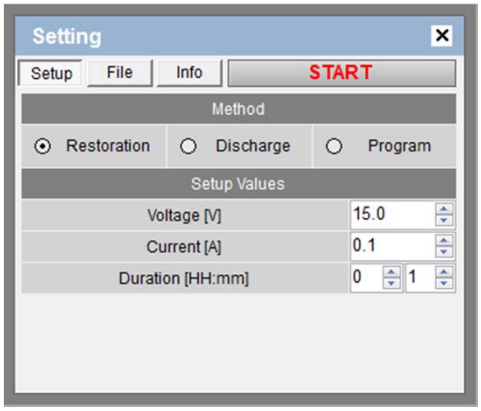
- **Left panel : MCS , Right panel : BMS**
- **Bottom Box : operation information**
- **Top Buttons : Start , Stop, Pause, Sync, Enable Sound, Split Button**

Integration Server is connected with MCS one on one.

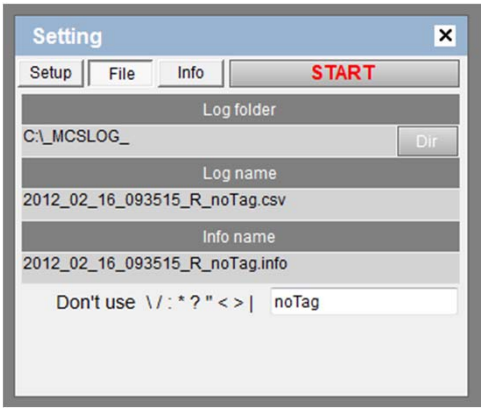
2-2 Operate

● Operate MCS

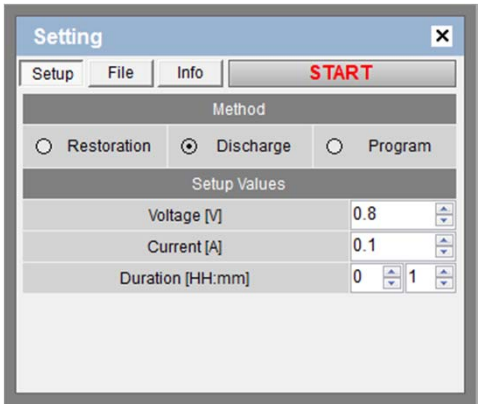
⑩ **Pop up window for setting. → Click "start" after input setting data.**



[Manual-Restoration Setting]



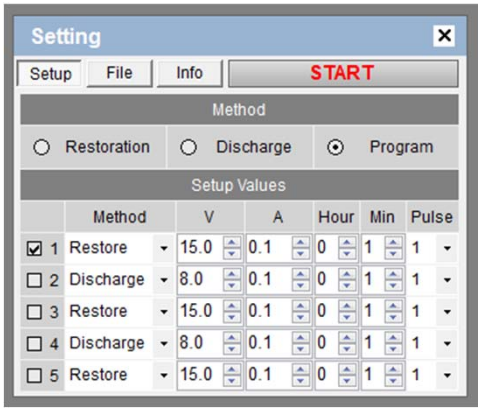
[Set Folder to save Log file]



[Manual-Discharge Setting]

[Tip]

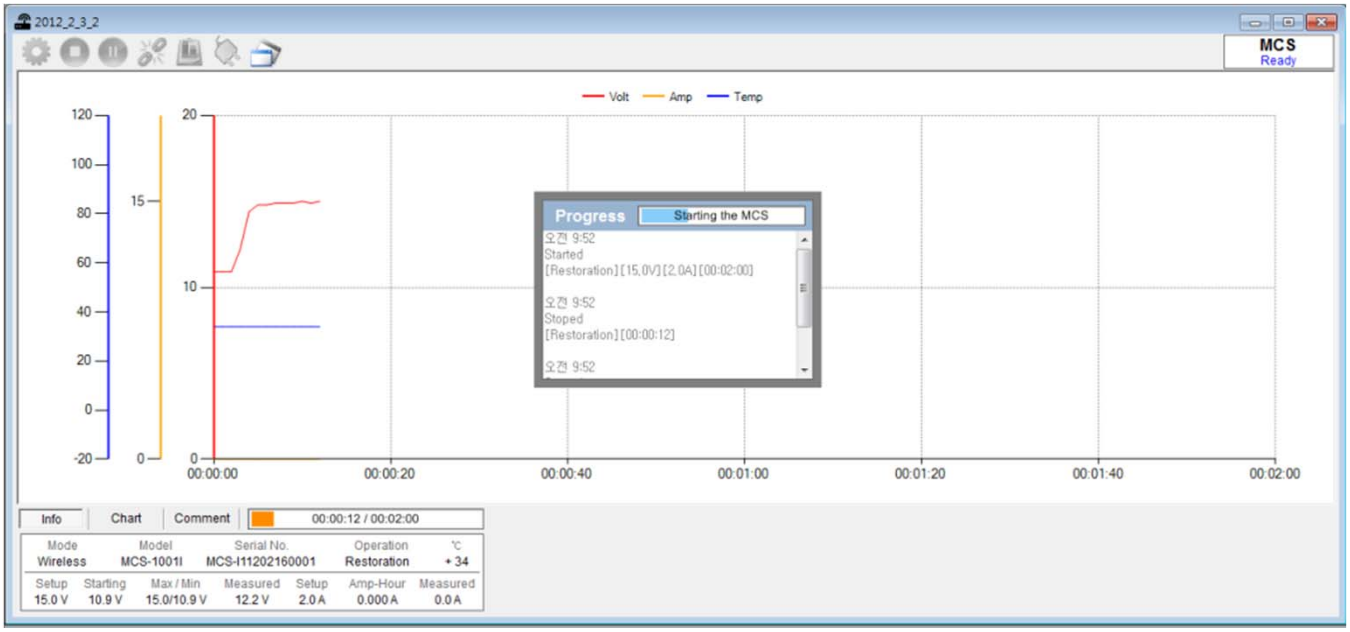
Tag will help you to find Log File saved.

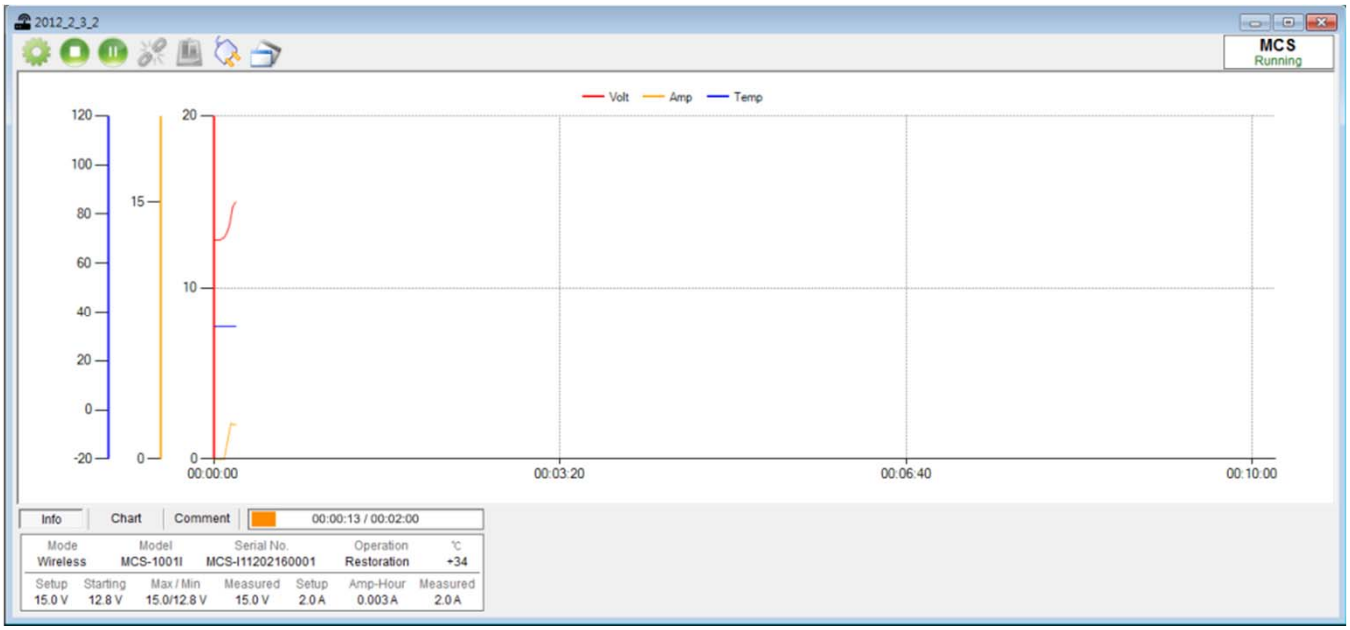


[Program Setting]

2-2 Operate

- **Operate MCS**





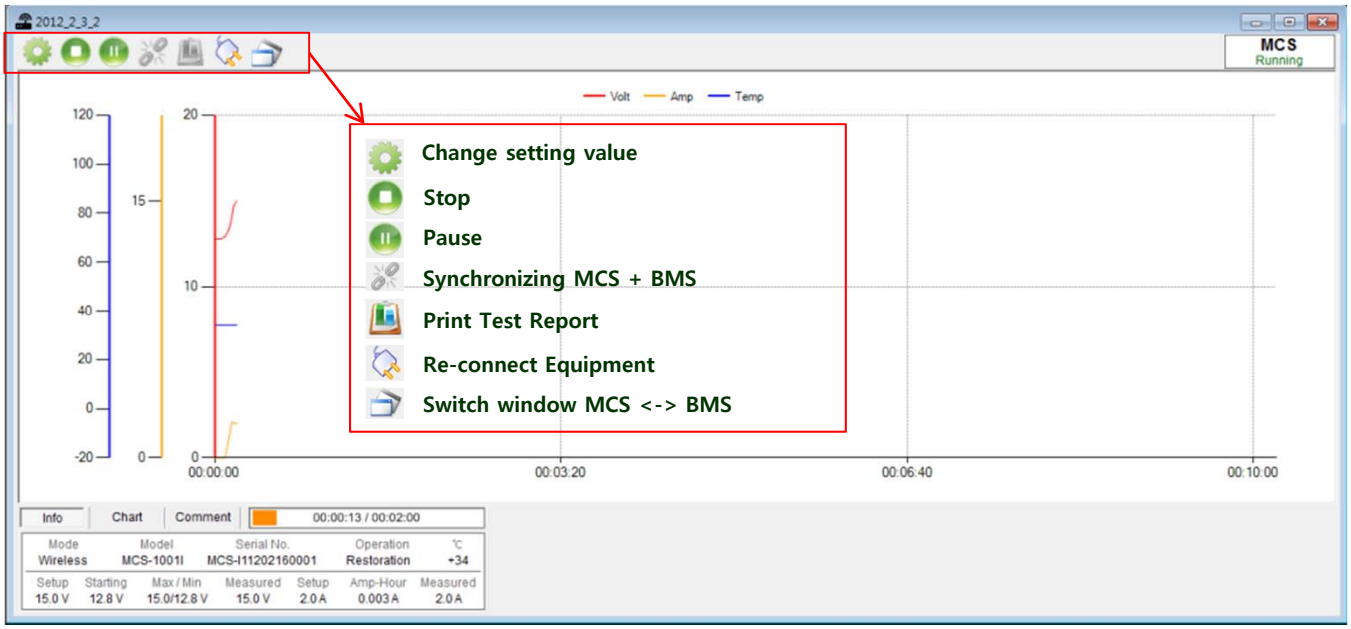
[Example for progress of MCS]

Chapter 2. PC Integrated Monitor Program

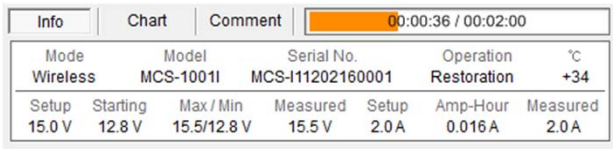
2-2 Operate

● Operate MCS

❖ Description of the top menu of progress mode

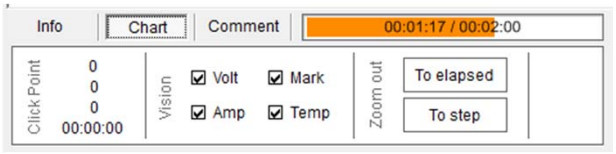


❖ Description on the bottom menu



- Information of MCS and operation

- Comment on Log file
  →Take a note, and Click Save
- When you bring the Log file you can find the note in [Comment].



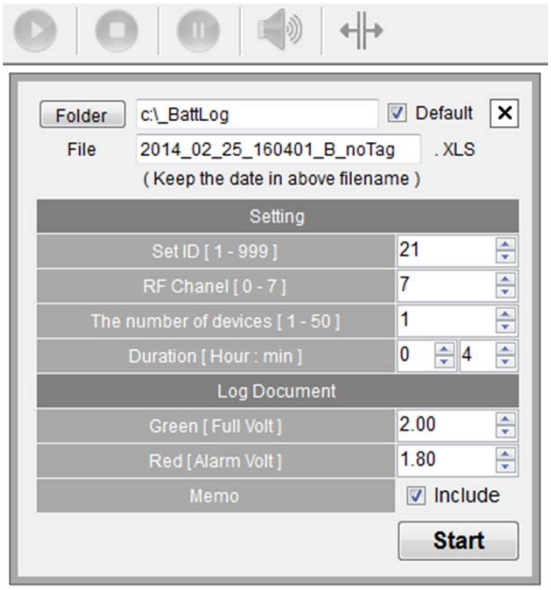
- Check Point : Check voltage, current, temperature, time on the check point
- Choose items to be shown on Graph
- To elapsed : Reduce graph by elapsed time
- To step : return to previous range

Chapter 2. PC Integrated Monitor Program

2-2 Operate

- **Operate BMS**

This popup will be shown after clicking start button. This is setup for starting.



- Set ID (1~999) – input same amount as device label.
- RF Channel (0~7) – input same as set frequency channel of device.

(Refer to the BMS operation page)

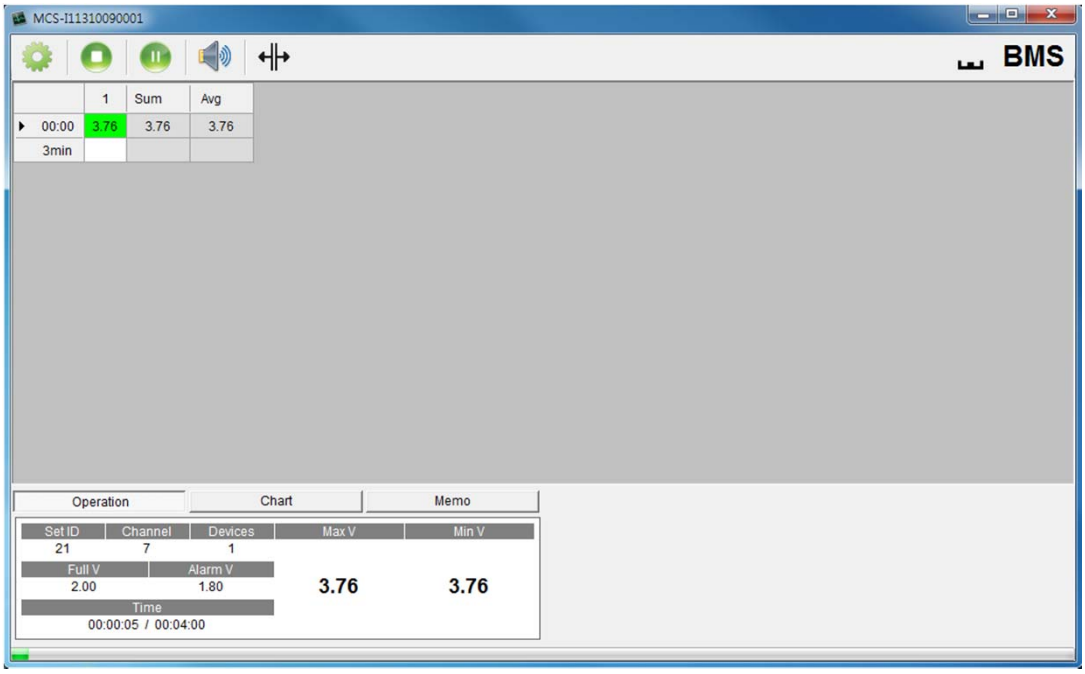
- The number of BMS cell (1~50) – how many devices connect with batteries.
- Green (Full voltage) – full voltage of battery that will be monitored.
- Red (Battery voltage) – under satisfied voltage of battery that will be monitored.
- Duration (MAX 10hours) – monitoring operation hour
- Memo – function of memo activated

Chapter 2. PC Integrated Monitor Program

2-2 Operate

- **Operate BMS**

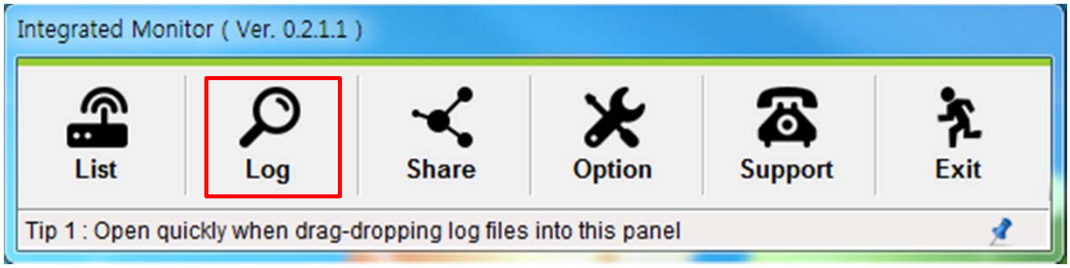
This is the screen of BMS operation. If it reaches of setting hour of press the stop button, the monitoring program is finished and save the log-file.



- the space is added every 3 minutes
- added space shows cell voltage.
- if the added space shows under set voltage, alarm rings.

2-3 LOG

- **Open a Log File**

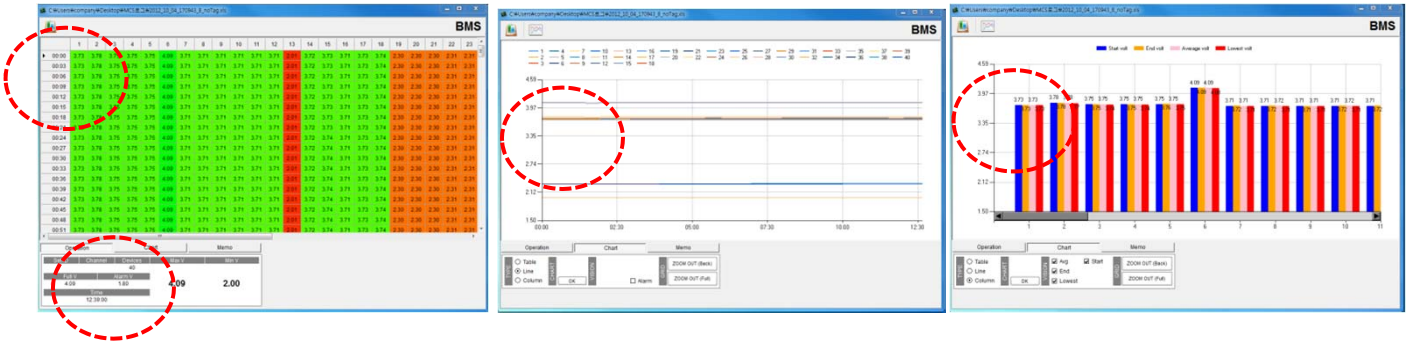


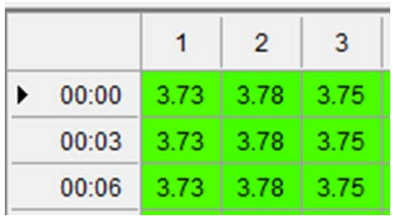
- Log file show the details of existing operation in short time.
- Issuing and printing Test Report for customer
- Understand the history of MCS operation

Chapter 2. PC Integrated Monitor Program

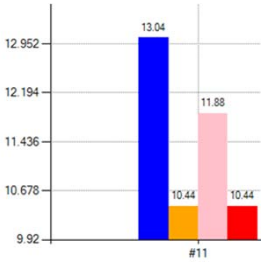
2-3 LOG

- **Analyzing chart**

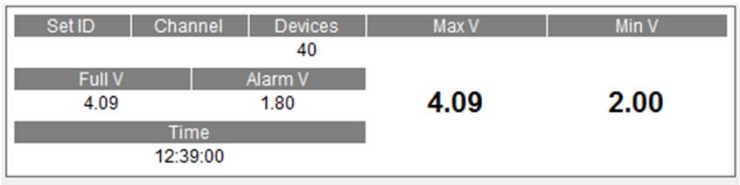




Column – Cell number
Line – Operation time
Number - Voltage
Green - Good volt.
Red - Bad volt.

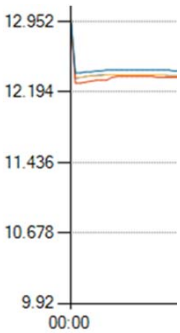


Y-axis - Voltage
Blue – start voltage
Orange – final voltage
Pink – average voltage
Red – minimum voltage



Time – total operation hour
Max V – maximum voltage during operation
Min V – minimum voltage during operation

TYPE – Change the chart shape (table, line, stick)
CHART – Full Volt, Alarm Volt setting change
Color – color sign activated

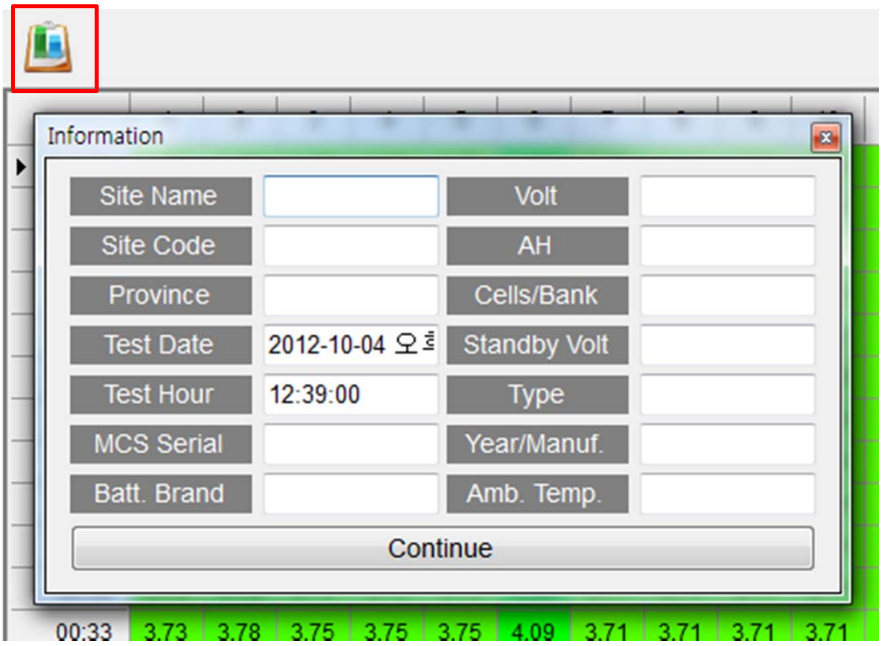


Y-axis - Voltage
X-axis - Time

2-3 LOG

- **Print a log file**

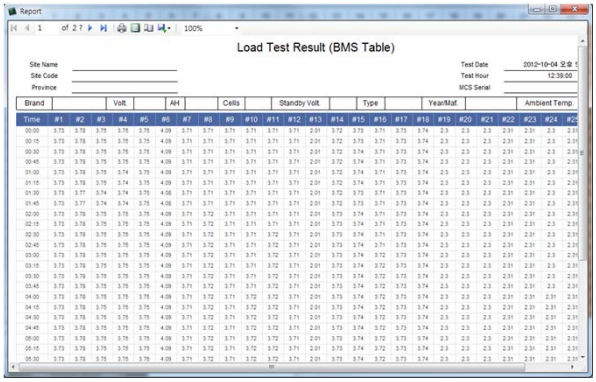
Click the left-top button for printing and fill in basic information.



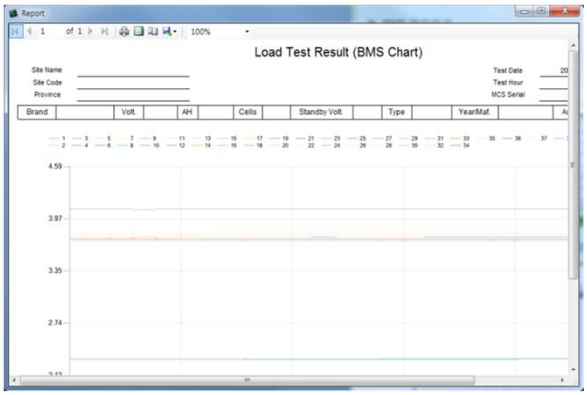
Chapter 2. PC Integrated Monitor Program

2-3 LOG

- **Print paper type**



- **Table Chart**



- **Line Chart**

- **Table Chart**