FSIP ELECTRONICS
A division of TVH

Operation Manual



For more information or technical assistance, please call us toll-free 1-800-333-1194 or visit us online at shop.fsip.biz

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Key Characteristics of Xtender Machines

The Xtender Regenerator is a newly developed device for the regeneration of Lead-Acid Batteries using electric properties with the new concept of IT convergence technology.

The Xtender is an economic and eco-friendly "Green Energy" product which efficiently regenerates used batteries without the use of ecologically harmful chemicals or necessitating disassembly of batteries.



① IVI Charge system (constant current , constant voltage, constant current) with high-performance & high-efficiency.

② Discharge through technology of smart current control and inversion.

③ Easy program application (5 steps of modes for charge/discharge with max operation time of 99H:59M)

④ Six (6) scenario patterns can be applied according to performance degradation of used batteries.

⑤ Test results & VI Graphs show the full process of operation and final "Test Report" can be issued for clients.

⑥ 8" LCD touch screen for easy operation.

⑦ CE Certificates & worldwide patents

⑧ SD Memory Card for recording of full history & operation data. Easy automatic upgrading system through Internet.

Safety Instruction for Xtender Machines

Please be fully aware of safety instructions described in this manual to prevent any possible danger. Please note that we shall not take any responsibility or liability for any loss or damage occurred by improper operation of control. For your safety, you should read this manual before operation of this equipment.

<DANGER> Danger indicates an extremely hazardous situation. If not observed and avoided, will result in death or serious injuries.

<WARNING> Warning indicates a hazardous situation. If not observed and avoided, could result in death or serious injuries .

<CAUTION> Caution indicates a hazardous situation. If not observed and avoided, could result in minor, moderate injuries or property damage.

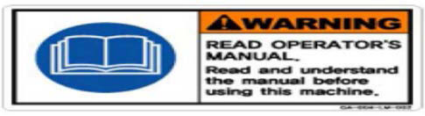
DANGER
DANGER

WARNING
WARNING

CAUTION
CAUTION







Safety Instruction for Xtender Machines

Please be fully aware of safety instructions described in this manual to prevent any possible danger. Please note that we shall not take any responsibility or liability for any loss or damage that occurs due to improper operation of controls. For your safety you should read this manual before operating the equipment.

DANGER

DANGER

① **Make sure that electric power supply matches the units specification and capacity first. Check the cables before connecting the power supply.**

② **Before connecting cables to power supply, you should ground in accordance with your local safety regulation.**

③ **Before contact with interface ports, make sure that power supply is not connected.**

④ **Before inspecting the Xtender for maintenance or repair, first shut off power supply and wear safety gear in order to avoid risk of hazardous electric shock.**

⑤ **While equipment is running or connected with power supply, any contact with physical or conductive material and interior parts of the machine are strictly prohibited.**

⑥ **Sulfuric acid is a highly corrosive substance and could result in burn injury. Don't attempt to touch or drink electrolyte.**

⑦ **Install the units in an area with adequate air flow.**

⑧ **Do not allow impact to batteries during charging or discharging.**

Safety Instruction for Xtender Machines



WARNING

CAUTION

① **Physical contact may result in death or serous injury because high voltage current flowing inside the units. While operating or while connected to power supply, any contact with internal parts is strictly prohibited.**

② **For your safety please wear safety gear while the units are in use. Check for loose and bad connections regularly to protect your safety.**

③ **Don’t attempt to disassemble or modify the units at your own discretion. Unauthorized modification or abnormal operation of unit could result in serious injury or property damage.**

④ **Be sure to turn off power supply before working on, repairing or maintaining the equipment in order to avoid risk of hazardous electric shock.**

⑤ **Ensure that the cooling vents on each side of the unit have at least 20 cm (approx. 8”) distance from the wall or other materials. Malfunction of the cooling system can cause damage to the unit.**

Safety Instruction for Xtender Machines



CAUTION

CAUTION

① Install the unit on a flat surface without any slope. Make sure to keep the unit fastened and fixed using the castors mounted on the bottom of the unit.

② Running excessively high or low voltage in the unit could cause a malfunction or damage to the unit.

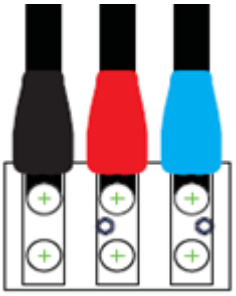
③ Charge or Discharge using proper Voltage and Ampere per the specification and condition of battery.

④ Keep the unit clean, and vacuum the ventilation area regularly. Dust or dirt on the ventilation will reduce the cooling capacity and cause the performance degradation of the unit.

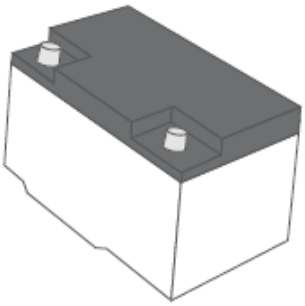
⑤ Never try to restore or discharge frozen batteries.

⑥ Operation of the unit including restoration and discharge should be performed in open space with adequate flowing air.

Check List Before Xtender Operation



When you connect the Xtender to the power supply, make sure that power cords follow the local safety regulations exactly.



Always check the condition of batteries before performing a Restoration or Discharge.

Cracked, damaged or frozen batteries are strictly prohibited to Restore or Discharge using the Xtender.



Do not attempt to disassemble, modify or repair the unit on your own unless instructed otherwise and guided clearly in operation manual. It can cause electric shock or malfunction of the machine. It may also void any warranties. Any damage or removal of the stickers attached on unit may void any warranties and make servicing the machine very difficult.

Safety Instruction During Operation

① **Do not disassemble the unit.**

② **Only use it for its intended purpose. It is strictly prohibited to use the Xtender for any other purposes.**

③ **Avoid using in extremely high or low temperatures, dusty, dirty areas or in high humidity conditions.**

④ **Keep the unit out of direct sunlight.**

⑤ **Do not scratch or impact the surface of the unit using any solid materials.**

⑥ **Do shut off the power to the unit before moving the unit.**

⑦ **ONLY connect Lead Acid Batteries.**

● Safety Instruction During Operation

◆ WEAR PROTECTIVE GOGGLES

The battery contains explosive gas, and a risk of explosion. Be sure to wear protective goggles or a face mask for your safety when you operate or work on the Xtender.

◆ USE OF FIRE STRICTLY PROHIBITED

There is a risk of explosion when batteries are exposed to extreme heat. Do not allow any fire such as lighters, cigarettes, or welding machines near them and do not make spark during the operation of the machine.

◆CAUTION OF SULFURIC ACID

Batteries contain strong corrosive sulfuric acid. It can cause lose of eyesight, burns to the skin or damage to clothing. Wear protective goggles and rubber gloves to prevent dangerous accidents in advance.

◆ CHILDREN PROHIBITED

Due to the risk of explosion and physical damage caused by the sulfuric acid, children should be prohibited from entering the designated area the Xtender is used in.

Please be fully aware of safety instructions of this manual to prevent any possible danger during operation.

● Safety Instruction During Operation

◆ **REMOVE ALL ELECTROSTATIC OBJECTS AROUND THE BATTERY**

Batteries generate hydrogen gas with a risk of explosion. Move any objects producing static electricity away from the battery. It can cause an explosion by spark or static from the heat or a short circuit when you cover the batteries with vinyl or metal substances.

◆ **DO NOT USE OVER CAPACITY OR FOR OTHER THAN INTENDED PURPOSE**

In the case of using the battery over its capacity or for other than its original purpose, batteries could be damaged or explode. It could also cause the leaking of sulfuric acid which could result in a loss of eyesight or a skin burn or damage to the Xtender.

◆ **AVOID USING IN WET AREA**

Water can cause a fire as a result of a short circuit and high humidity can damage the battery.

◆ **DO NOT IMPACT OR SLANT THE BATTERIES MORE THAN 45° TILT**

The leaking of electrolyte when impacting, slanting or overturning the batteries can cause sever damage.

Please be fully aware of safety instructions in this manual to prevent any possible danger during operation.

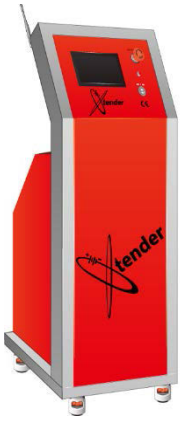
Emergency Treatment Recommendation

◆ IN AN EMERGENCY

If any accident happens with the electrolyte, it could lead to a fatal injury. If the electrolyte gets into your eyes, you should clean your eyes with water several times and visit an eye doctor. If it gets into your mouth, you should rinse your mouth out and brush your teeth several times. In case you swallowed it, you should drink lots of water and seek medical care as soon as possible. If it stained your skin or clothes, you should wash with the plenty of fresh water. If there are abnormal symptoms like a skin burn, seek medical care.

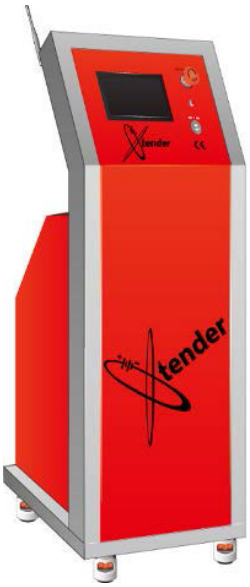
Please be fully aware of safety instructions in this manual to prevent any possible danger during operation.

Xtender™ Line-Up



Model	93-M1001
Input Power	AC 1PH, 220V, 50/60Hz
Output	1.2V ~ 100V, 0A ~ 30A
Battery Volume	300 AH
Transformer	7.5 kW

Model	93-M1005
Input Power	AC 3PH, 220V or 380V, 50/60Hz
Output	1.2V ~ 120V, 0A ~ 50A
Battery Volume	500 AH
Transformer	10 kW



Model	93-M1007
Input Power	AC 3PH, 220V or 380V, 50/60Hz
Output	1.2V ~ 150V, 0A ~ 100A
Battery Volume	1,000 AH
Transformer	20 kW



Model	93-M1009
Input Power	AC 3PH, 220V or 380V, 50/60Hz
Output	1.2V ~ 75V, 0A ~ 300A
Battery Volume	3,000 AH
Transformer	50 kW

Xtender Accessories

No.	Photo	Description	Qty	Xtender Model
1		Output Cable 1	1	93-M1001 93-M1005
2		Output Cable 2	1	93-M1007 93-M1009
3		Output Cable 3	1	93-M1007
4		Output Cable 4	1	93-M1007 93-M1009
5		Output Cable 5	1	93-M1007
6		Output Cable 6	1	93-M1009

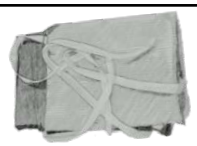
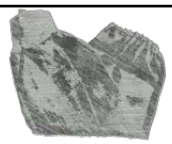
Accessories provided are subject to change without prior notice for safety or inventory.

Xtender Accessories – Popular

No.	Photo	Description	SPEC	Qty	Xtender Model
7		Temperature Sensor	PT100/2.5m	1	common
8		Serial Cable	Xtender to Router	1	common
9		Xtender Router		1	common
10		USB Cable	Router to PC	1	common
11		Server Ant.	2.4GHz	2	common
12		Xtender Ant.	2.4GHz	1	common
13		SD Card	2G	1	common
14		SD Card Reader		1	common
15		Key		1	common

Accessories provided are subject to change without prior notice for safety or inventory.

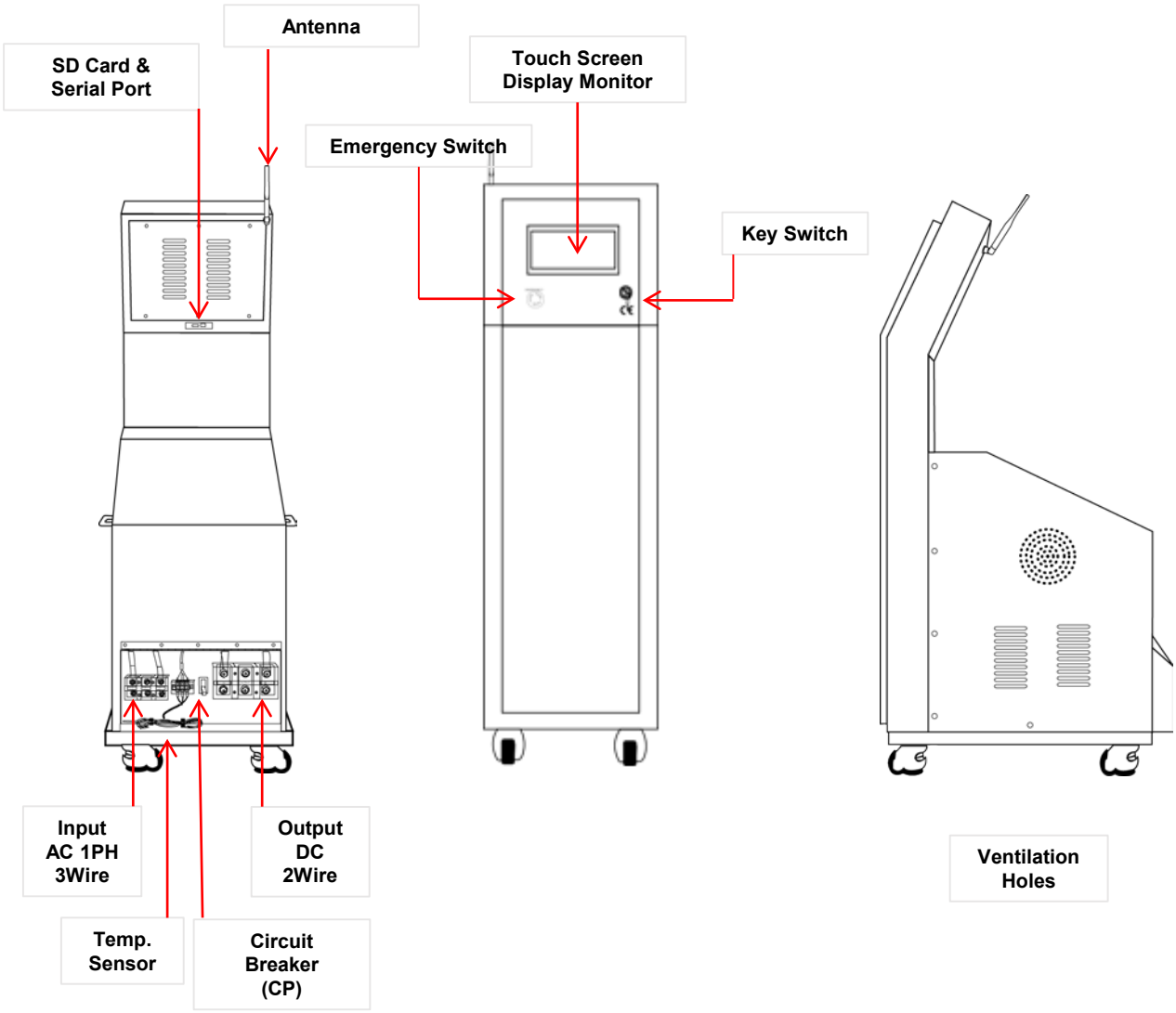
Xtender Accessories – Popular

No.	Photo	Description	Qty	Xtender Model
16		Gloves	1	common
17		Apron	1	common
18		Arm Cover	1	common
19		Face Shield	1	common

Accessories provided are subject to change without prior notice for safety or inventory.

Machines – Name & Functions

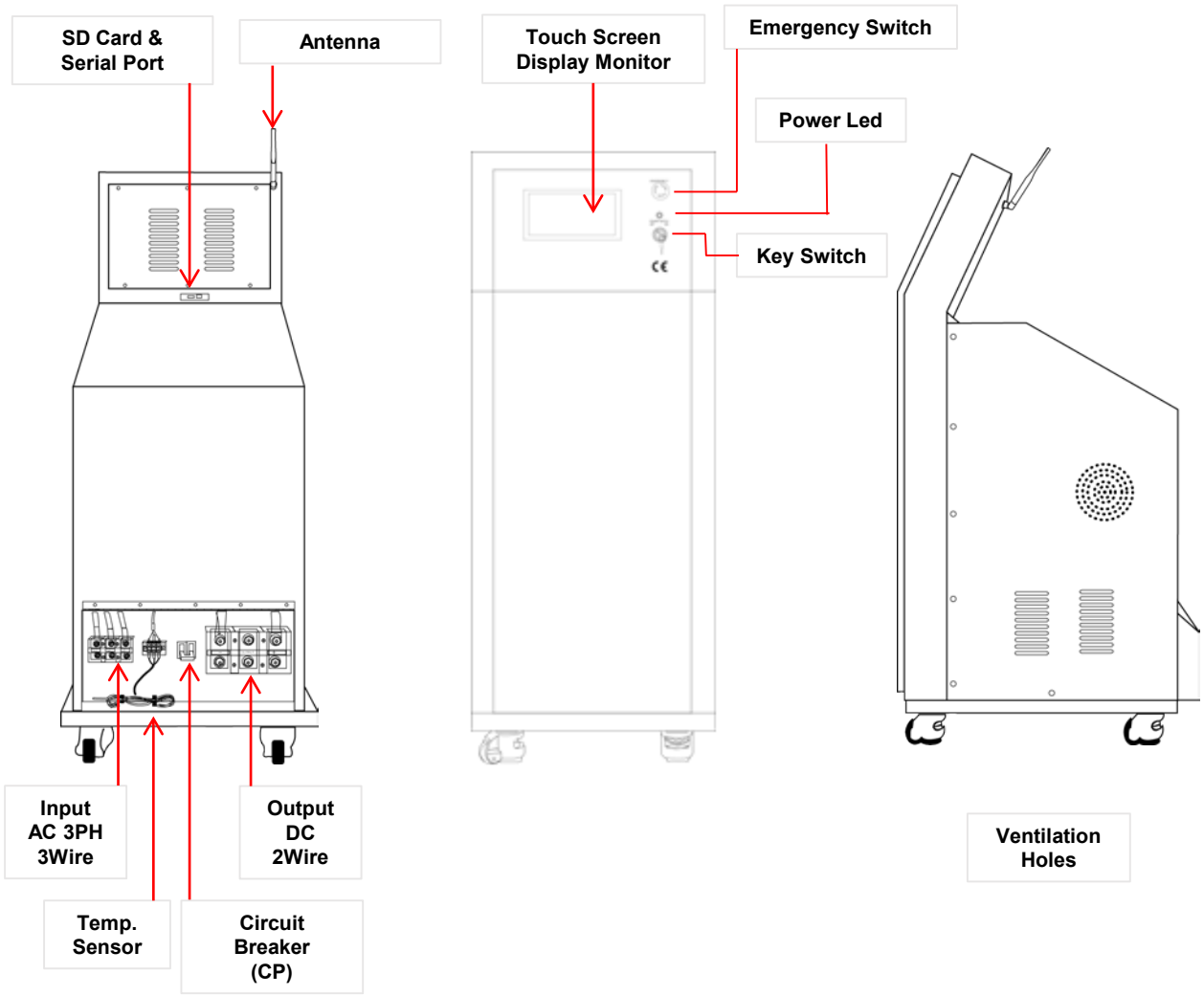
- **93-M1001**



Be careful not to allow sulfuric gases enter into the Xtender through the vent during restoration & discharge.

Machines – Name & Functions

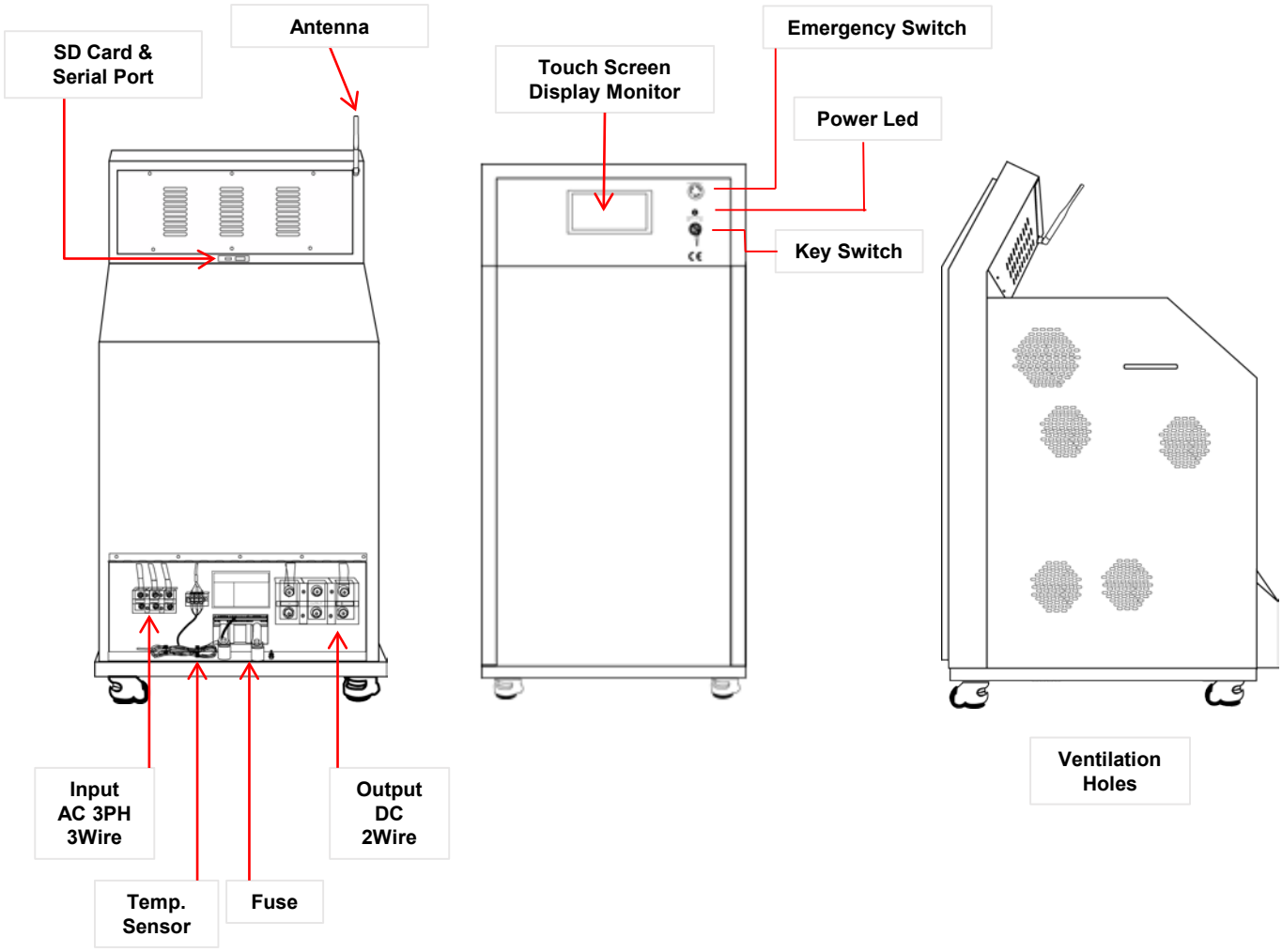
- **93-M1005 & 93-M1007**



Be careful not to allow sulfuric gases enter into the Xtender through the vent during restoration & discharge.

Machines – Name & Functions

- **93-M1009**

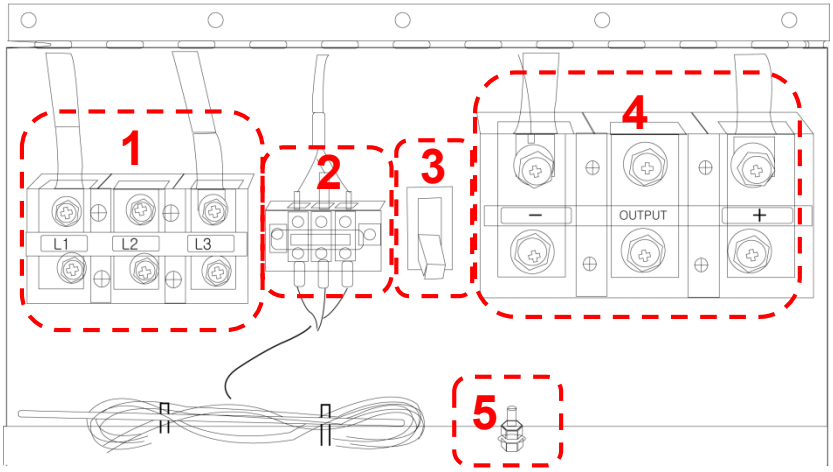


Be careful not to allow sulfuric gases enter into the Xtender through the vent during restoration & discharge.

Wiring Instructions

93-M1001





1 **INPUT :**
Xtender Electricity power / AC 220V / Single Phase 60Hz

2 **TEMP.SENSOR :**
Connect Temp. Sensor with Model PC-100 provided

3 **CIRCUIT BREAKER :**
Xtender Protection Device: It will automatically cut electricity off during the excessive current or a power failure.

4 **OUTPUT :**
Battery has a polarity of (+) & (-). Be sure that they are connected correctly.

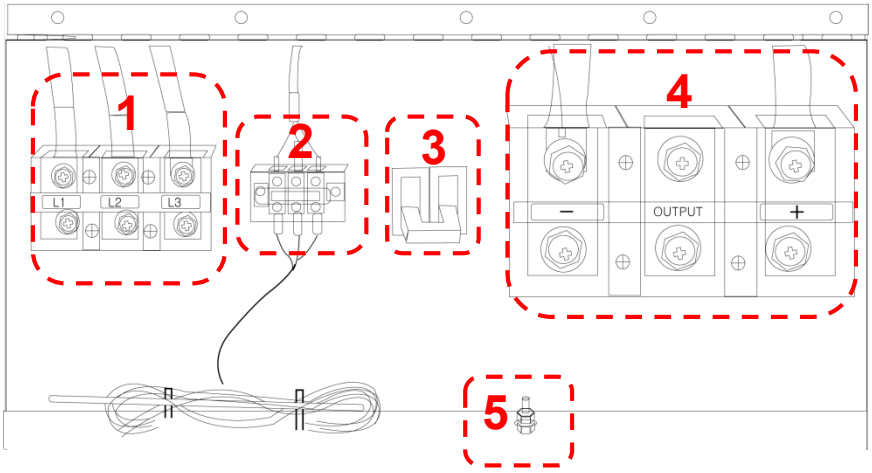
5 **GROUND :**
Xtender to Earth Ground

- **When connecting cables to the backside of Xtender, be sure the location and connect to right position.**
- **When connecting cables to OUTPUT be cautious to polarity (+) & (-) to be connected correctly.**

● Wiring Instructions

◆ **93-M1005**





1 **INPUT :**
Electricity power / AC 3 Phases 220V 60Hz / L1, L2 ,L3 3Wires

2 **TEMP.SENSOR :**
Connect Temp. Sensor with Model PC-100 provided

3 **CIRCUIT BREAKER :**
Xtender Protection Device: It will automatically cut electricity off during the excessive current or a power failure.

4 **OUTPUT :**
Battery has polarity of (+) & (-). Be sure that they are connected correctly.

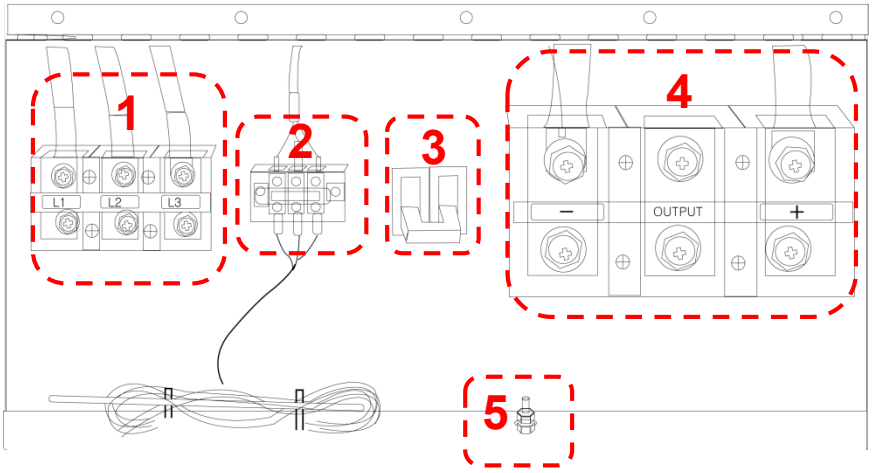
5 **GROUND :**
Xtender to Earth Ground

- ❖ **When connecting cables to the backside of Xtender, be sure to connect with suitable position.**
- ❖ **When connecting cables to OUTPUT, be cautious not to confuse polarity (+) & (-).**

● Wiring Instructions

◆ **93-M1007**





1 **INPUT :**
Electricity power / AC 3 Phases 220V 60Hz / L1 (red), L2 (yellow) , L3 (blue) 3 Wires

2 **TEMP.SENSOR :**
Connect Temp. Sensor with Model PC-100 provided

3 **CIRCUIT BREAKER :**
Protection Device: It will automatically cut electricity off during the excessive current or a power failure. CIRCUIT BREAKER REQUIRED FOR THIS MODEL IS 80 AMPS.

4 **OUTPUT :**
Battery has polarity of (+) & (-). Be sure that they are connected correctly.

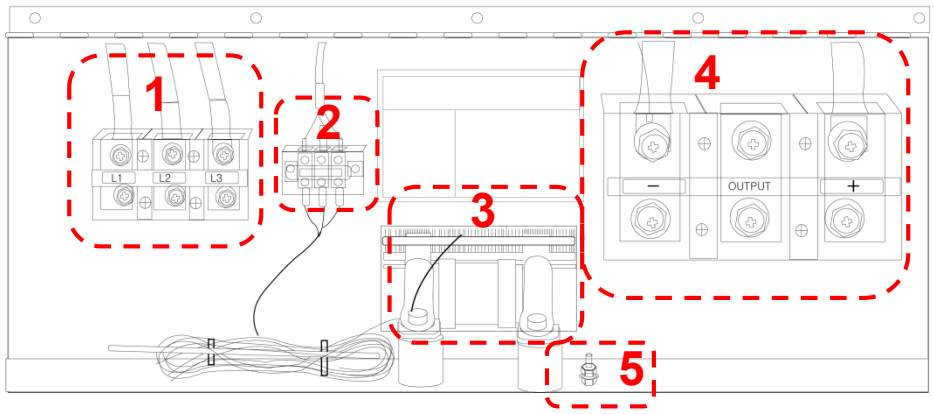
5 **GROUND :**
Xtender to Earth Ground

- ❖ **When connecting cables to the backside of Xtender, be sure to connect to the suitable position.**
- ❖ **When connecting cables to OUTPUT, be cautious not to confuse polarity (+) & (-).**

● Wiring Instructions

◆ 93-M1009 : Cable Connection





1 **INPUT :**
Xtender Electricity / AC 3 Phases 220V or 400V / 50Hz or 60Hz / L1, L2 ,L3 3Wires

2 **TEMP.SENSOR :**
Connect Temp. Sensor with Model PC-100 provided

3 **Fuse :**
Xtender Protection Device: It will automatically cut electricity off when excessive ampere or power blackout.

4 **OUTPUT :**
Battery has polarity of (+) & (-). Be sure that they are connected correctly.

5 **GROUND :**
Xtender to Earth Ground

- ❖ **When connecting cables to the backside of Xtender, be sure to connect with the suitable position.**
- ❖ **When connecting cables to OUTPUT, be cautious not to confuse polarity (+) & (-).**

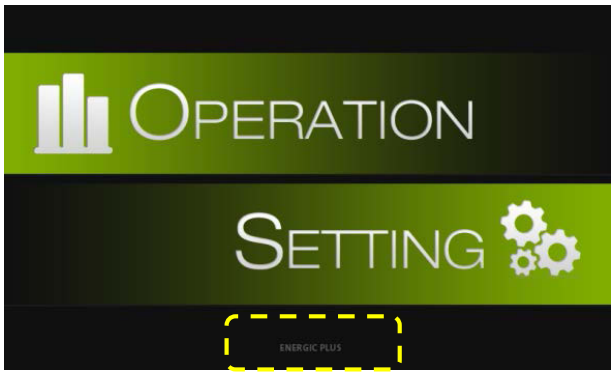
1. Start & Setting

● SYSTEM START



1) Turn the key of Xtender “ON”.

2) System loading picture with Xtender logo will show in screen.



[Main Screen]

❖ Each model shows on screen

- ➢ 93-M1001
- ➢ 93-M1005
- ➢ 93--M1007
- ➢ 93-M1009

3) After booting up PC, main screen will show as above.

4) Select the mode by touching the position.

- ✓ OPERATION : Enter the mode for Restoration & Discharging
- ✓ SETTING : Configure the Xtender settings & Software upgrade

1. Start & Setting

● SETTING



[Main Screen]



[Setting Screen]

1) Select icon “SETTING” on main screen.

2) It will move Setting Screen as shown above.

❖ SETTING SCREEN TITLES

① Date : YY/ MM/ DD
② Time : Time setting, HH/ MM / SS.
③ Touch : Touch Screen Calibration
④ Screen Lock : Setup screen lock password to prevent tampering.
⑤ Bluetooth : Bluetooth wireless communication between Xtender and integrated receiver.
⑥ Back light off : Automatically backlighting off, energy saving mode.
⑦ Language : Korean, English, Spanish and Japanese
⑧ S/W upgrade : Latest Firmware and Software Update
⑨ Upgrade of Xtender : HW & SW Version
⑩ Xtender Time, Connection Information

Operation (Restoration & Discharge) data will be recorded on SD Memory Card so be sure to set time to match your local time.

1. Start & Setting

● SETTING SCREEN – TOUCH CALIBRATION

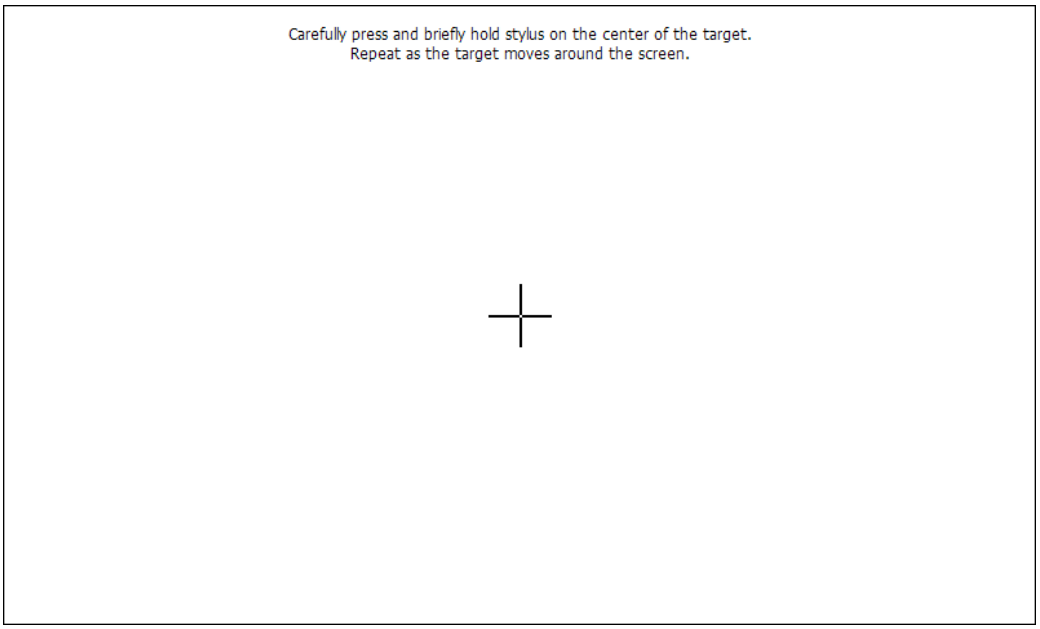




Touch Screen is for setting of coordinate location.

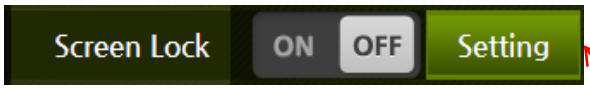
You can select : Touch Calibration, Run for activation.

1) **When you activate, "+" will be shown up on the screen as under.**
2) **Keep press "+" with finger or touch pen, it will move and calculate location of coordinate.**



1. Start & Setting

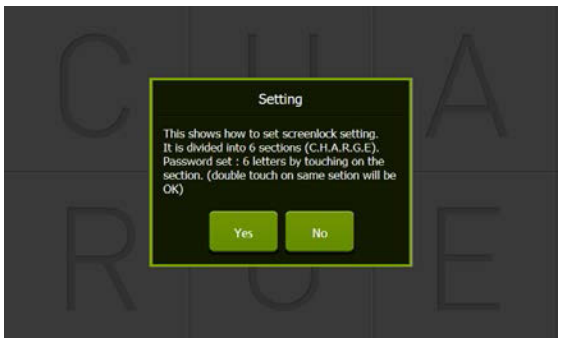
● SETTING SCREEN – SCREEN LOCK





Screen Lock can protect Xtender from unauthorized personnel changing settings or operational data.
Any change without password will not be permitted.

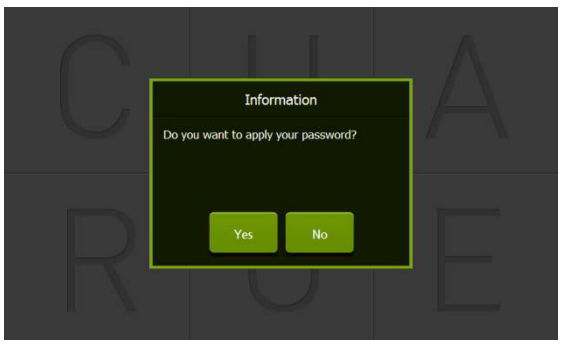
1) Touch "Setting"



2) Make Password with 6 letters from C,H,A, R,G,E (example: CCHHAE or EGRAHC)



3) Set Password ➔ YES



4) Activate Screen Lock :OFF ➔ ON



- **After 10 minutes it will be in effect.**

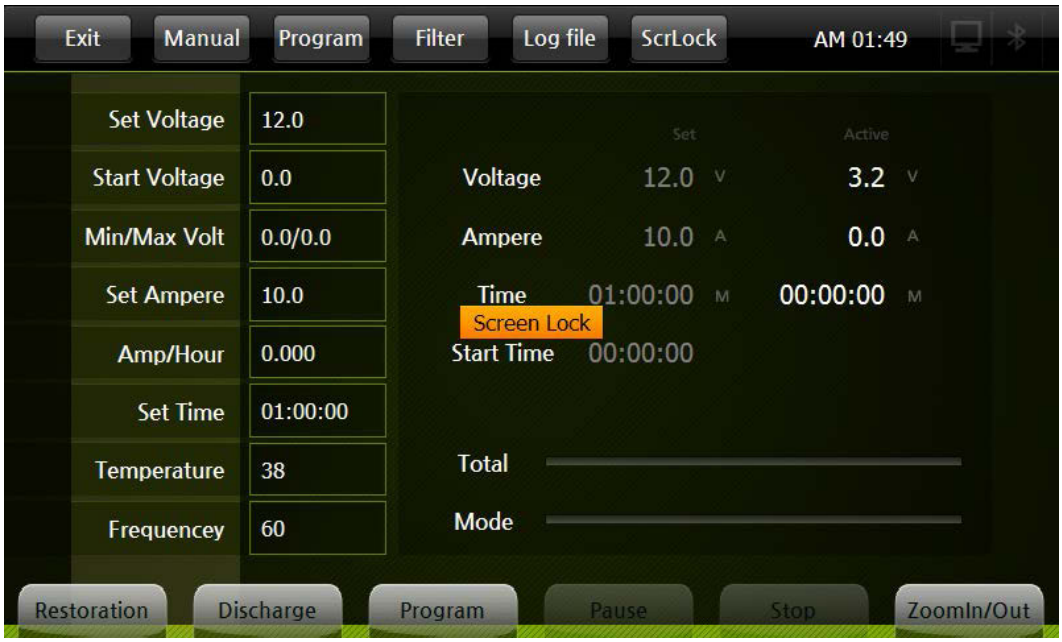


- **Screen Lock can be set directly from the menu on Operation Screen.**

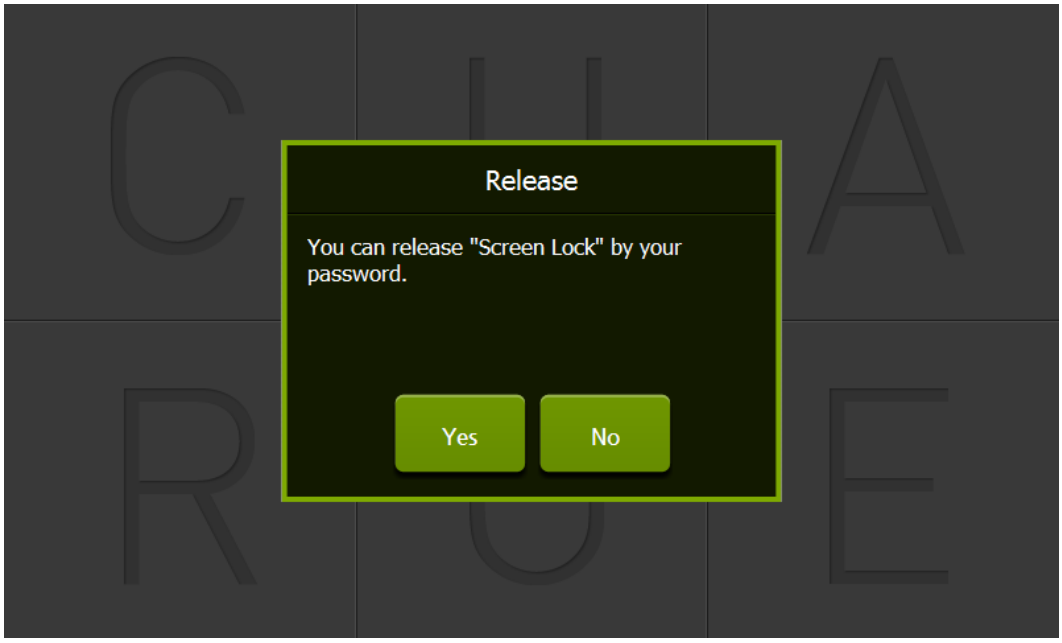
When you forget the password or need urgent operation, you can power-off then power-on to cancel Screen Lock and reset a password .
A forced power-off during operation could damage the units or cause problems in the battery.

1. Start & Setting

- **SETTING SCREEN – SCREEN LOCK**



- **Screen Lock is in effect.**



- **When you touch the Screen Lock, the picture will be shown as above and you can release Screen Lock with your password.**

1. Start & Setting

● SETTING SCREEN – BLUETOOTH





Bluetooth wireless communication between Xtender and Integrated Receiver.

Connected :

Disconnected :

● SETTING SCREEN – BACK LIGHT OFF





For the life span of LCD & energy saving, LCD Back light will be automatically off after set time regardless of operation of Xtender.

You can resume back light on by touching any part of screen.

<options>

Always On :

After 30min : Back light off automatically after 3o minute

After 1 hour : Back light off automatically after 1 hour

1. Start & Setting

- **SETTING SCREEN – LANGUAGE**



Xtender supports Korean, English, Spanish and Japanese.





Other languages will be added to the list continuously.

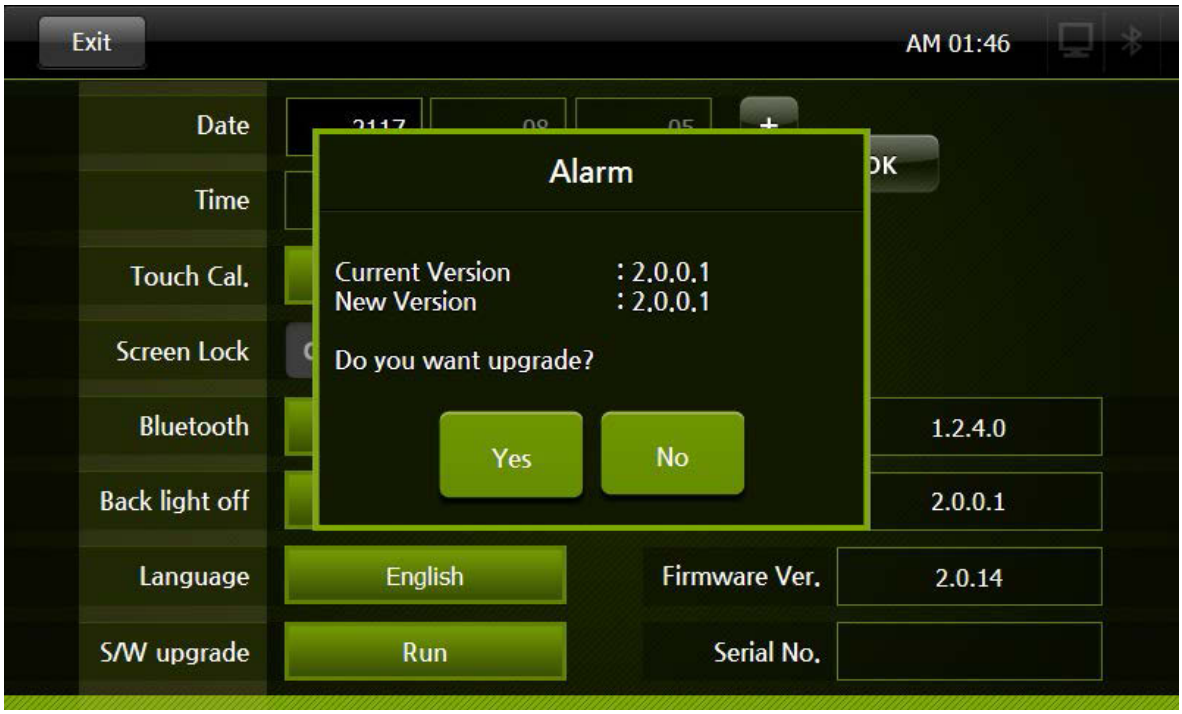
1. Start & Setting

- **SETTING SCREEN – S/W UPGRADE**



Download the latest software to your SD Card from website for free.
Then you can upgrade Xtender through this SD Card.





Details of Upgrade will be explained in next page.

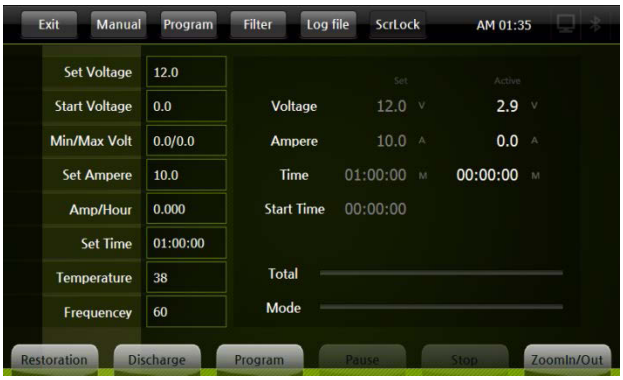
Only use software files supplied by FSIP.

2. Operation (Restoration & Discharge)

● OPERATION - MENUS



[Main Screen]



[Operation Screen]

1) Select icon “OPERATION” on Main Screen

2) Move to the Operation Screen as above.

◆ OPERATION - SCREEN

1

- Set V :
- Start V :
- Min/Max V :
- Set A :
- Amp-Hour :
- Set Time :
- Temp : present Temperature
- Freq. : input Frequency



[Operation Screen]

2

- Set : Set value
- Active : Active value
- ➢ Current Voltage
- ➢ Current Ampere
- ➢ Charge/Discharge Time
- ➢ Other information

All set and measured data will be seen on the screen during operation of Xtender. When touching any part of the “2” area, it will show the running information by graph.

2. Operation (Restoration & Discharge)

● OPERATION SCREEN - MENUS



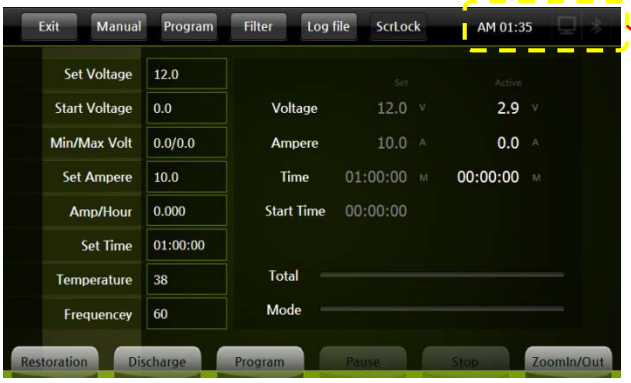
◆ TOP MENU

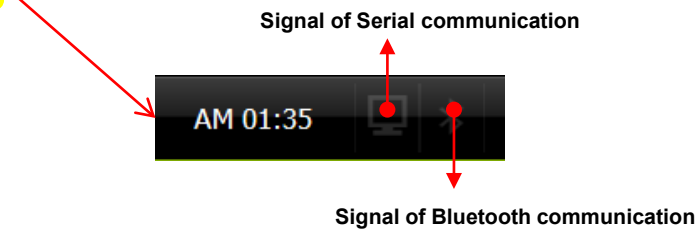
① Exit : Return to Main Screen
② Manual : Go into manual mode
③ Prog. : Go into program mode
④ Filter : Go into filter mode for graph
⑤ Log file : Bring the Log files saved
⑥ ScrLock : Activate/Inactivate Screen Lock



◆ BOTTOM MENU

① Restoration : Start Restoration in Manual mode
② Discharge : Start Discharge in Manual mode
③ Program : Go into Program mode
④ Pause : Temporarily Stop
⑤ Stop : Completely Stop
⑥ Zoom : Graphic mode for Zoom In/Out

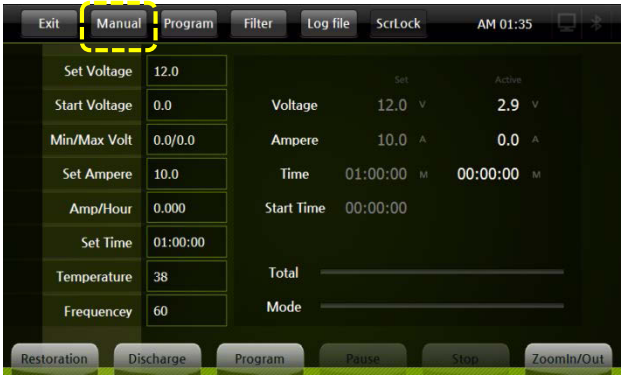




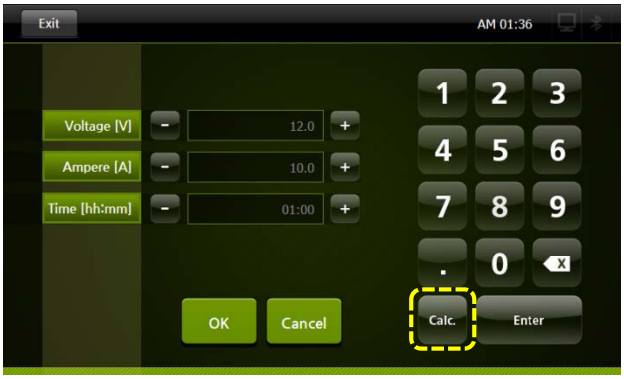
Top menu of Operation is related to setup of each mode of Xtender operation.
Bottom menu of the Screen is related to the operation of Xtender mode.

2. Operation (Restoration & Discharge)

● MANUAL MODE – SETTING VALUES

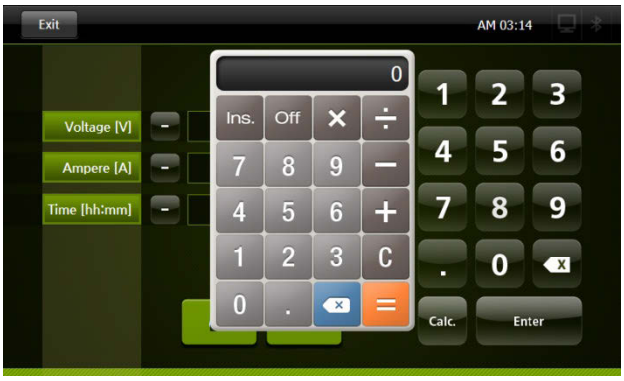


- Click “Manual” on Top menu



- Exit : Return to Operation Screen.
- Calc : Calculator

You can calculate total “Voltage” for Battery operation (Restoration & Discharge)



Calculator works only to set “Voltage”

① **Click “Voltage”**

② **Click “Calc”. Calculator will pop up as picture.**

③ **Calculate the voltage by inputting the data.**

④ **Click INS the data will be put in.**

When you click “OK”, it will save the set data and return to operation screen.

When you click “Exit”, it will move to the operation screen without saving the set data.

2. Operation (Restoration & Discharge)

● MANUAL MODE – SETTING VALUES

This mode allows you to preform a single operation to a connected battery, for instance a discharge cycle only.



[picture 6]

1

- **Voltage : Set Voltage for Charge/Discharge**
- **Ampere : Set Current at Charge/Discharge**
- **Time : Charge/Discharge hour (max. 99H:59M)**
- **One click of a button of (-) and (+)**

  Voltage : 0.1V up and down

  Ampere : 0.1A up and down

  Time : I min. up and down

2

- **Setting of Voltage, Ampere, Time:**

Keypad will be activated in white color ready for input when you click the icon of Voltage or Ampere or Time. Then you insert data and press enter.

(Example) insert 15A

① **Select Ampere in "1" area of the screen**
② **Click 1 & 5 on keypad**
③ **Click "Enter" on keypad**
④ **15 (A) will be shown as Ampere set value in "1" area of the screen.**

(Example) 10 Hours

① **Select Time in "1" area of the screen**
② **Click 1 & 0 on keypad**
③ **Click "Enter" on keypad**
④ **10:00 (T) will be shown as Time set value in "1" area of the screen.**

CAUTION

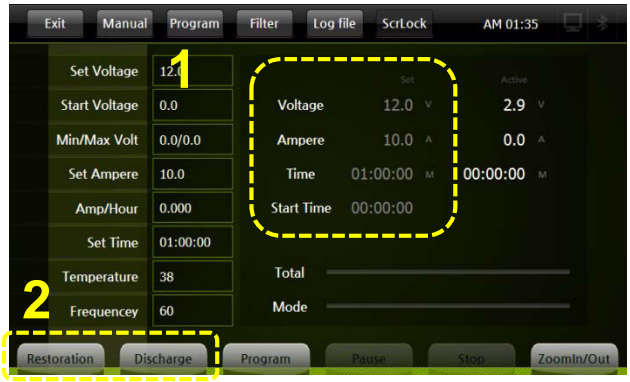
CAUTION

❖ **You should check the specification of batteries for set Voltage, Ampere and Time before inputting set values.**

❖ **Wrong set values may a cause damage to Xtender machine and degradation of performance.**

2. Operation (Restoration & Discharge)

● MANUAL MODE - OPERATION



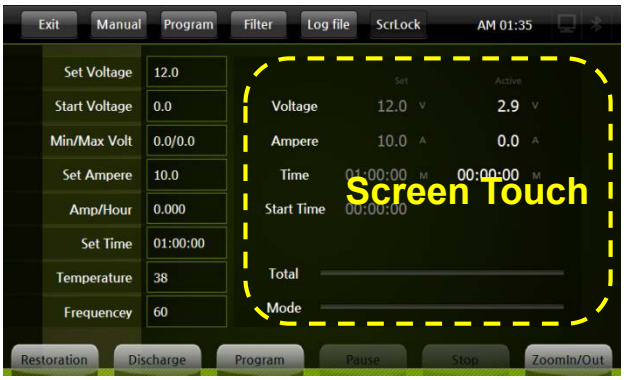
1 ▪ **Check Set values**

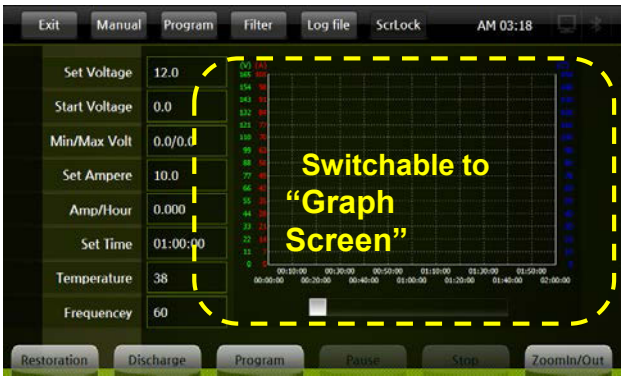
2 ▪ **Select either Restoration or Discharge from Xtender bottom menu to begin programmed manual cycle.**

- **If manual mode is programmed to discharge battery select "Discharge", if manual mode is programmed to regenerate battery select "Restoration."**

❖ **Time will start counting when Restoration or Discharge starts operation, and total AH (Ampere Hour) will be shown on the screen.**

● Xtender Operation – SCREEN SWITCH





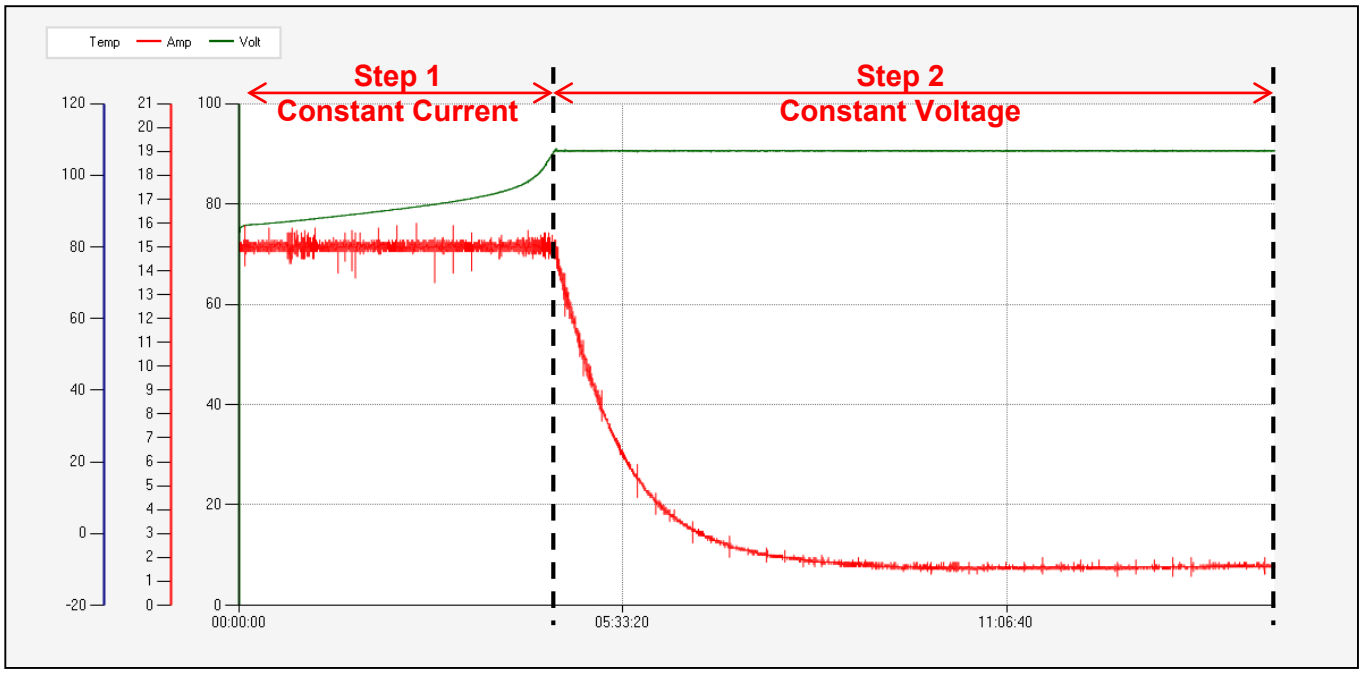
When you are viewing the log files under operation or saved, you can switch to "Graph Screen" by screen touch, and return to information screen the same way.

This will be applied to Manual mode as well as Program Mode.

2. Operation (Restoration & Discharge)

● MANUAL MODE – RESTORATION PROCESS

❖ **Manual Mode : Restoration is performed with Constant Current and Constant Voltage form,**



- **This Graph shows Restoration**

◆ **Explanation for the Graph of Restoration**

① **[Step 1] Keep Restoring with Set Ampere until it reaches Set Voltage**

② **[Step 2] When it reaches Set Voltage, it will maintain Set Voltage by controlling Active Ampere until Set Time.**

③ **This process is same as Pulse 2 in Program Mode.**

Caution

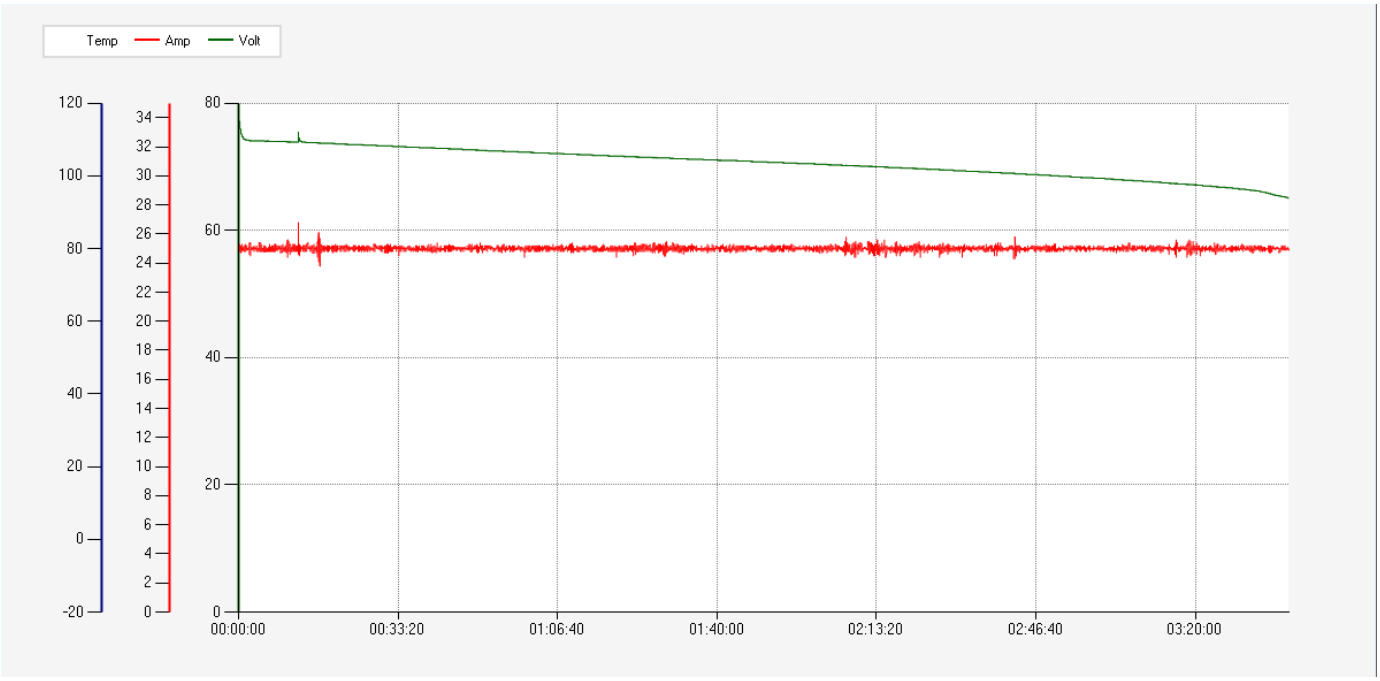
CAUTION

- ✓ **Xtender checks temperature of Battery every five(5) minutes and it will decrease Active Ampere by 10% when temperature reaches over 50℃ (adjustable in Setup menu)**
- ✓ **Install temperature sensor connected with back side of Xtender unit on the top or good place on batteries to check the temperature of battery. If connecting to a large multiple cell battery place the temperature sensor over the middle cell.**
- ✓ **Don't let temperature sensor get exposed to the electrolyte acid solution to prevent damage to the**

2. Operation (Restoration & Discharge)

● MANUAL MODE – DISCHARGE PROCESS

❖ **Manual Mode: Discharge is performed with Constant Ampere form.**



- **This graph shows Discharge**

◆ **Explanation for the Graph of Discharge**

① **Start Discharge with Set Ampere until it reaches Set Voltage (Final Voltage for Discharge)**

② **When Active Voltage reaches Set Voltage , it will complete Discharge Mode regardless of Set Time.**

③ **When it reaches Set Time, it will complete Discharge Mode even though it does not reach Set Voltage. (Regardless of Set Voltage)**

****This is same as Pulse 1 in Program Mode.**

Caution

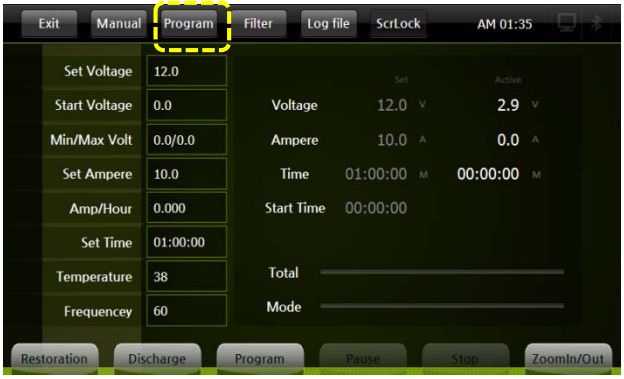
CAUTION

✓ **Don't discharge under final voltage provided by battery manufacturers for discharging .**

✓ **Discharge under final voltage specified may cause serious damage to your batteries.**

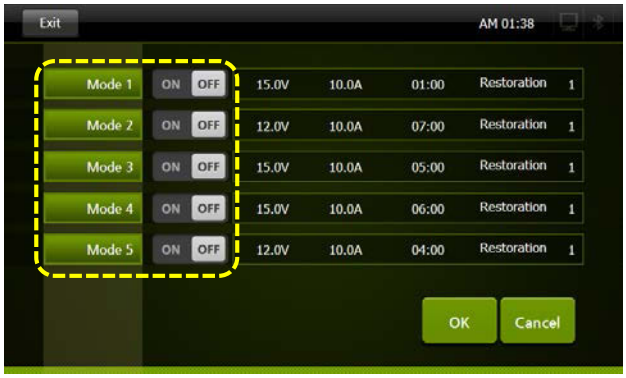
2. Operation (Restoration & Discharge)

● PROGRAM MODE – SETTING (V = Voltage, A = Ampere, T = Time)



- Operation Screen : Click “Program “ on top menus

◆ Program Mode – Setting Screen



[program setting screen]

❖ Operation will proceed automatically according to the set modes in order.

❖Total 5 modes are supported and total Setting time is 99H:59M.

❖Pulse has six(6) patterns for restoration and two(2) patterns for Discharge in Program Mode.

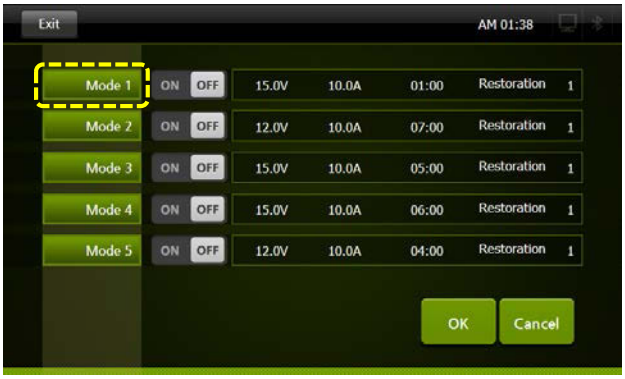
- MODE : Restoration, Discharge, Pulse patterns, Set V, Set A, Set T per each Mode.
- MODE ON / OFF : Activate or Skip depend on your selection
- As you can see on the screen,

  Operator can perform Restoration and Discharge as per his scenarios of Mode..

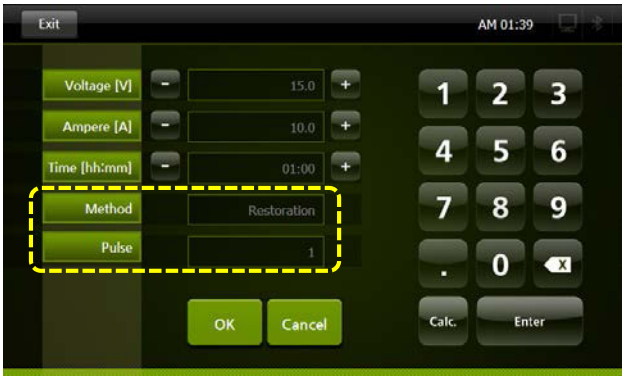
You should check specification & conditions of used batteries before you input Set V, Set A and Set Time for regeneration of batteries. Wrong set values will cause damages to batteries due to over charge or other reasons.

2. Operation (Restoration & Discharge)

● PROGRAM MODE – SETTING



- Select MODE1



- Setting Screen per MODE

- Input Set Voltage
- Input Set Amperage
- Input Set Time
- Enter Key must be pressed with each change of the above to save changes

Caution

CAUTION

❖ Restoration ➔ Regeneration Charge

❖ Discharge ➔

❖ In Program Mode Only

- Method : Restoration or Discharge
- Pulse :
  - ➢ Restoration : Insert 1 ~ 6 by keypad
  - ➢ Discharge : Insert 1 ~ 2 by keypad

You should check specification & conditions of used batteries before you input Set V, Set A and Set Time for regeneration of batteries. Wrong set values will cause damages to batteries due to over charge or other reasons.

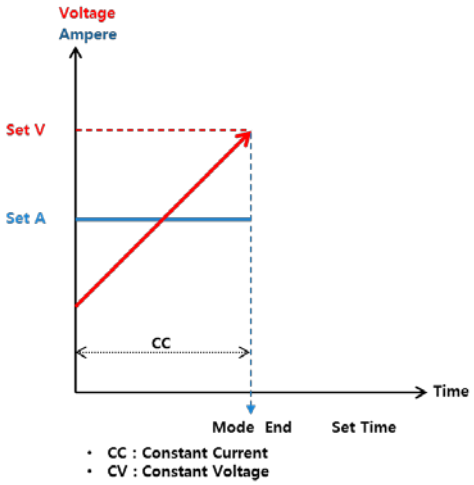
2. Operation (Restoration & Discharge)

● PROGRAM MODE – PULSE SCENARIOS

❖ Restoration(regeneration charge) Method – Pulse Scenarios (Patterns)

(V = Voltage, A = Ampere, T = Time)

Pulse 1



◆ Restoration Pulse1 Scenario :

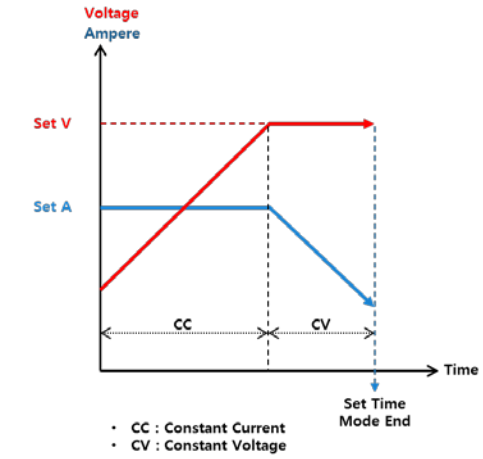
① Start Charging with Set A.

② When Actual Voltage reaches Set V, it will finish the Mode regardless of Set T.

② When it reaches Set T, it will also finish the Mode even though Actual V has not yet reached Set V.

"Constant Current" Charging will be applied

Pulse 2



◆ Restoration Pulse2 Scenario :

① Start Charging with Set A until Actual Voltage reaches Set Voltage. (Constant current)

② When Actual V reaches Set V, maintain Set V until Set Time by controlling Actual Ampere. (Constant Voltage).

③ When it reaches Set time, it will finish the Mode.

You should check specification & conditions of used batteries before you input Set V, Set A and Set Time for regeneration of batteries. Wrong set values will cause damages to batteries due to over charge or other reasons.

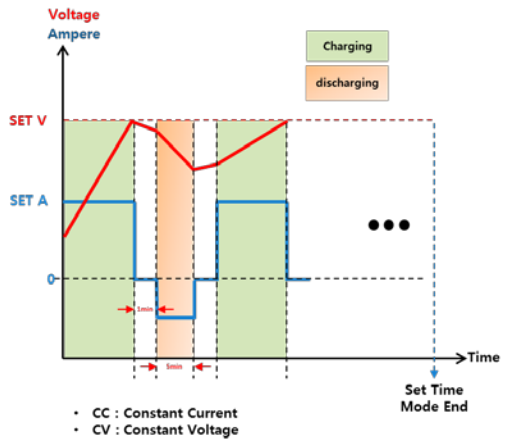
2. Operation (Restoration & Discharge)

● PROGRAM MODE – PULSE SCENARIOS

❖ Restoration (regeneration charge) Method – Pulse Scenarios (Patterns)

(V = Voltage, A = Ampere, T = Time)

Pulse 3 Restoration and Discharge are combined



◆ Restoration Pulse 3 scenario :

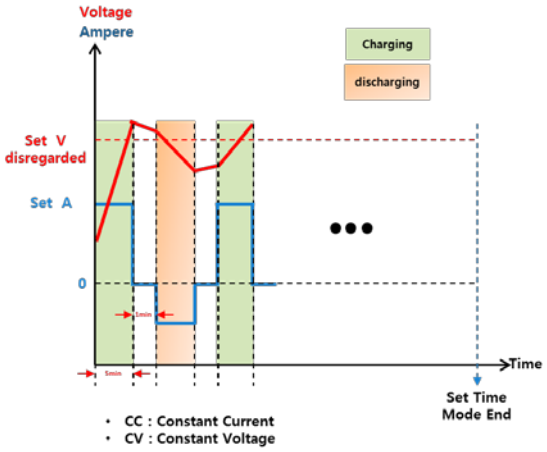
① When actual Voltage reached Set V,
▸Keep Zero(0) Ampere for 1 minute
(Stop charging for 1 minute)

② Discharge for 5 minutes at 1/3 A of Set A (Ex. 30A -> 10A), ▸Keep Zero(0) Ampere for 1 minute.

③ Repeat ①~② continuously.

④ When it reached Set T, it will finish the Mode.

Pulse 4 Restoration and Discharge are combined



◆ Restoration Pulse 4 scenario :

① Start Charging with at Set A for 5 minutes (regardless whether it reaches or over Set V).
▸Keep Zero(0) Ampere for 1 minute.

② Discharge for 5 minutes at 1/3 A of Set A.
▸Keep Zero(0) Ampere for 1 minute.

③ Repeat ①~② continuously.

④ When it reached Set T, it will finish the Mode.

As Pulse 3 & Pulse 4 in Program Mode also make discharge during Restoration, you are requested to extend restoration time to secure considerable charging capacity.

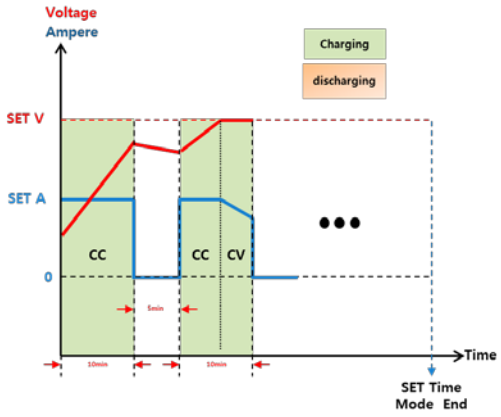
2. Operation (Restoration & Discharge)

● PROGRAM MODE – PULSE SCENARIOS

❖ Restoration(regeneration charge) Method – Pulse Scenarios(Patterns)

(V = Voltage, A = Ampere, T = Time)

Pulse 5



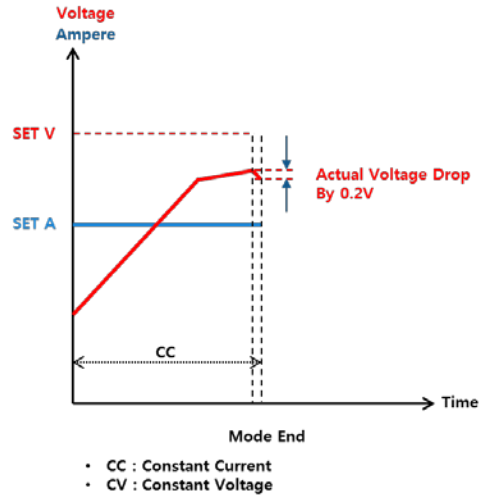
◆ Restoration Pulse 5 Scenario :

① Start Charging with Set A for 10 minutes .
▸Keep Zero (0) Ampere for 5 minutes.

② Repeat ① continuously until Set T, then stop.

③ Except, when it reaches Set V, maintain Set V by controlling Actual A. (Constant Mode)

Pulse 6



- CC : Constant Current
- CV : Constant Voltage

◆ Restoration Pulse 6 Scenario :

① Start Charging with Set A until it reaches Set V. (same as pulse 1)

② But when Actual Voltage suddenly drops to 0.2V during Charge, it will finish the Mode regardless of Set Time.

③ If this (drop by 0.2V) does not happen it will continue until Set Time and finish the Mode.

You should check specification & conditions of used batteries before you input Set V, Set A and Set Time for regeneration of batteries. Wrong set values will cause damage to batteries due to over charge or other reasons.

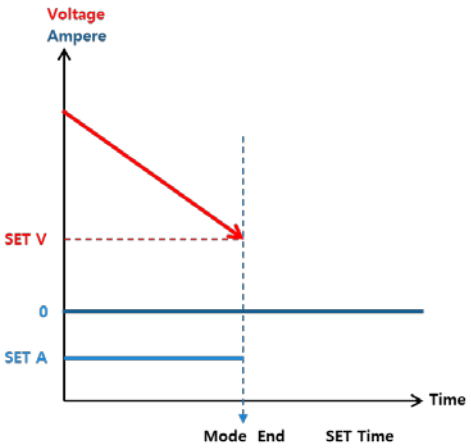
2. Operation (Restoration & Discharge)

● PROGRAM MODE – PULSE SCENARIOS

❖ Discharge Method - Pulse Scenarios (Patterns)

(V = Voltage, A = Ampere, T = Time)

Pulse 1



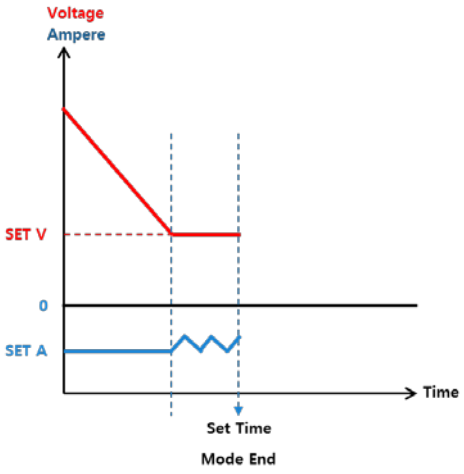
◆ Discharge Pulse 1 Scenario :

① Start Discharging with Set A.

② When Actual V reaches Set V, it will finish the Mode regardless of Set Time.

③ When it reached Set T, it will also finish the Mode even though it has not reached Set V.

Pulse 2



◆ Discharge Pulse 2 Scenario :

① Start Discharging with Set A. (Constant Current)

② When Actual V reaches Set V, it maintains Set V by controlling Actual A. (Constant V).

③ When it reaches Set T, it will finish the Mode.

You should check specification & conditions of used batteries before you input Set V, Set A and Set Time for regeneration of batteries. Wrong set values will cause damage to batteries due to over charge or other reasons.

2a. Typical Operation Program Mode

1. A typical regeneration process includes the following steps, assuming the process begins with a fully charged battery to be regenerated.

1. Discharge Battery to 20% capacity while monitoring AH output
2. Mass charge battery
3. Final/equalization charge battery
4. Again discharge battery while monitoring AH output; comparing to step #1.
5. Repeat step #2
6. Repeat step #3

When the above program cycle is completed, mode 1 can be compared to mode 3 (two discharge cycles) in order to easily demonstrate machines effectiveness.

2b. Program mode setup

1. Locate and record the following information found on the battery to be regenerated.

   -Nominal Voltage
   -AH rating (may be stated as C6/6 hour rating, C10/10 hour rating, C20/20 hour rating etc.)

2. If battery C10 or 10 hour rating is not given you must estimate the 10 hour rating by preforming the following.

   a. Multiply C6/6 hour rating by 110% becomes C10.
   b. Multiply C20/20 hour rating by 90% becomes C10.

You should check specification & conditions of used batteries before you input Set V, Set A and Set Time for regeneration of batteries. Wrong set values will cause damage to batteries due to over charge or other reasons.

2b. Program mode setup cont'd

3. Example program typical lead acid battery regeneration process:
   ALWAYS FOLLOW BATTERY MANUFACTURERS RECCOMENDATIONS!
   a. Select "MODE 1" and follow formula in the below chart.
      i. Number of Cells = ½ of nominal battery voltage.
   b. Select "MODE 2"
   c. Continue until all 6 Modes have been completely programmed.

MODE	VOLTAGE(V)	CURRENT(A)	TIME(H)	SELECT	PULSE
MODE 1	1.7 x Number of Cells	C10 AH x 10%	10:00	DISCHARGE	1
MODE 2	2.5 x Number of Cells	C10 AH x 10%	8:00	RESTORATION	1
MODE 3	2.5 x Number of Cells	C10 AH x 5%	8:00	RESTORATION	2
MODE 4	1.7 x Number of Cells	C10 AH x 10%	10:00	DISCHARGE	1
MODE 5	2.5 x Number of Cells	C10 AH x 10%	8:00	RESTORATION	1
MODE 6	2.5 x Number of Cells	C10 AH x 5%	8:00	RESTORATION	2

4. Example program using 36V battery with 680 AH 6 hour rating, assuming process is began with fully charged battery:

MODE	VOLTAGE(V)	CURRENT(A)	TIME(H)	SELECT	PULSE
MODE 1	30.6V	74.8A	10:00	DISCHARGE	1
MODE 2	45V	74.8A	8:00	RESTORATION	1
MODE 3	45V	37.4A	8:00	RESTORATION	2
MODE 4	30.6V	74.8A	10:00	DISCHARGE	1
MODE 5	45V	74.8A	8:00	RESTORATION	1
MODE 6	45V	37.4A	8:00	RESTORATION	2

5. Once each mode is successfully programmed verify information displayed is correct then press "OK" to begin the regeneration process.

You should check manufacturers specification & conditions of used batteries before you input Set V, Set A and Set Time for regeneration of batteries. Wrong set values will cause damage to batteries due to over charge or other reasons.

2b. Program mode setup cont'd

1. Functional explanation of previous sample program:

a. **MODE 1** Battery is discharged with a 74.8A load until either the actual voltage measures 30.6V (1.7Vpc 20%) or the timer reaches 10 hours. **In effect Mode 1 is used to measure the beginning battery capacity.**

b. **MODE 2** Start charging with 74.8A until measured voltage reaches 45V or 8 hour timer expires. **Constant current, bulk charging regeneration cycle.**

c. **MODE 3** Start charging with 37.4A until measured voltage equals 45V, when measured voltage equals 45V maintain set voltage until 8 hour timer expires by varying current. **Constant voltage, equalization cycle.**

d. **MODE 4** Second battery discharge with same parameters as mode 1, the time it takes to complete this cycle can be directly compared to the time it took to complete mode 1 cycle, showing any capacity increase. (Mode 1 Time/ 8= original capacity %, Mode 2 Time/8 = secondary capacity %)

e. **MODE 5** Copy of mode 2 cycle. **Final regeneration cycle**

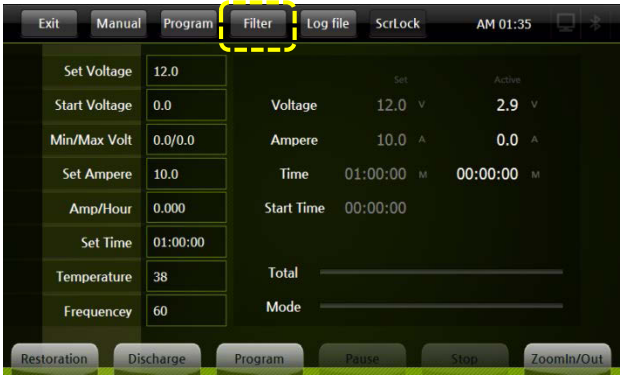
f. **MODE 6** Copy of mode 3 cycle. **Final equalization cycle.**

MODE	VOLTAGE(V)	CURRENT(A)	TIME(H)	SELECT	PULSE
MODE 1	30.6V	74.8A	10:00	DISCHARGE	1
MODE 2	45V	74.8A	8:00	RESTORATION	1
MODE 3	45V	37.4A	8:00	RESTORATION	2
MODE 4	30.6V	74.8A	10:00	DISCHARGE	1
MODE 5	45V	74.8A	8:00	RESTORATION	1
MODE 6	45V	37.4A	8:00	RESTORATION	2

You should check manufacturers specification & conditions of used batteries before you input Set V, Set A and Set Time for regeneration of batteries. Wrong set values will cause damage to batteries due to over charge or other reasons.

3. Useful Additional Functions

● FILTER :



[Operation Screen]

- [Operation Screen] Click “Filter” on Top Menu



[Filter Setting Screen]

- Select items what you want to show up on the Graphic Screen by ON/OFF .
  - ➢ Set Voltage :
  - ➢ Set Ampere :
  - ➢ Voltage : Active Voltage
  - ➢ Ampere : Active Voltage
  - ➢ Temperature : Active Temperature



[Filter Graph]

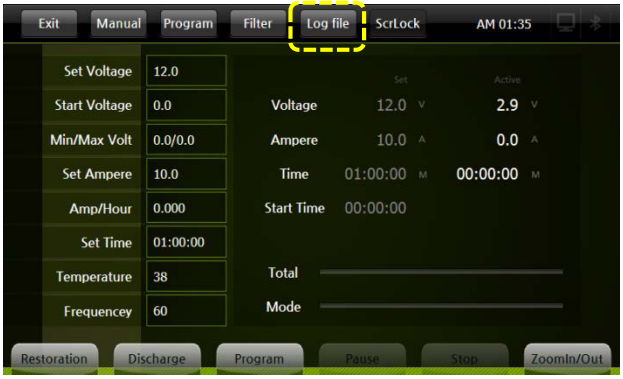
- Example for selecting all (5) items.

Active Ampere, Set Ampere
Active Voltage
Set Voltage
Temperature

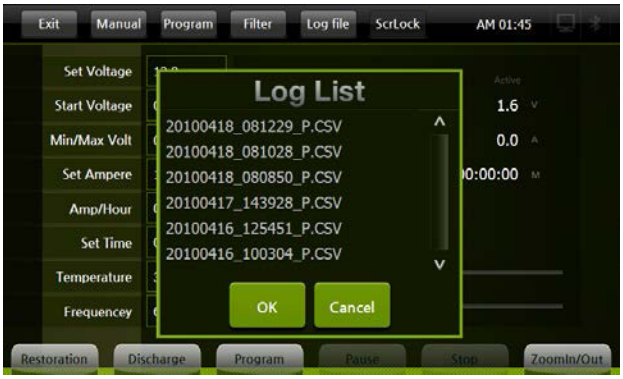
The Filter is useful to check the progress & the status of batteries during the operation (Restoration & Discharge) by the Graph.

3. Useful Additional Function

● LOG FILE :



- Click Log file



- You can check the details of Xtender operation by loading log files saved in your SD Memory Card.

➢ Active Log Files are created by the operation time of Xtender and saved as the title of Starting date & time of operation.

➢ R: Restoration (Regeneration Charge),
D: Discharge
P: Program Mode



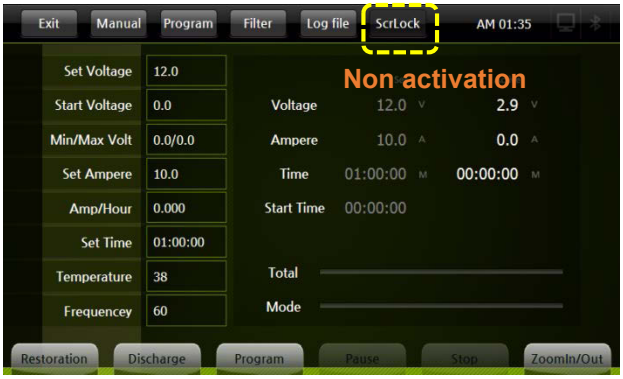
- You can output the results on the screen and check the operation easily.

❖ If you have problems during operation of Xtender, please send your Log Files to the Head office to solve the problems quickly.

Log file : All operation data is saved on SD Memory Card, you can load the saved file to the screen for a graph to see full details at a glance about the operating and processing.

3. Useful Additional Functions

● SCREEN LOCK:





◆ **ScrLock is the function that protects Xtender from changing Set Data by others except authorized operators.**

◆ **Lock process : Activate according to following process.**



① **Click "ON" to Screen Lock in Setting Screen (Setting of Password was explained in page 29)**

② **Click ScrLock of operation Top Menu**
➔ it starts the function of "Screen Lock"

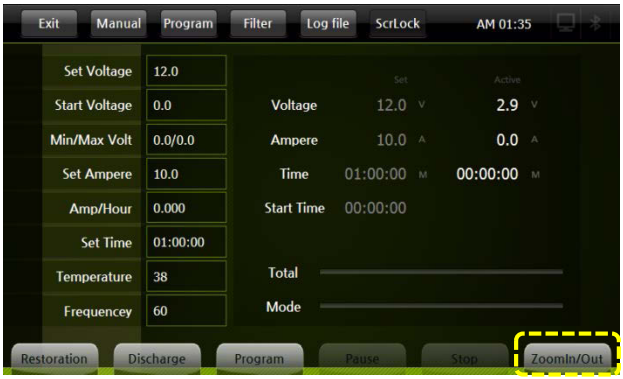
③ **After 10 minutes "Screen Lock" activates automatically**

If you loose password or need urgent operation, you can power-off then resume power-on to cancel and reset Screen Lock.

!!! Forced termination during operation of Xtender could damage unit & battery!!!

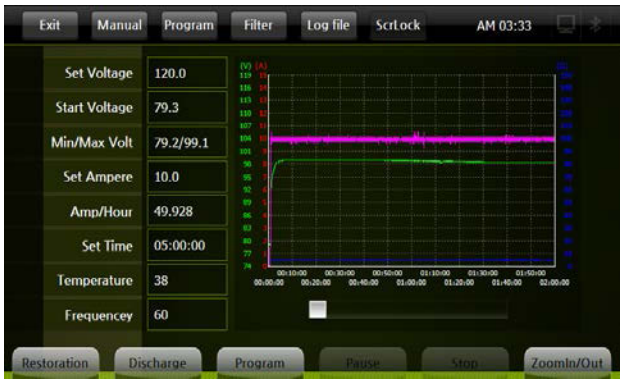
3. Useful Additional Functions

- **ZOOM :**



- **Zoom : You can load graph on the screen during operation of xtender or from the log files saved in SD card.**
- **Graph shows for the results of every 30/60/120 minutes or total hours through zoom function on the screen.**



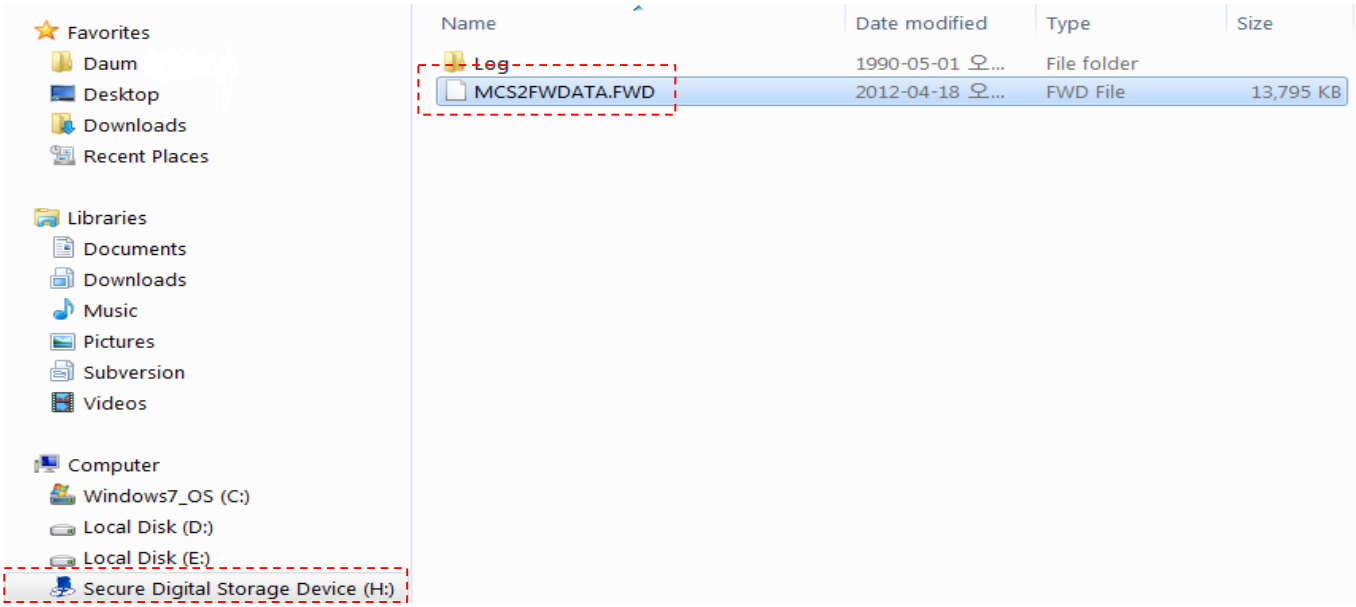




By using Zoom Function, you can check easily the changing process of batteries..

4. Upgrade of Xtender Machines

● SOFTWARE UPDATE:



- **Install Xtender SD card into USB adapter and insert into pc usb drive. Copy the downloaded files from your pc to the SD card. When copying firmware do not place it into subfolders.**

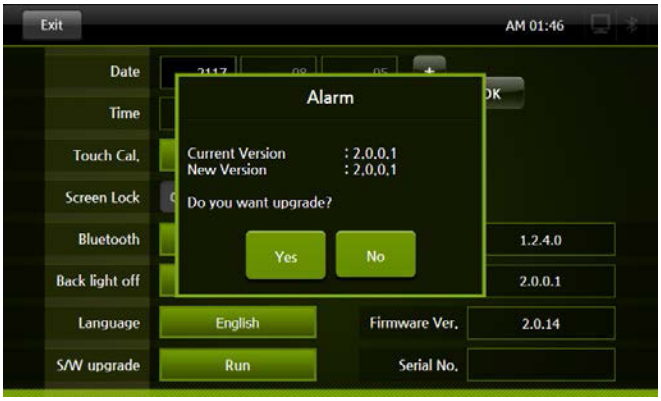


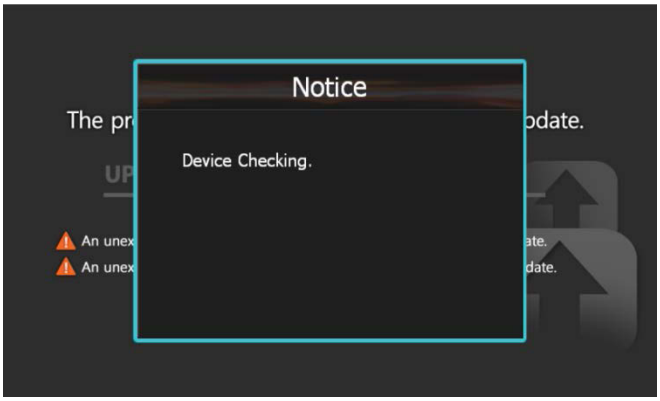
- **Install the SD Card in your Xtender and Power on.**
- **Select APP & MCU on the Setting Screen, and click S/W upgrade. APP & MCU will be updated and then program will reboot automatically after update.**

After updating of Software, please confirm App Ver. & MCU Ver.

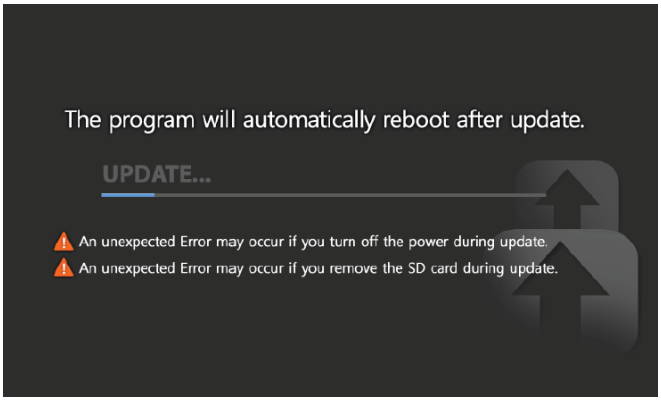
4. Upgrade of Xtender Machines

- **SOFTWARE UPDATE:**





- **If you select Yes for update, Xtender will check files in SD card and give you the information of devices as shown in the picture. After checking devices, perform the upgrade.**



Only use software files supplied by FSIP.

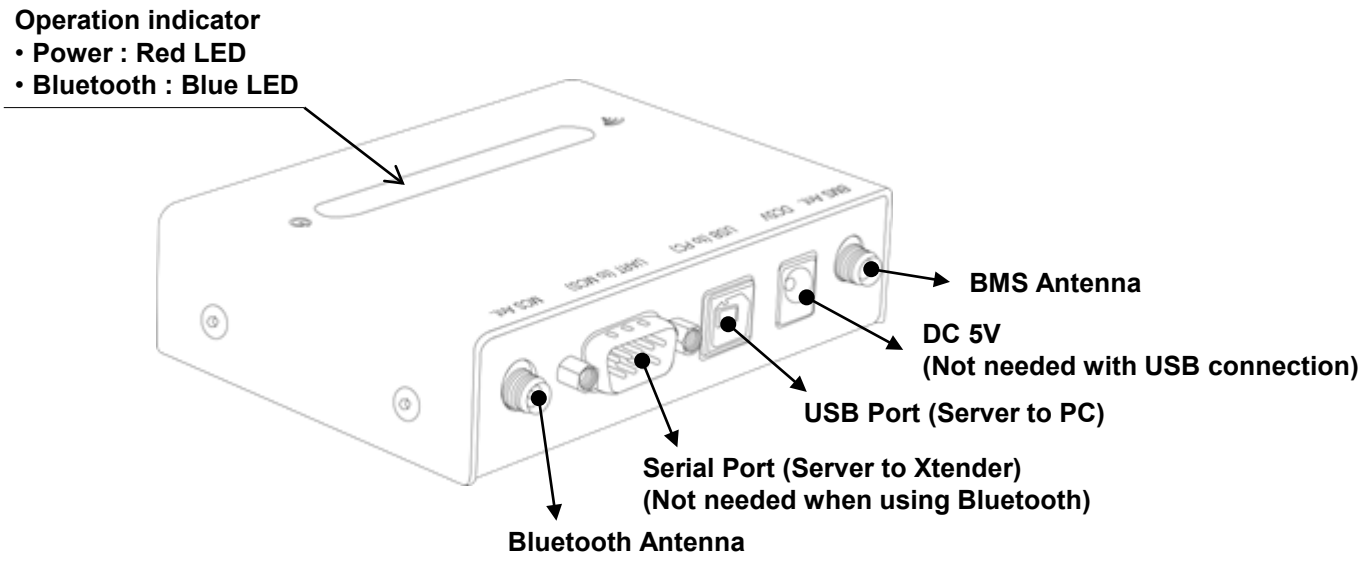
5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM FOR PC

- Integrated Monitoring program for PC can control the Xtender and manage the operation data easily by using integrated router.

- BMS (Battery Monitoring System) can be synchronized with the Xtender through this program.

● Integration Router



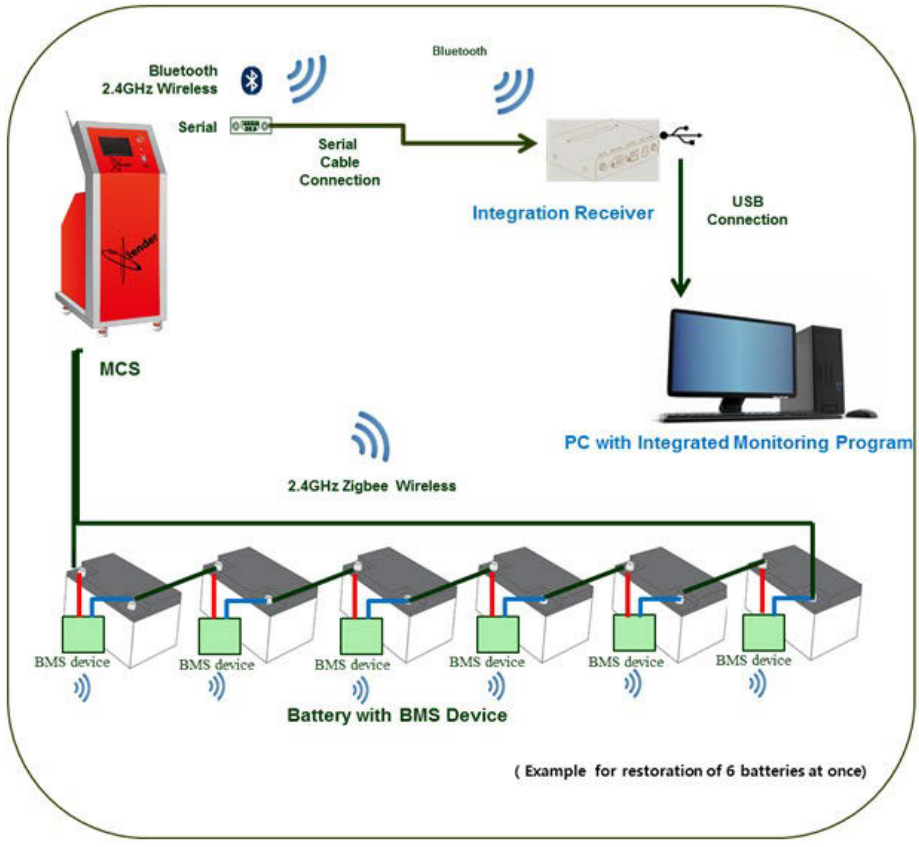
Integrated PC Monitoring Program can provide Xtender more efficient control. Log files will be saved in PC as well as SD Memory Card.

5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM – PROGRAM INSTALLATION

- **Integrated Monitoring program for PC can control the Xtender and manage the operation data easily by using integrated server.**

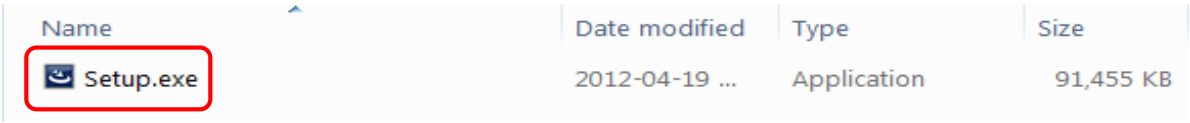
- **BMS (Battery Monitoring System) can be synchronized with the Xtender through this program.**



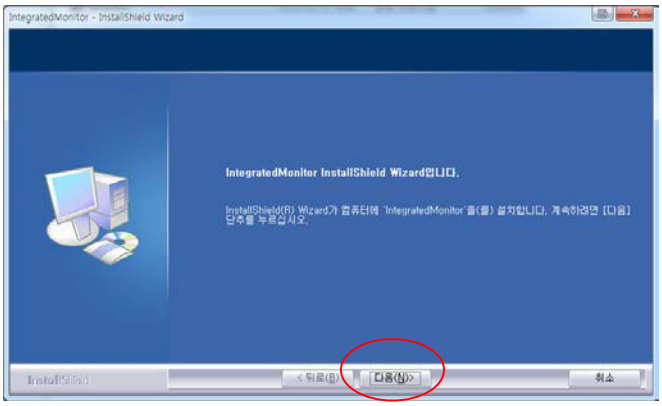
[Structure map of Integration Sever with Xtender]

5. Xtender Monitoring Program for PC

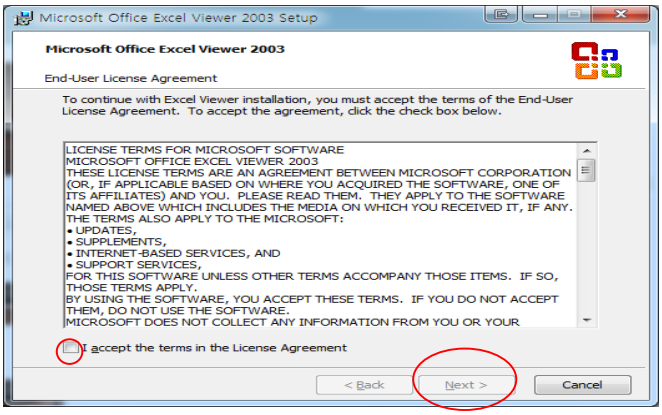
● INTEGRATED MONITORING PROGRAM – PROGRAM INSTALLATION

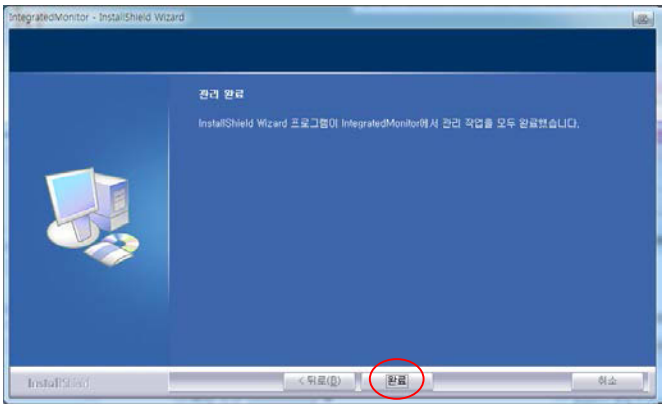


- **Install the program in your PC using Setup.exe file from the CD-ROM supplied.**







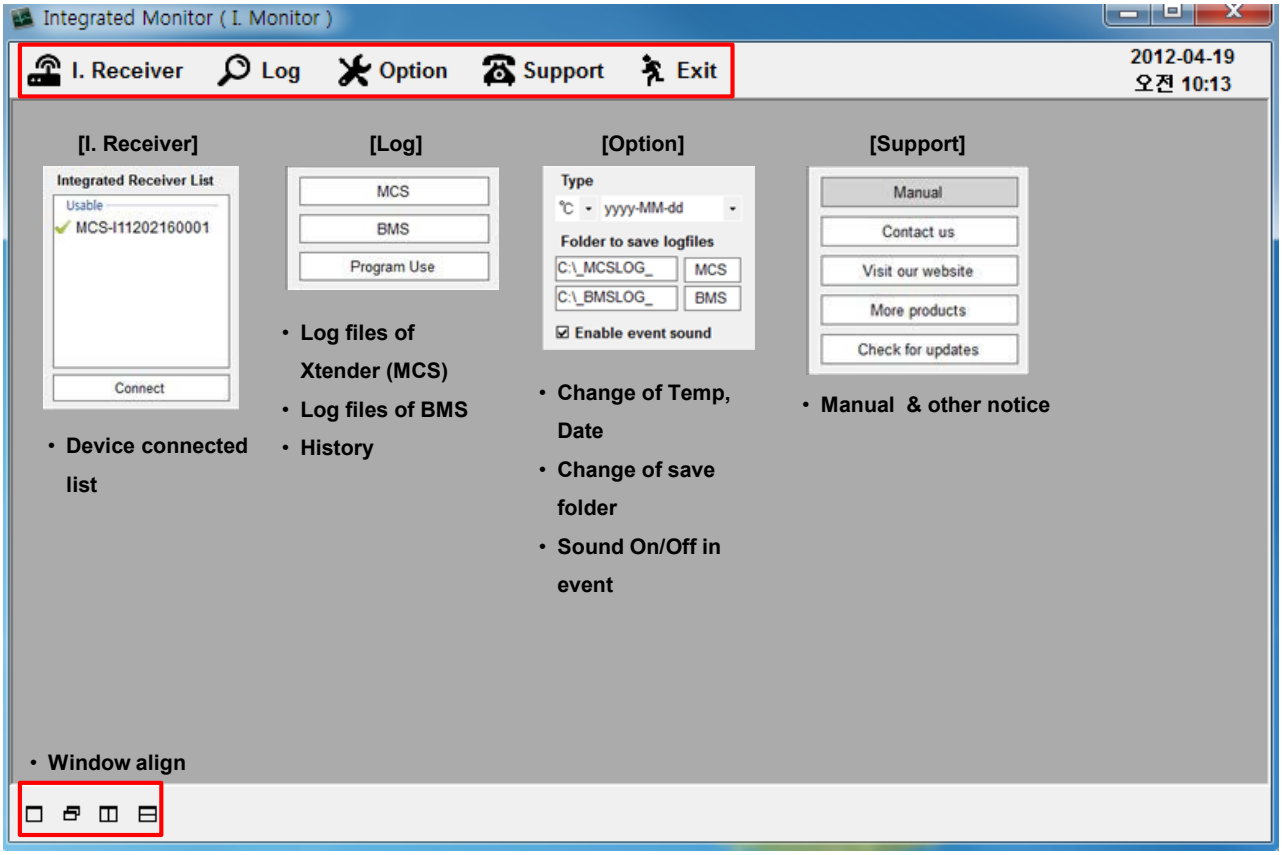




- **Integrated Monitoring shortcut will be generated on the desktop of your PC.**

5. Xtender Monitoring Program for PC

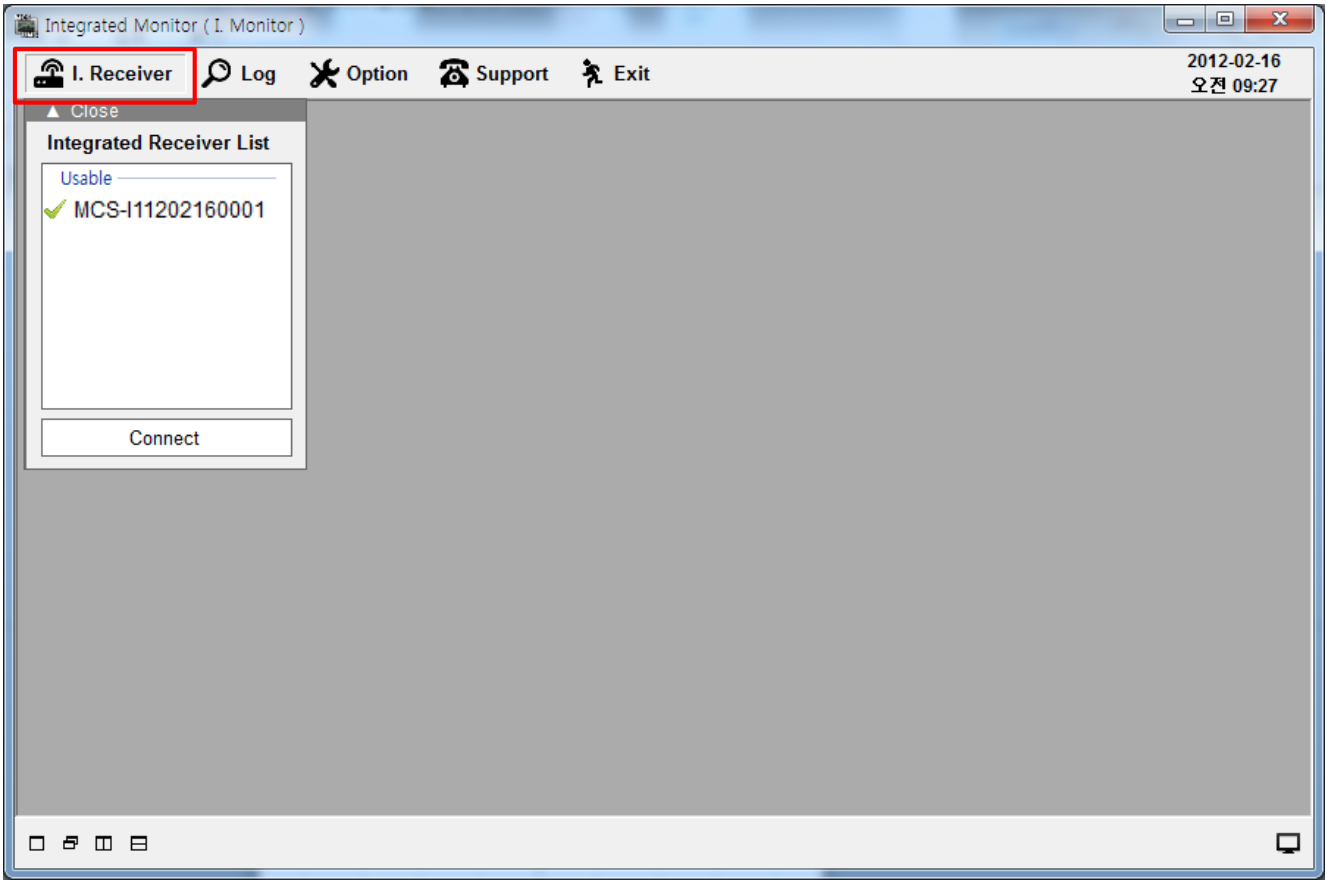
● INTEGRATED MONITORING PROGRAM



- Double click the generated icon of Integrated Monitoring Program on the wallpaper to activate program as above picture.
- Connect your PC with “Integration Router” using USB Cable supplied with Xtender.
- COM PORT will be set automatically.
- Integrated Monitoring program can perform following functions.
  - ① Xtender Operation
  - ② BMS Operation
  - ③ Xtender Operation & BMS Operation at the same time.(Integrated operation is possible only for Discharging, not for Restoration.)
  - ④ Loading the Log Files saved and issuing the Test Reports.

5. Xtender Monitoring Program for PC

- **INTEGRATED MONITORING PROGRAM FOR EQUIPMENT CONTROL**



① **Activate Integrated Monitoring Program.**

② **Select I. Receiver on the top menus. (will be shows as MCS-serial number)**

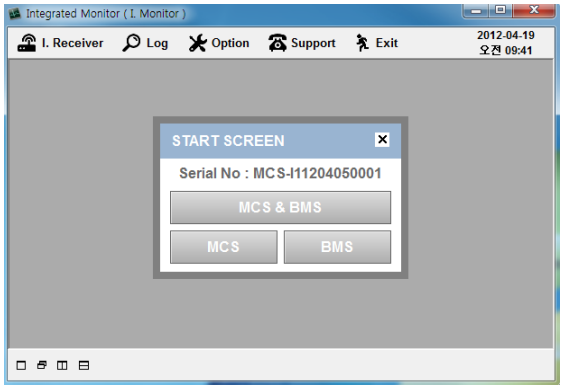
③ **Serial No. of the units will be shown as above**

④ **Select one unit on the list and “double click” it or click “connect” for activation**

Integrated receiver will be connected with Xtender one to one (1:1)

5. Xtender Monitoring Program for PC

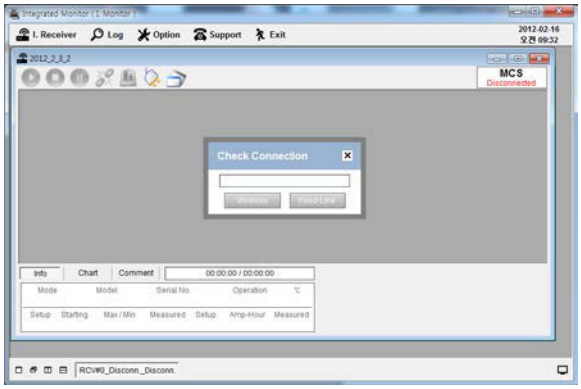
- **INTEGRATED MONITORING PROGRAM FOR EQUIPMENT CONTROL**



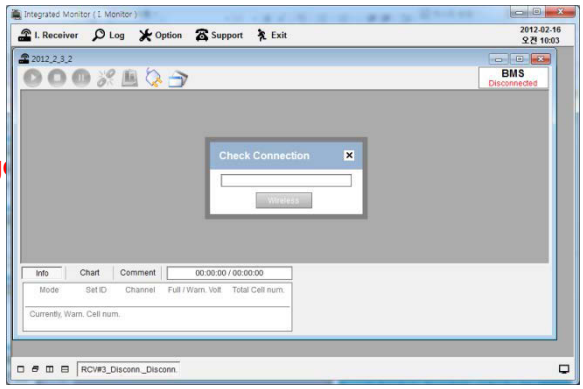
⑤ **Select equipment you want to operate.**

- ✓ **MCS : Xtender only**
- ✓ **BMS : BMS only**
- ✓ **MCS+BMS : Xtender + BMS synchronized**

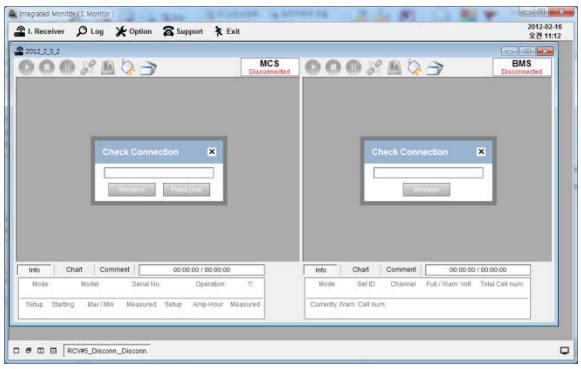
Synchronization only possible during manual discharg



[Xtender only]



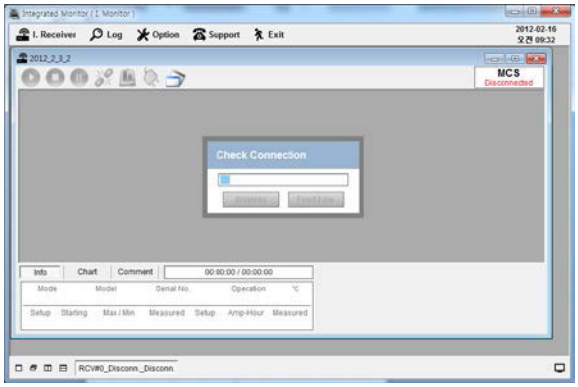
[BMS only]



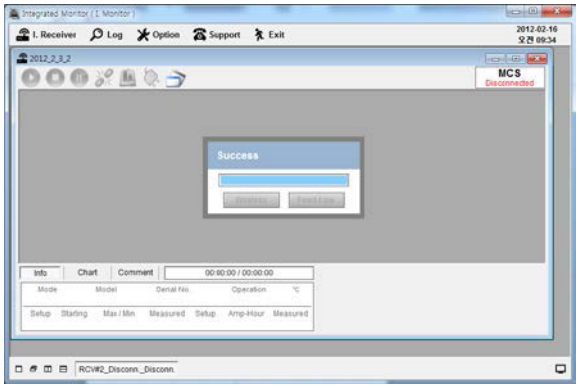
[Xtender + BMS synchronized]

5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM – Xtender CONTROL



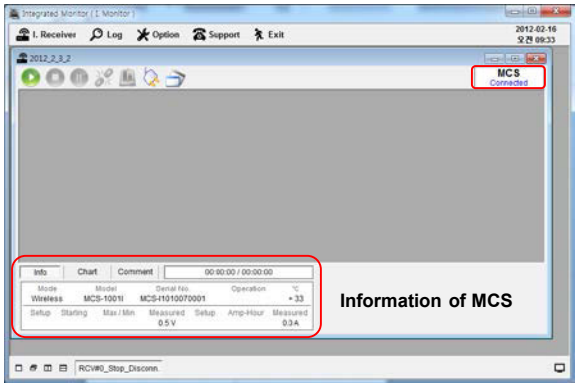
⑥ Select MCS only for Xtender only.



⑦ You can select the communication method from options below.

✓ Wireless : Bluetooth 2.4GHz

✓ Fixed-Line : Serial communication by cable (Serial cable should be connected between Xtender and Router.)



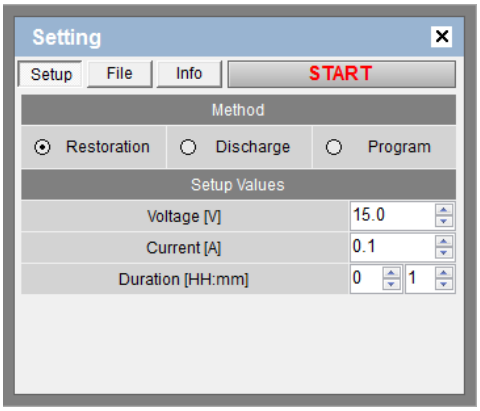
⑧ Xtender is connected.

⑨ Click from top menu to proceed.

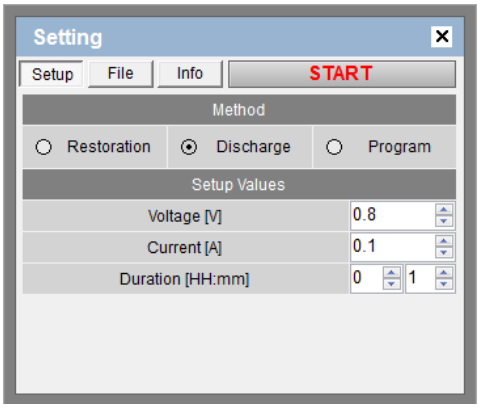
5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM – Xtender CONTROL

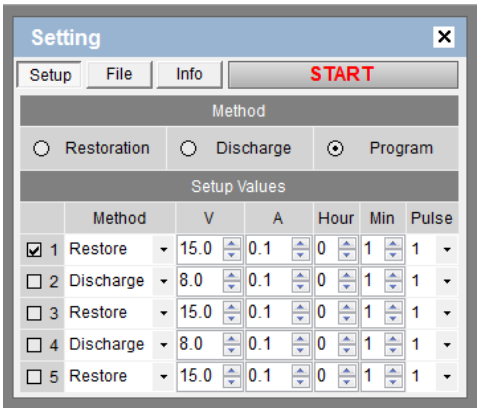
⑩ Pop-up window for setting ➔ Click “start” after input setting data



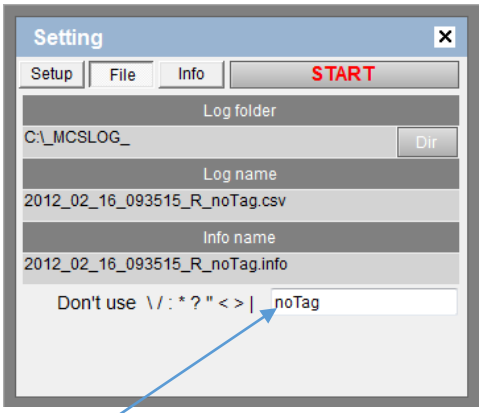
[(Manual-Restoration Setting]



[Manual-Discharge Setting]



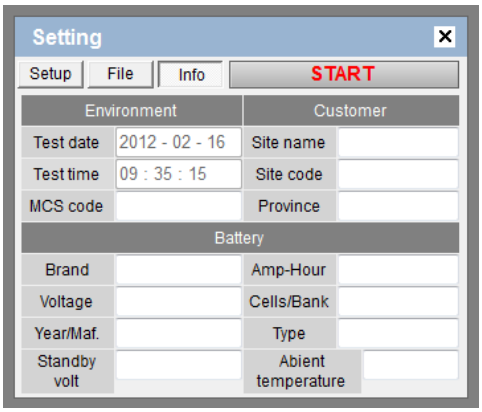
[Program Setting]



[Folder for saving Log file]

[Tip]

“Tag” will help you find log files saved.



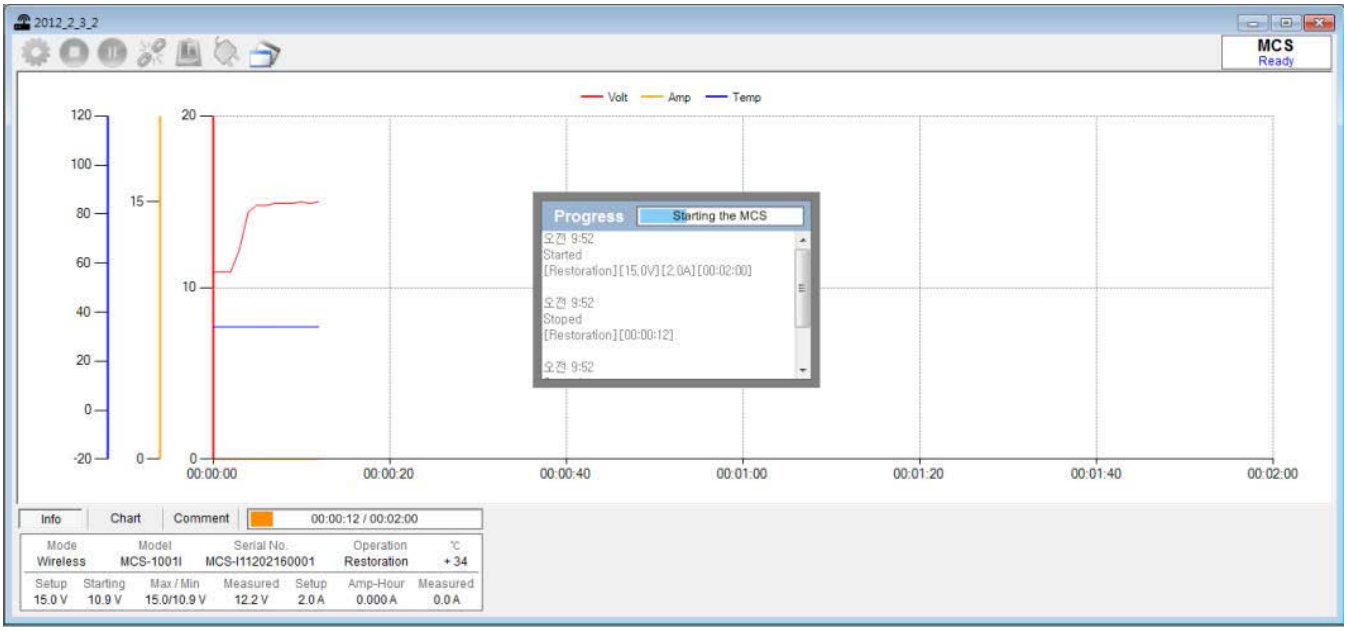
[Information of Customers & Batteries]

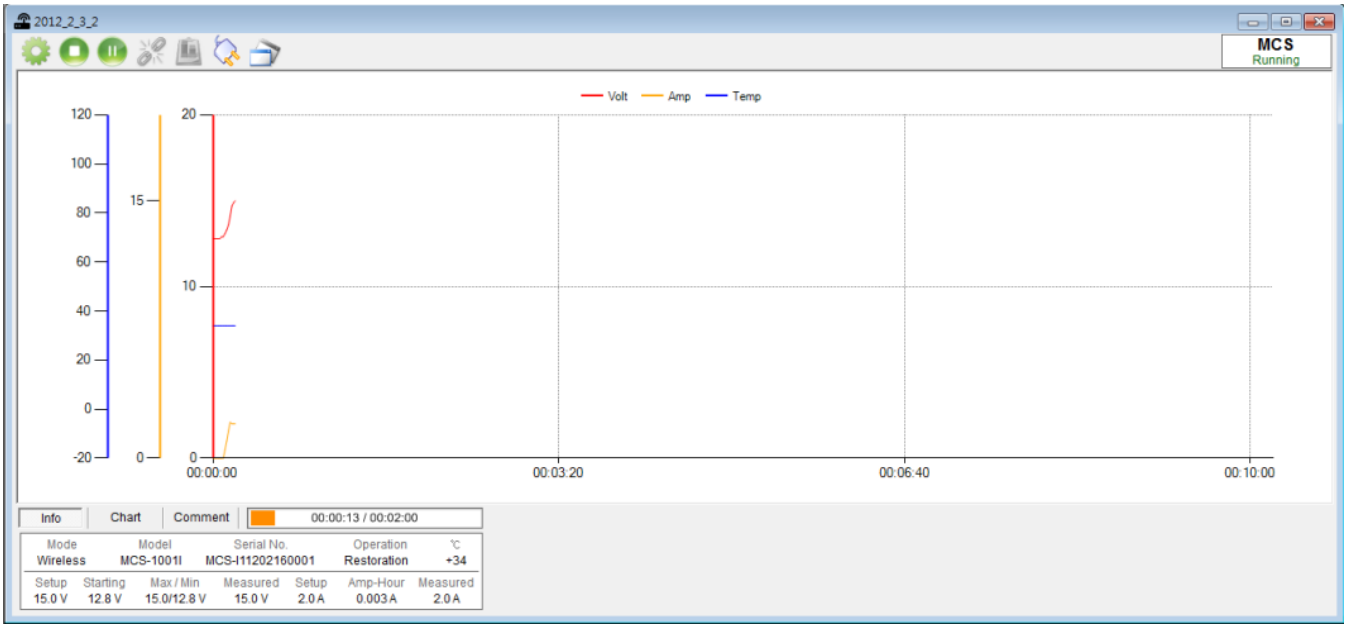
[Tip]

If you leave a record it will help you to issue the Test Report and manage the Log Files.

5. Xtender Monitoring Program for PC

- **INTEGRATED MONITORING PROGRAM – Xtender CONTROL**



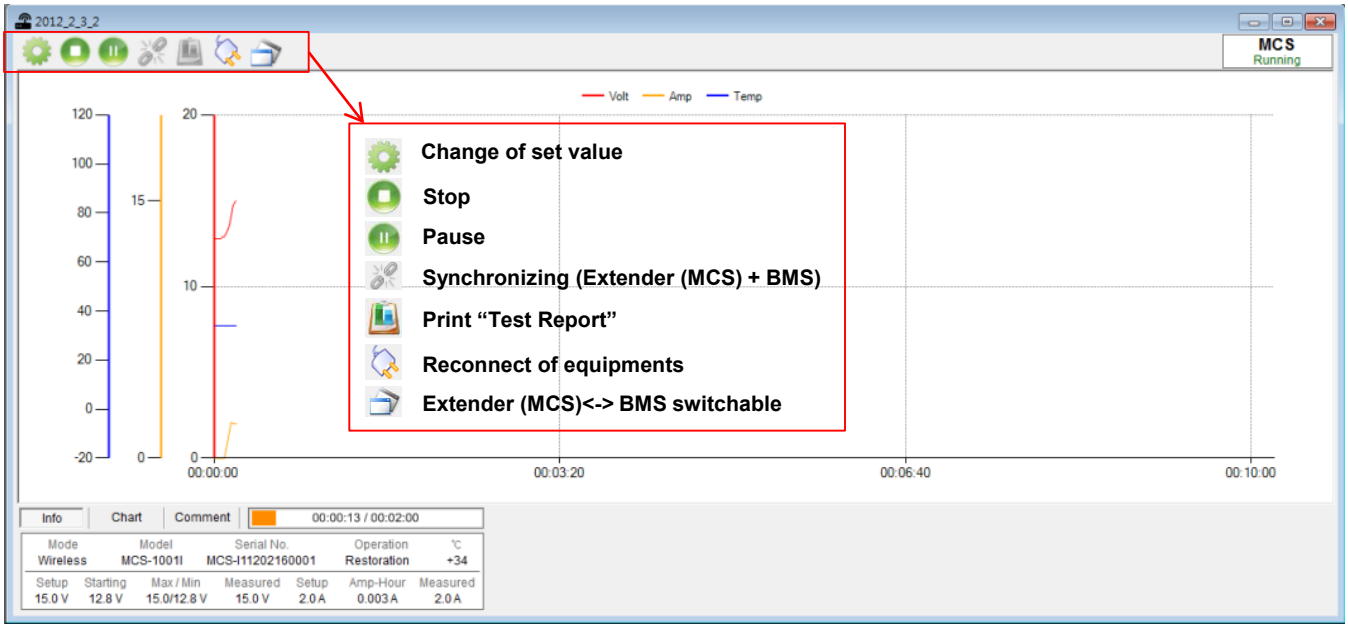


[Graph in progress]

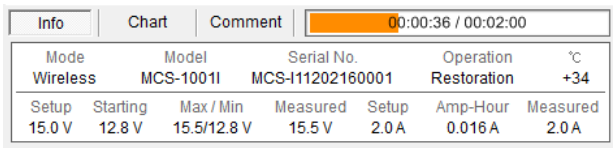
5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM – Xtender CONTROL

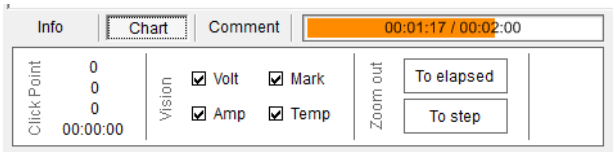
❖ Operation Mode : Top Menus

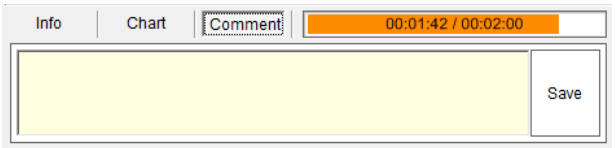


❖ Operation Mode : Bottom Menus



- **Information of Xtender & Operation**



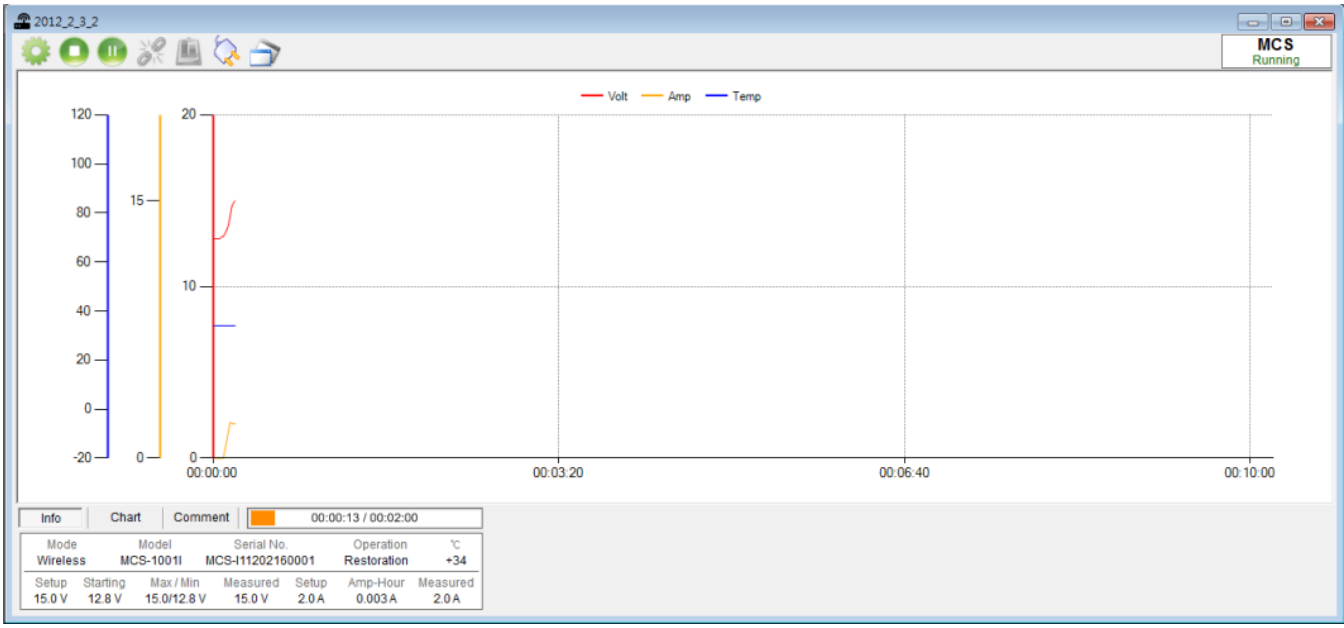


- **You can leave a comment in Log files then click the save button to save your record in Log files.**
- **When you check the Log file, you can find the record from "Comment"**

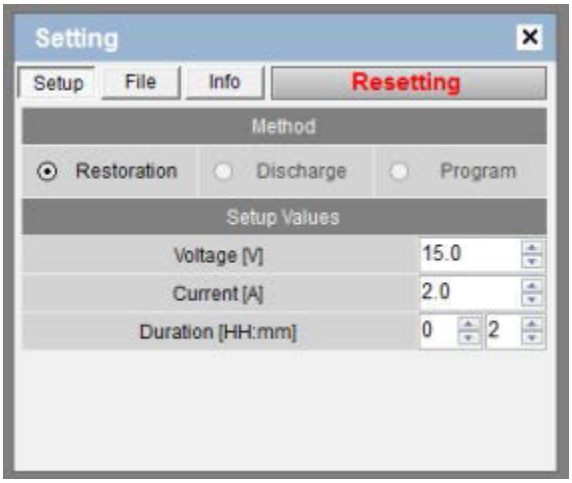
- **Check Point : Acting values on the check point of graph (Voltage, Ampere, Temperature, Time)**
- **Vision : Graph items to be selected.**
- **To elapsed : Graph until elapsed time.**
- **To step : return to previous range**

5. Xtender Monitoring Program for PC

- **INTEGRATED MONITORING PROGRAM – Xtender CONTROL**



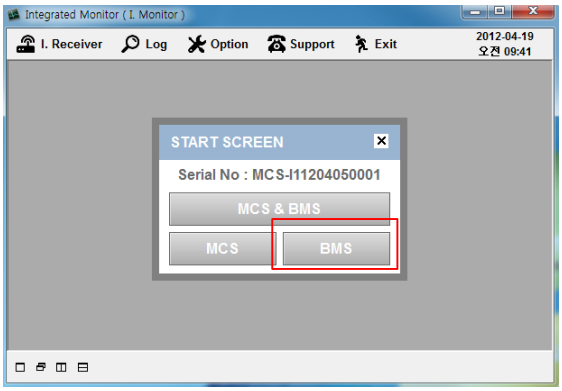
When you change Set values during Xtender operation, Select  **and revise set value.**



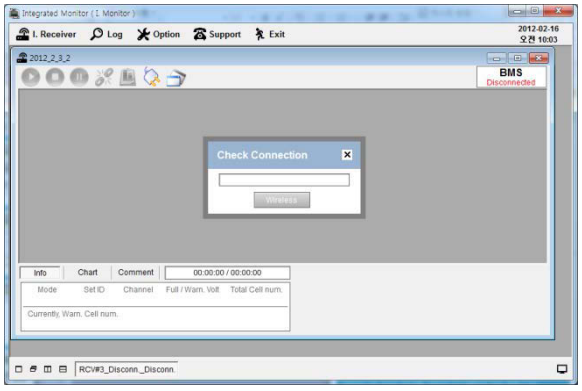
After revising set values, click “Resetting” button to apply new values.

5. Xtender Monitoring Program for PC

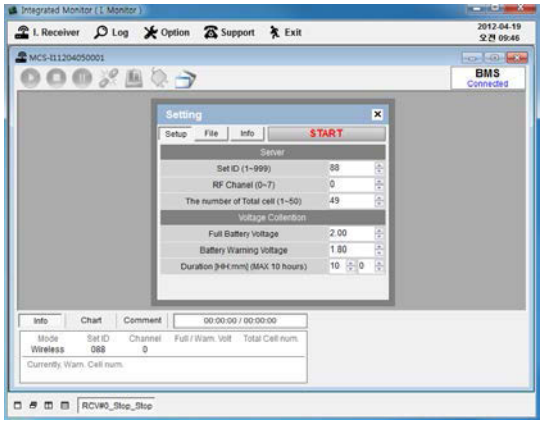
● INTEGRATED MONITORING PROGRAM – BMS CONTROL



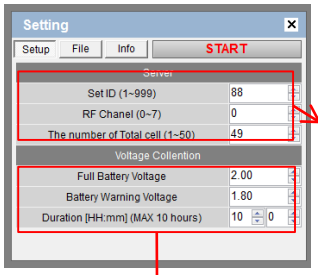
① **Select "BMS"**



② **Process of connection with BMS.**



③ **When you select , pop-up window for setting will be shown on the screen Input set values, then click "Start" button for activation.**



BMS Server Setting

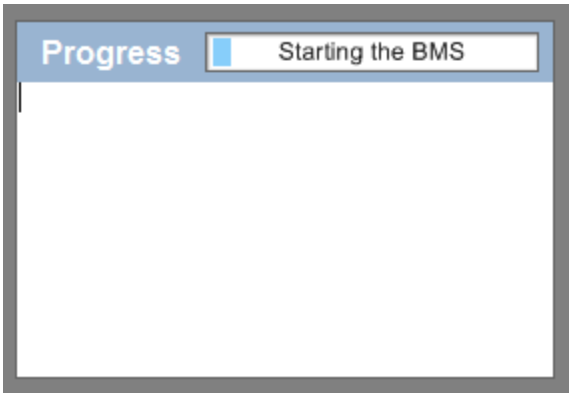
- ✓ **Set ID**
- ✓ **Channel**
- ✓ **The num of BMS cell**

BMS Voltage Setting

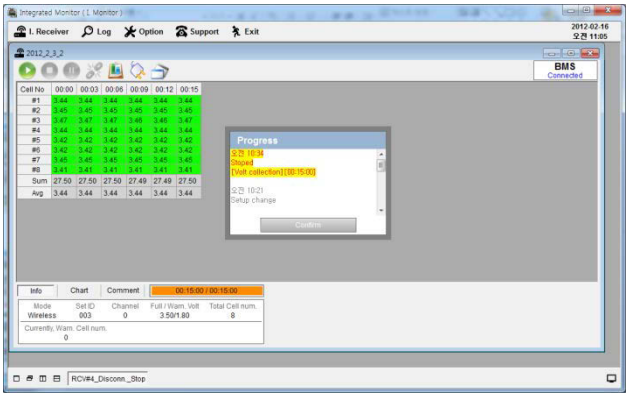
- ✓ **Full Battery Voltage : Full charging voltage**
- ✓ **Battery Warning Voltage :**
- ✓ **Duration : Operation Time**

5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM – BMS CONTROL

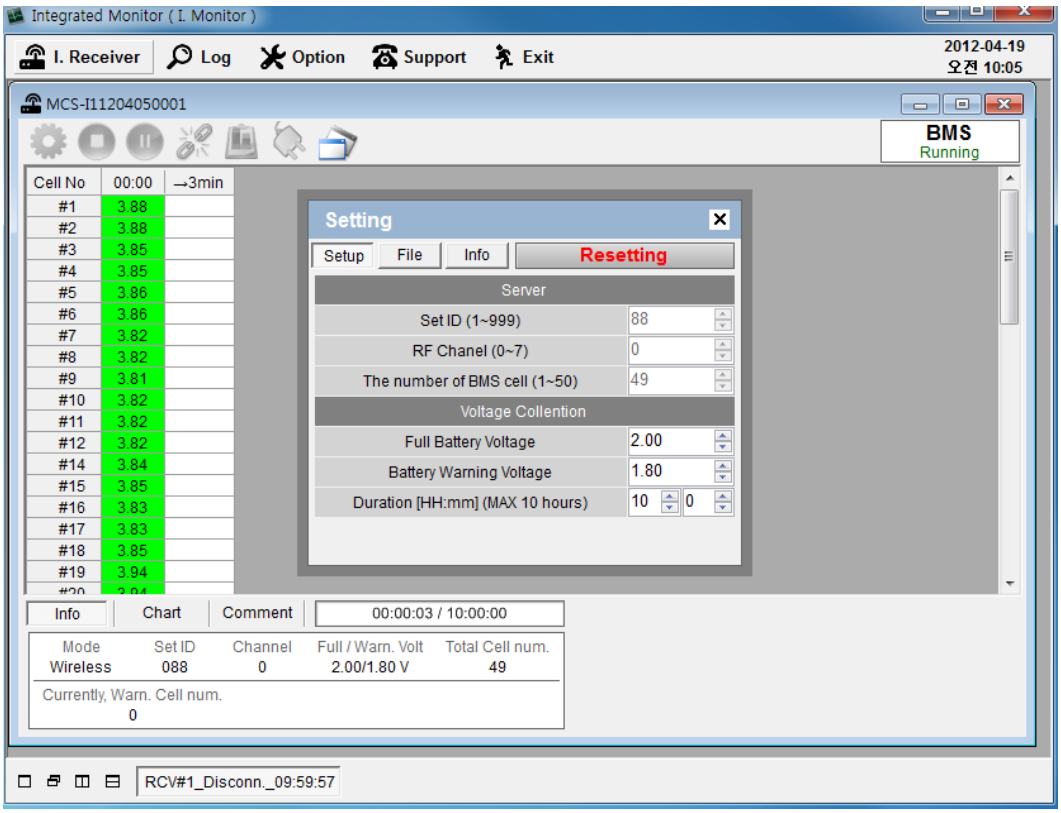


④ **BMS is in progress**



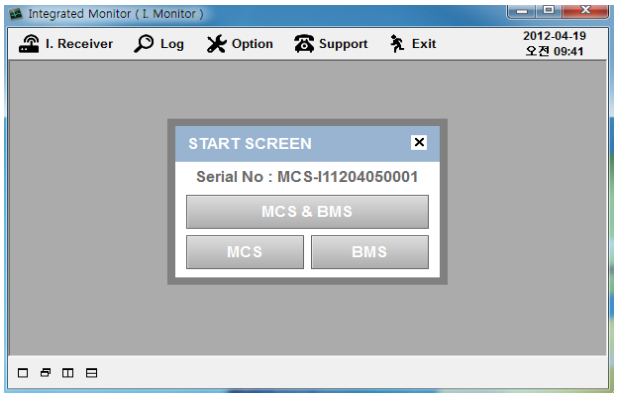
⑤ **BMS proceed during Set Time**

When you change Set values during BMS operation, Select  **to revise set values.**

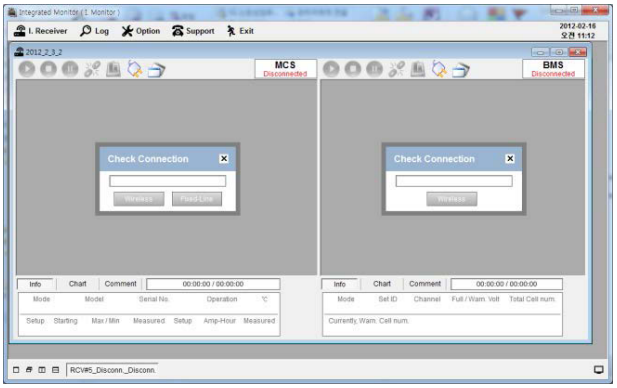


5. Xtender Monitoring Program for PC

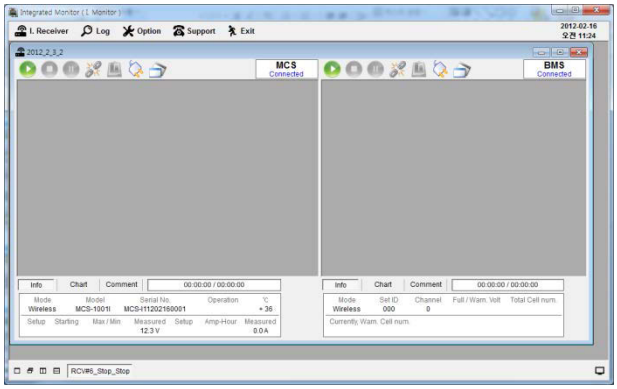
- **INTEGRATED MONITORING PROGRAM – Xtender+BMS CONTROL**
  USED TO MONITOR MANUAL DISCHARGE CYCLE ONLY



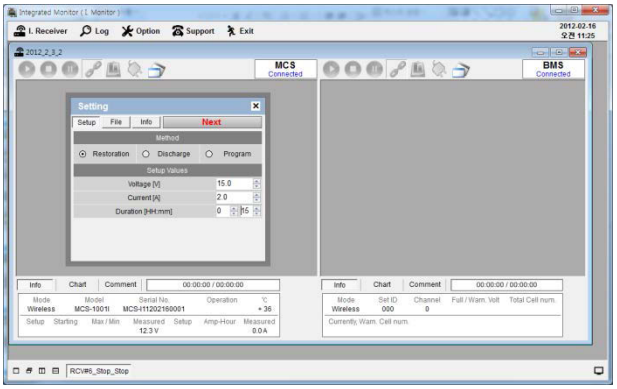
① **Select “MCS+BMS”**



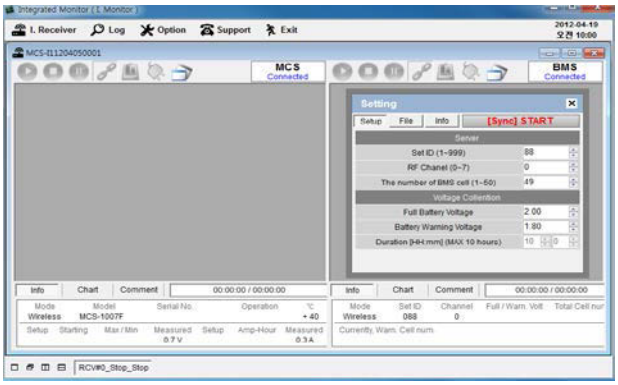
② **Process of connecting with MCS+BMS**



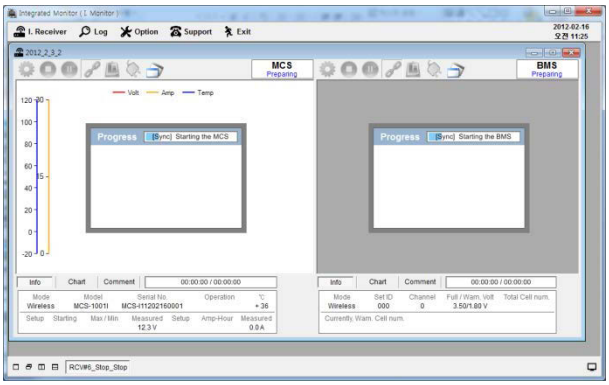
③ **Click**  **button to synchronize MCS and BMS.**



④ **Click**  **of MCS on the left ➔ input Set Values ➔ Click “Next” .**



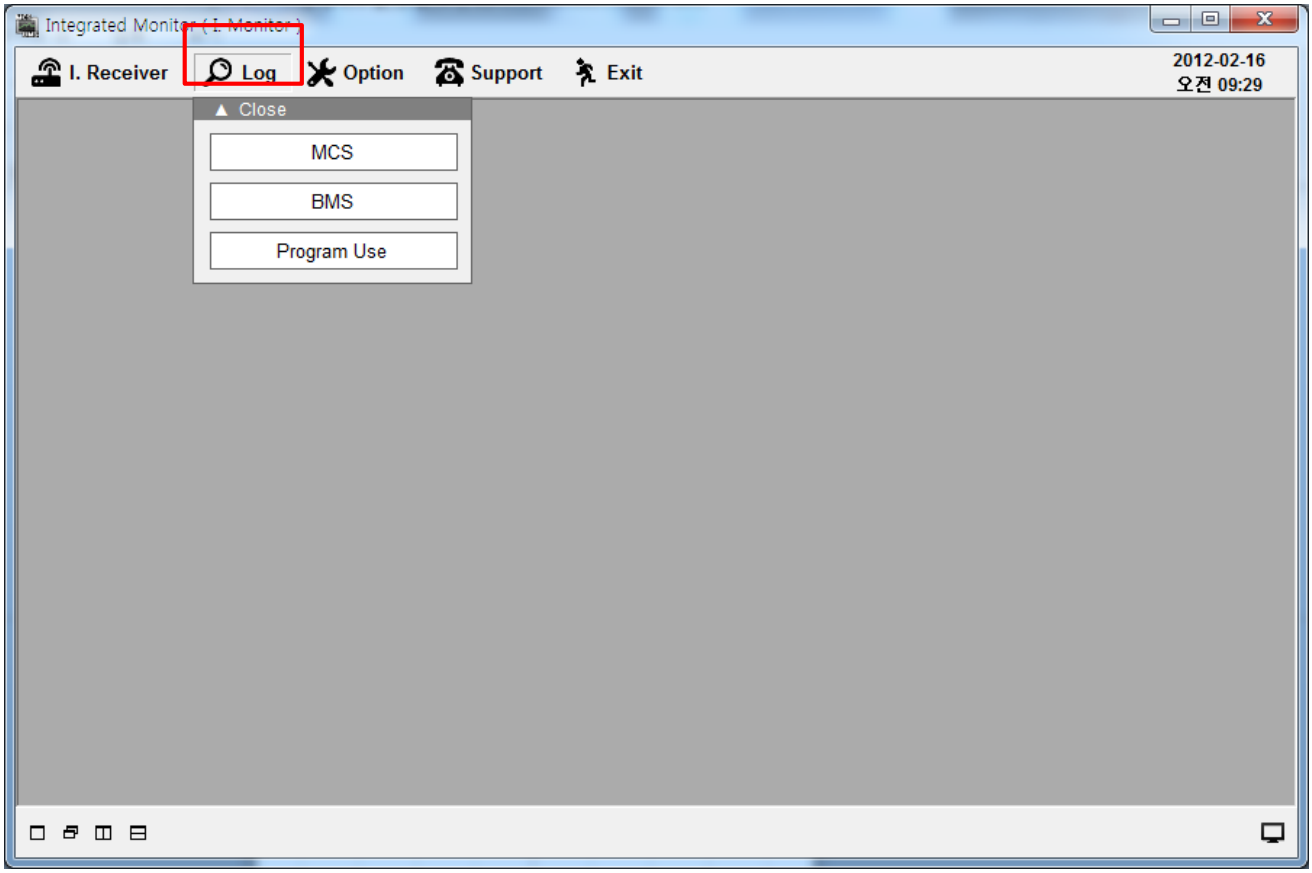
⑤ **Click**  **of BMS on the right ➔ input Set values➔ Click [Sync]”START”.**



⑥ **MCS and BMS are synchronized(integrated).**

5. Xtender Monitoring Program for PC

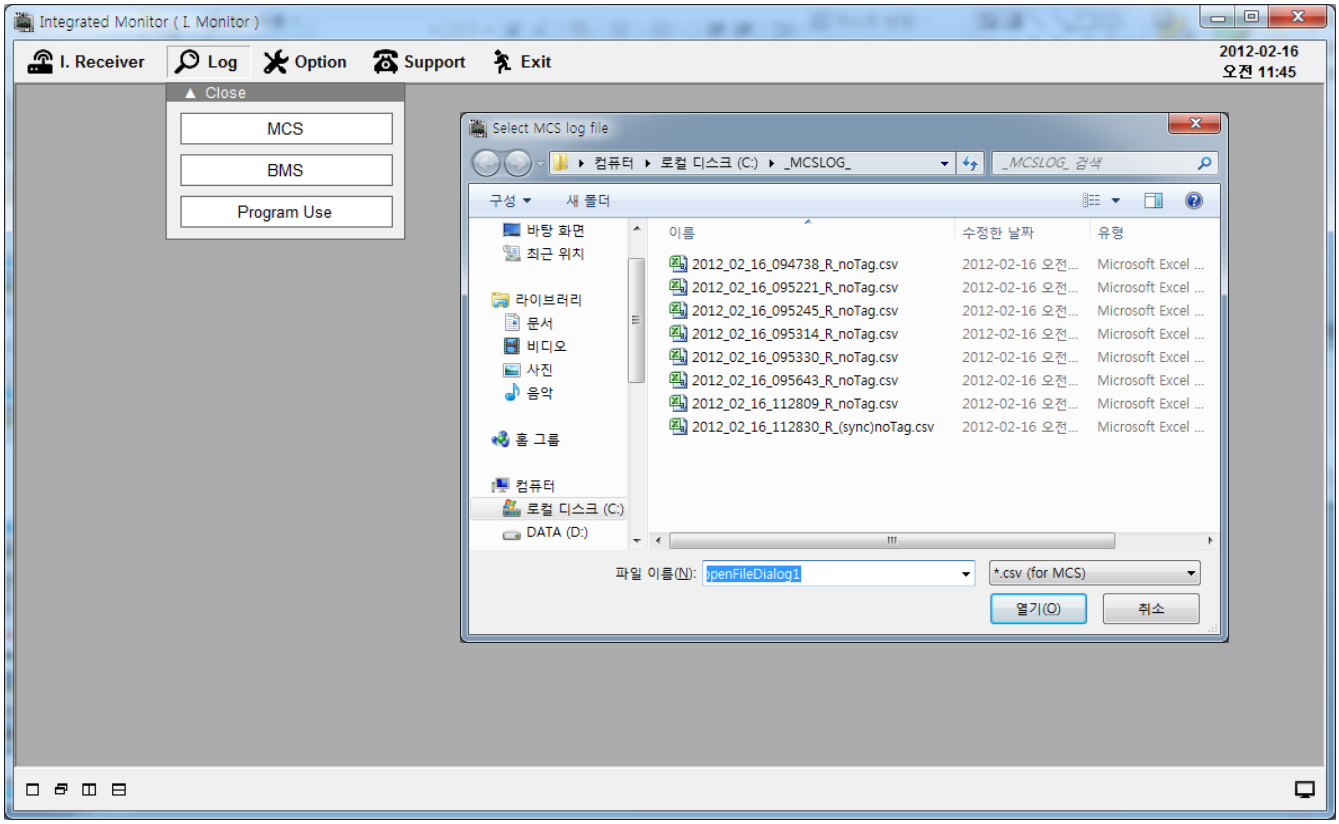
- **INTEGRATED MONITORING PROGRAM – LOG FILE VIEWING & PRINTING**



- **"Log file" saved in SD memory card or in PC shows the details of operation in a short time.**
- **"Test Report" can be printed for customers.**
- **We can review Xtender use history data through reviewing Log Files.**

5. Xtender Monitoring Program for PC

- **INTEGRATED MONITORING PROGRAM – LOG FILE VIEWING & PRINTING**



① **Click Log button on the top menu ➔ Select item on the list (MCS(Xtender), BMS. or Program Use)**

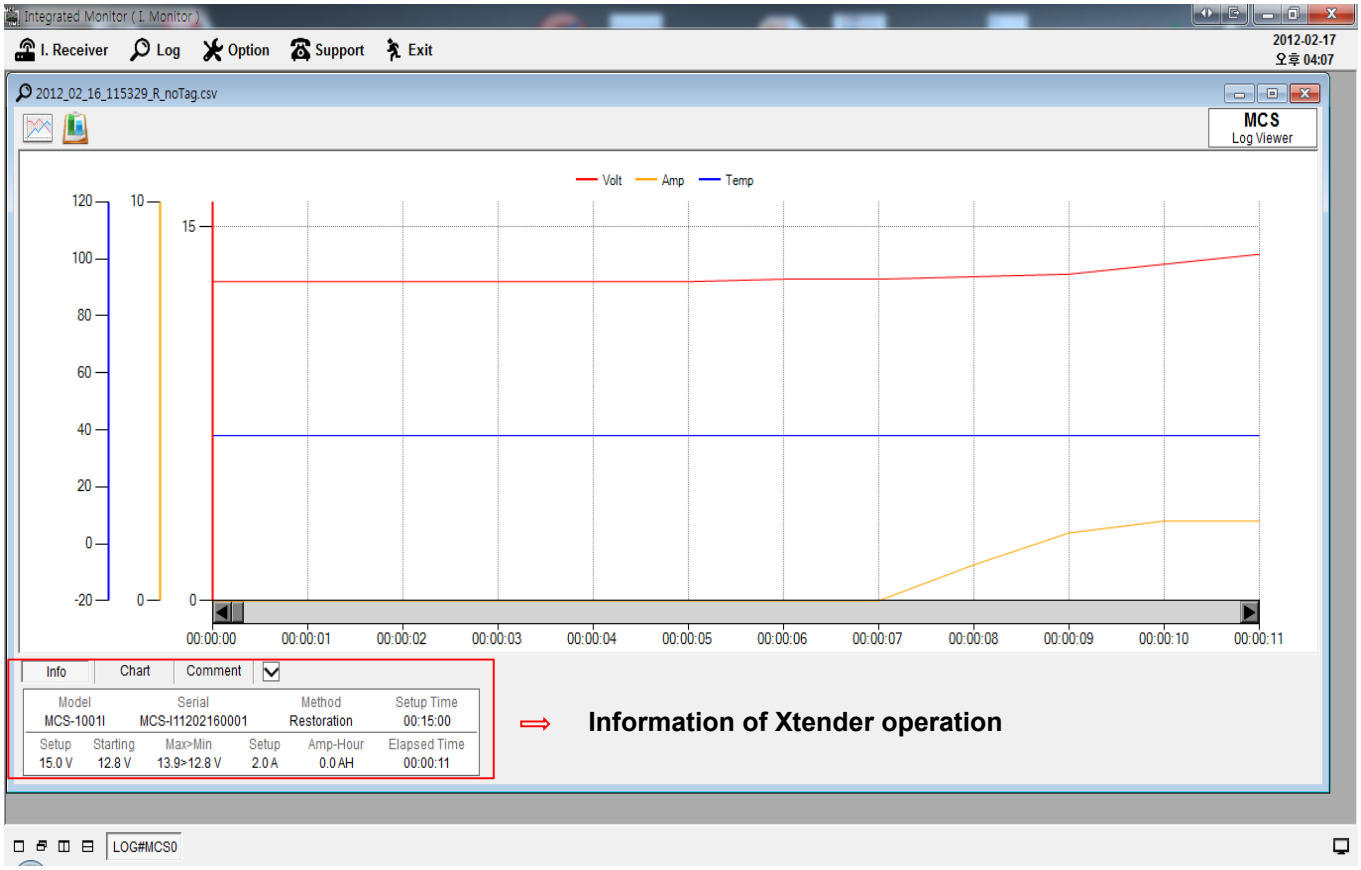
➔ Log Files will be pop-up on the screen.

② **Select one Log file on the list ➔ it will show up on the screen.**

5. Xtender Monitor Program for PC

● INTEGRATED MONITOR PROGRAM – LOG FILE VIEWING & PRINTING

❖ Example : Xtender Log file on the Screen

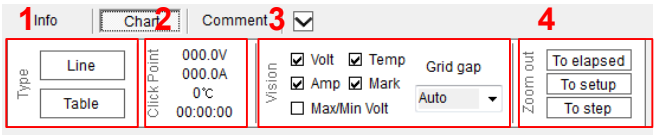


⇨ **Information of Xtender operation**

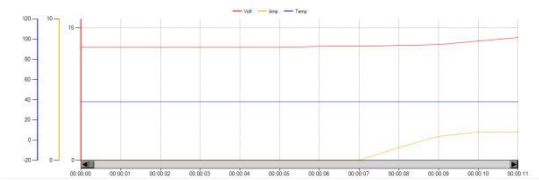
5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM – LOG FILE VIEWING & PRINTING

❖ **Xtender Log file : Bottom Menus**



1. Type

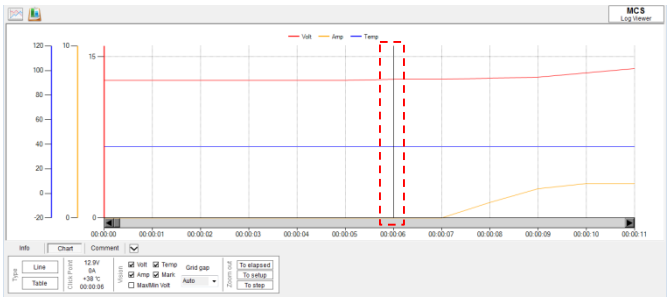


[Line Graph]

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16
2012-02-..	11:53:36	0	0	015.0	002.0	00:15	012.8	000.0	0000..	+038	1	60	0	0	00:00
2012-02-..	11:53:37	0	0	015.0	002.0	00:15	012.8	000.0	0000..	+038	1	60	0	0	00:00
2012-02-..	11:53:38	0	0	015.0	002.0	00:15	012.8	000.0	0000..	+038	1	60	0	0	00:00
2012-02-..	11:53:39	0	0	015.0	002.0	00:15	012.8	000.0	0000..	+038	1	60	0	0	00:00
2012-02-..	11:53:40	0	0	015.0	002.0	00:15	012.8	000.0	0000..	+038	1	60	0	0	00:00
2012-02-..	11:53:41	0	0	015.0	002.0	00:15	012.8	000.0	0000..	+038	1	60	0	0	00:00
2012-02-..	11:53:42	0	0	015.0	002.0	00:15	012.9	000.0	0000..	+038	1	60	0	0	00:00
2012-02-..	11:53:43	0	0	015.0	002.0	00:15	012.9	000.0	0000..	+038	1	60	0	0	00:00
2012-02-..	11:53:44	0	0	015.0	002.0	00:15	013.0	000.9	0000..	+038	1	60	0	0	00:00
2012-02-..	11:53:45	0	0	015.0	002.0	00:15	013.1	001.7	0000..	+038	1	60	0	0	00:00
2012-02-..	11:53:46	0	0	015.0	002.0	00:15	013.5	002.0	0000..	+038	1	60	0	0	00:00
2012-02-..	11:53:47	0	0	015.0	002.0	00:15	013.9	002.0	0000..	+038	1	60	0	0	00:00

[Table chart]

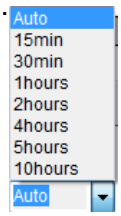
2. Check Point



Check Point Function : Possible to check the information of Voltage, Ampere, Temperature, Time on the point of the line graph by selecting each line.

3. Vision

Select items to be shown on the screen



You can select “Grid gap” on the list to show up as per your choice.

4. Zoom out

- **To elapsed : until elapsed time**
- **To setup : until set time**
- **To step : return to previous range**

If you leave any messages by using the Comment Function during operation of Xtender or BMS, you can read it when you activate the Log file saved.

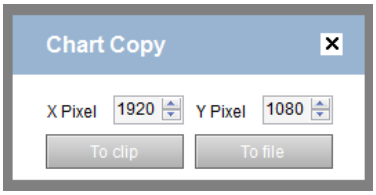
5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM – LOG FILE VIEWING & PRINTING

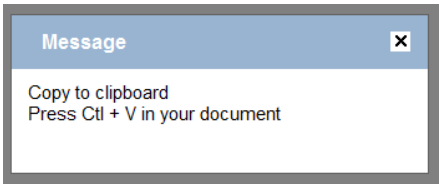
❖ **Xtender Log file : Top Menu**

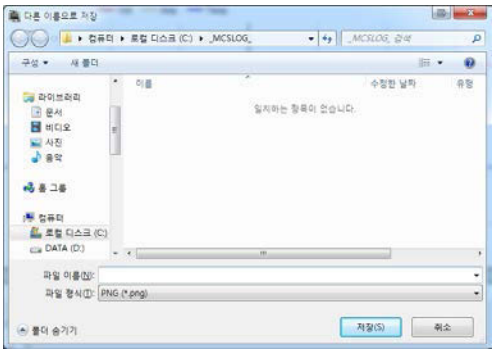


1.  **Copy the Chart .**

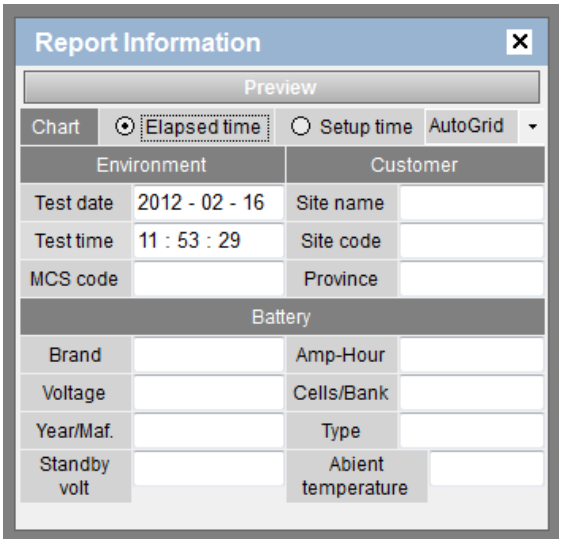


Adjust pixel of X. Y. Save or copy the chart as the graphic file.





2.  **Print "Test Report".**



Input the information and make "Preview" for printing Test Report.

Setting of time for the printing of Chart :

- Elapsed time :

- Setup time :

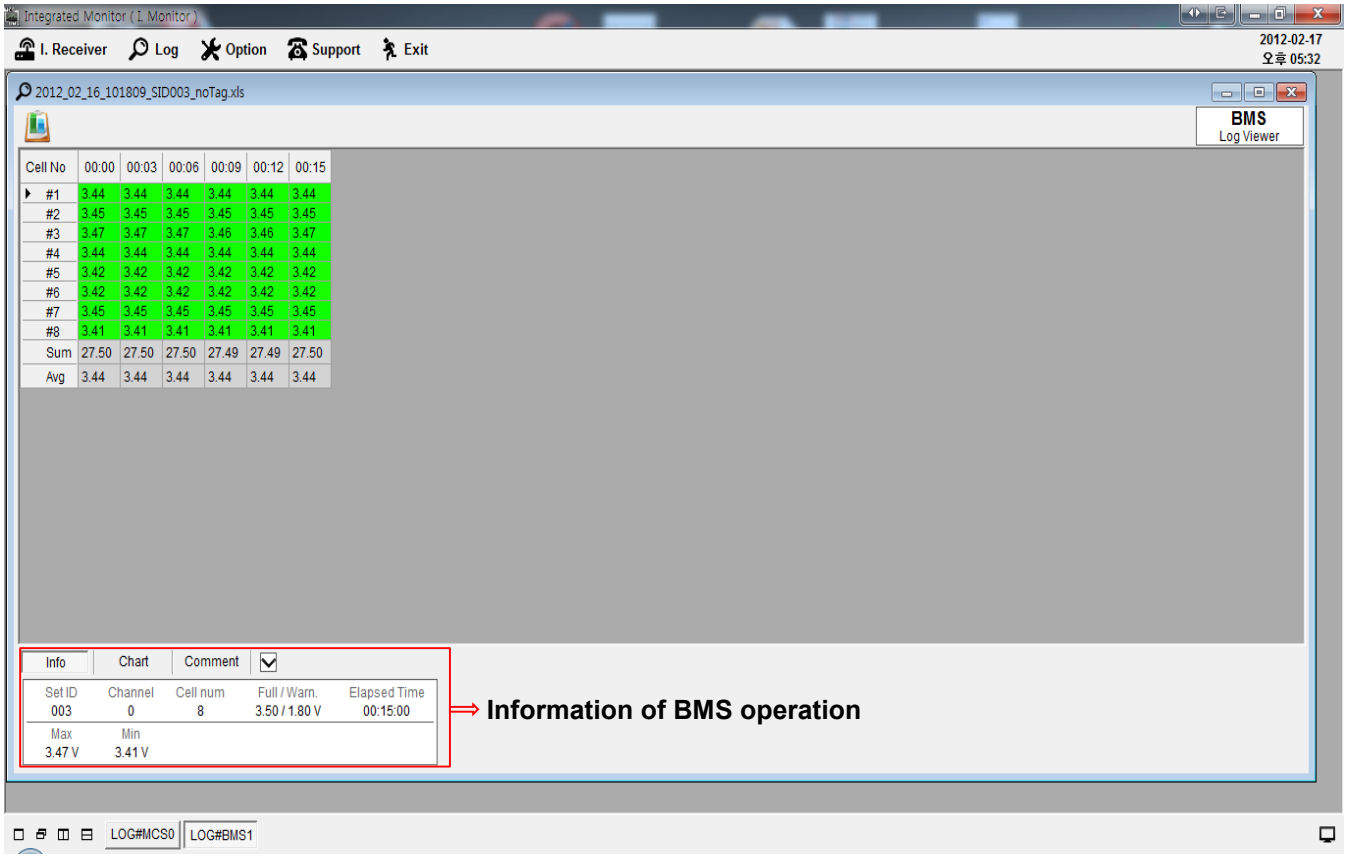
****Although it does not continue to operation during full set time. Time axis will be printed for full set time.**

It is very useful to compare the improvement between before and after regeneration for the customers.

5. Xtender Monitoring Program for PC

- **INTEGRATED MONITORING PROGRAM – LOG FILE VIEWING & PRINTING**

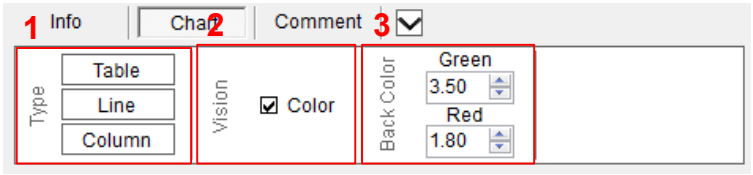
❖ **Example : BMS Log file on Screen**



5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM – LOG FILE VIEWING & PRINTING

❖ **BMS Log file : Bottom Menu – Table Chart**



1. Type

Cell No	00:00	00:03	00:06	00:09	00:12	00:15
#1	3.44	3.44	3.44	3.44	3.44	3.44
#2	3.45	3.45	3.45	3.45	3.45	3.45
#3	3.47	3.47	3.47	3.46	3.46	3.47
#4	3.44	3.44	3.44	3.44	3.44	3.44
#5	3.42	3.42	3.42	3.42	3.42	3.42
#6	3.42	3.42	3.42	3.42	3.42	3.42
#7	3.45	3.45	3.45	3.45	3.45	3.45
#8	3.41	3.41	3.41	3.41	3.41	3.41
Sum	27.50	27.50	27.50	27.49	27.49	27.50
Avg	3.44	3.44	3.44	3.44	3.44	3.44

[Table]

2. Vision ➔ Color

Cell No	00:00	00:03	00:06	00:09	00:12	00:15
#1	3.44	3.44	3.44	3.44	3.44	3.44
#2	3.45	3.45	3.45	3.45	3.45	3.45
#3	3.47	3.47	3.47	3.46	3.46	3.47
#4	3.44	3.44	3.44	3.44	3.44	3.44
#5	3.42	3.42	3.42	3.42	3.42	3.42
#6	3.42	3.42	3.42	3.42	3.42	3.42
#7	3.45	3.45	3.45	3.45	3.45	3.45
#8	3.41	3.41	3.41	3.41	3.41	3.41
Sum	27.50	27.50	27.50	27.49	27.49	27.50
Avg	3.44	3.44	3.44	3.44	3.44	3.44

[Activated]

Cell No	00:00	00:03	00:06	00:09	00:12	00:15
#1	3.44	3.44	3.44	3.44	3.44	3.44
#2	3.45	3.45	3.45	3.45	3.45	3.45
#3	3.47	3.47	3.47	3.46	3.46	3.47
#4	3.44	3.44	3.44	3.44	3.44	3.44
#5	3.42	3.42	3.42	3.42	3.42	3.42
#6	3.42	3.42	3.42	3.42	3.42	3.42
#7	3.45	3.45	3.45	3.45	3.45	3.45
#8	3.41	3.41	3.41	3.41	3.41	3.41
Sum	27.50	27.50	27.50	27.49	27.49	27.50
Avg	3.44	3.44	3.44	3.44	3.44	3.44

[Inactivated]

3. Back Color

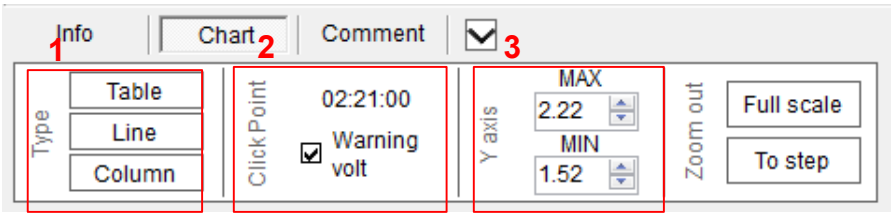
2.09	1.99	1.99	2.00	1.99	2.00	1.99	1.99	1.99	1.99	1.99	1.99
2.01	1.92	1.93	1.93	1.93	1.93	1.93	1.93	1.92	1.92	1.92	1.92
2.09	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99
2.06	1.97	1.97	1.98	1.98	1.98	1.98	1.97	1.97	1.97	1.97	1.97
2.03	1.94	1.95	1.94	1.94	1.94	1.94	1.92	1.90	1.84	1.88	1.89
2.07	1.97	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.97
2.02	1.93	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.93	1.93
2.05	1.95	1.95	1.96	1.96	1.95	1.95	1.95	1.95	1.95	1.95	1.95
2.07	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.97
2.07	1.98	1.99	1.99	1.99	1.99	1.99	1.99	1.98	1.98	1.98	1.98
2.05	1.95	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96
2.11	2.01	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.01	2.01	2.01
2.02	1.93	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.93	1.93	1.93
2.01	1.92	1.93	1.93	1.93	1.92	1.93	1.92	1.92	1.92	1.92	1.92

If you set default value of Voltage for Good (Green Color) and Bad (Red Color) status, Table data will be shown with gradation effect of color .

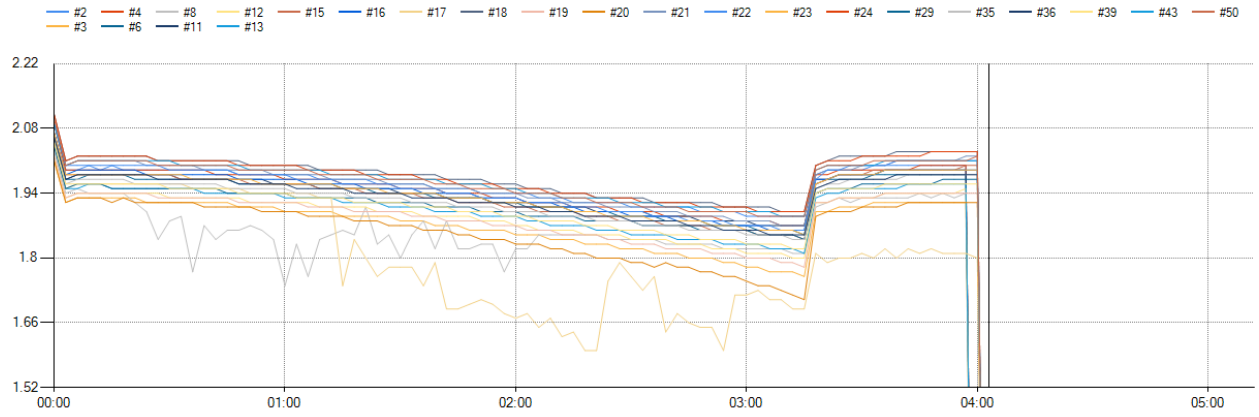
5. Xtender Monitoring Program for PC

- **INTEGRATED MONITORING PROGRAM – LOG FILE VIEWING & PRINTING**

❖ **BMS Log file : Bottom Menus – Line**



1. Line



[Line Graph]

2. Click Point

If you select a line graph on the screen, it will show the time on the point..

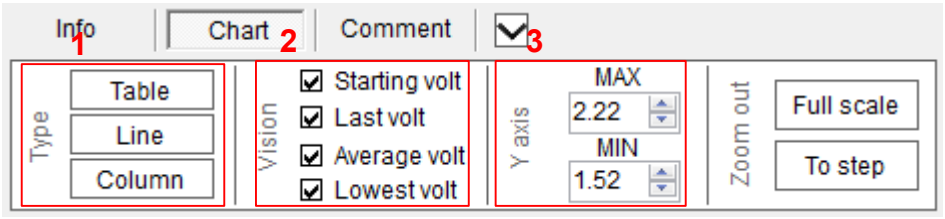
3. Y axis

You can change minimum or maximum value of the Set Voltage for Y axis.

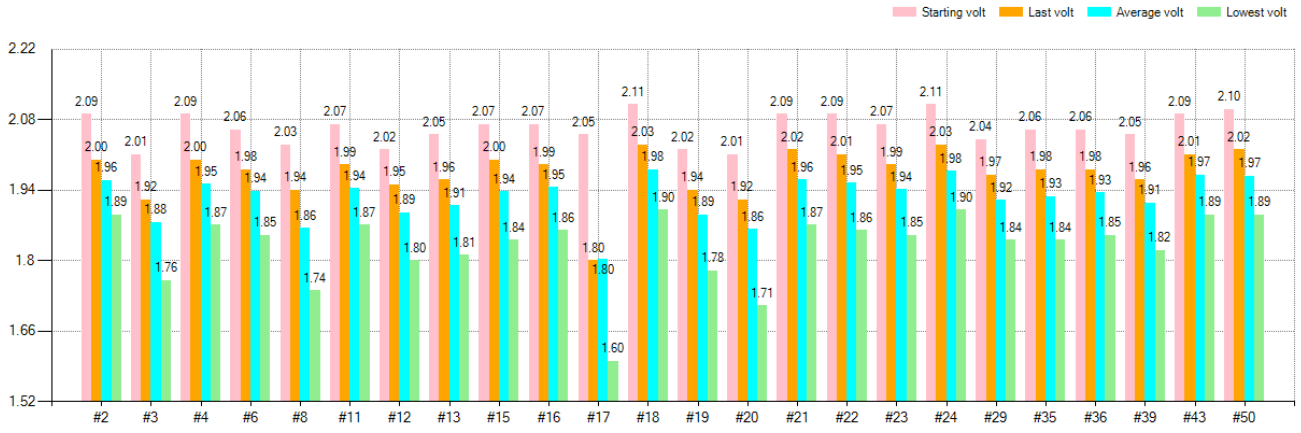
5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM – LOG FILE VIEWING & PRINTING

❖ **BMS Log file : Bottom Menus – Column**



1. Column



[Column Graph Example]

2. Vision

Select Voltage from the list to output.

- ✓ **Starting volt :**
- ✓ **Last volt :**
- ✓ **Average volt :**
- ✓ **Lowest volt :**

3. Y axis

You can change minimum or maximum value of the Set Voltage for Y axis.

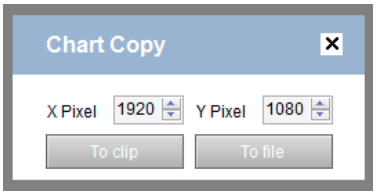
5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM – LOG FILE VIEWING & PRINTING

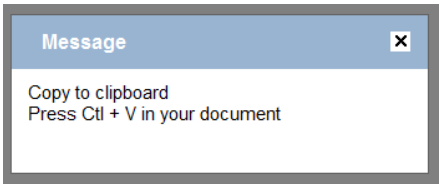
❖ Top Menus

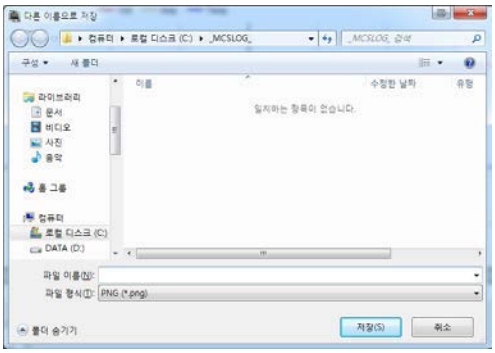


1.  **Copy the Chart**

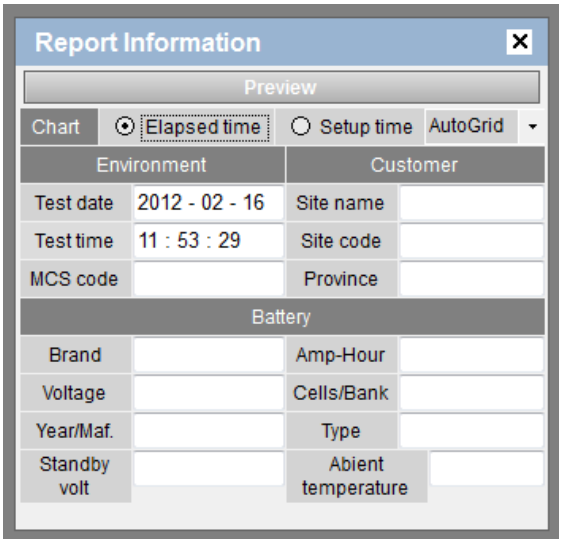


Adjust pixel of X. Y, Save or copy the chart as graphic file





2.  **Print " Test Report"**



Input the information and make "Preview" for printing Test Report.

Setting time for the printing of Chart :

-. Elapsed time :

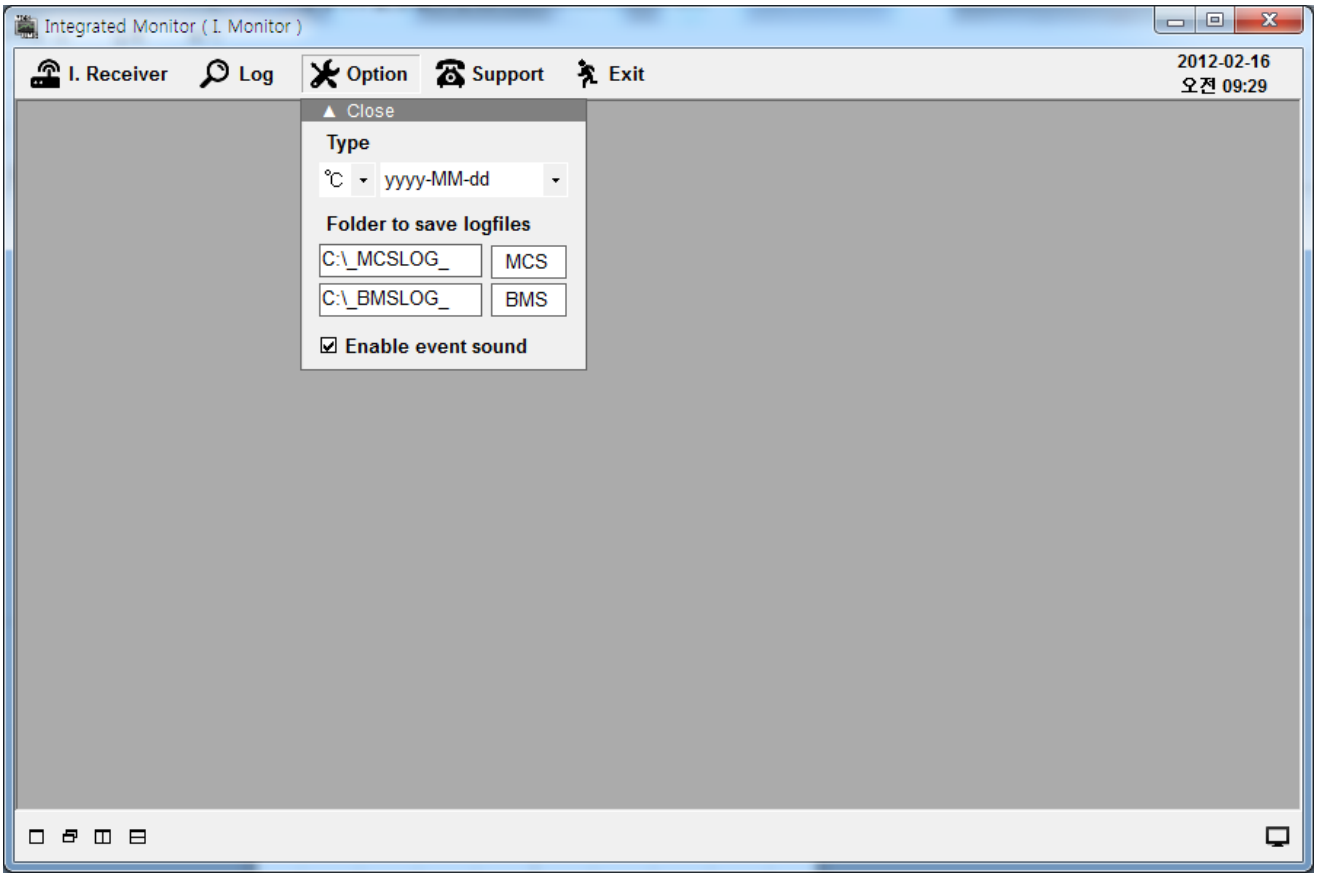
-. Setup time :

****Although the operation doesn't continue for full set time. Time axis will be printed for full set time.**

It is very useful to compare the improvement between before and after regeneration for the customers.

5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM - OPTIONS

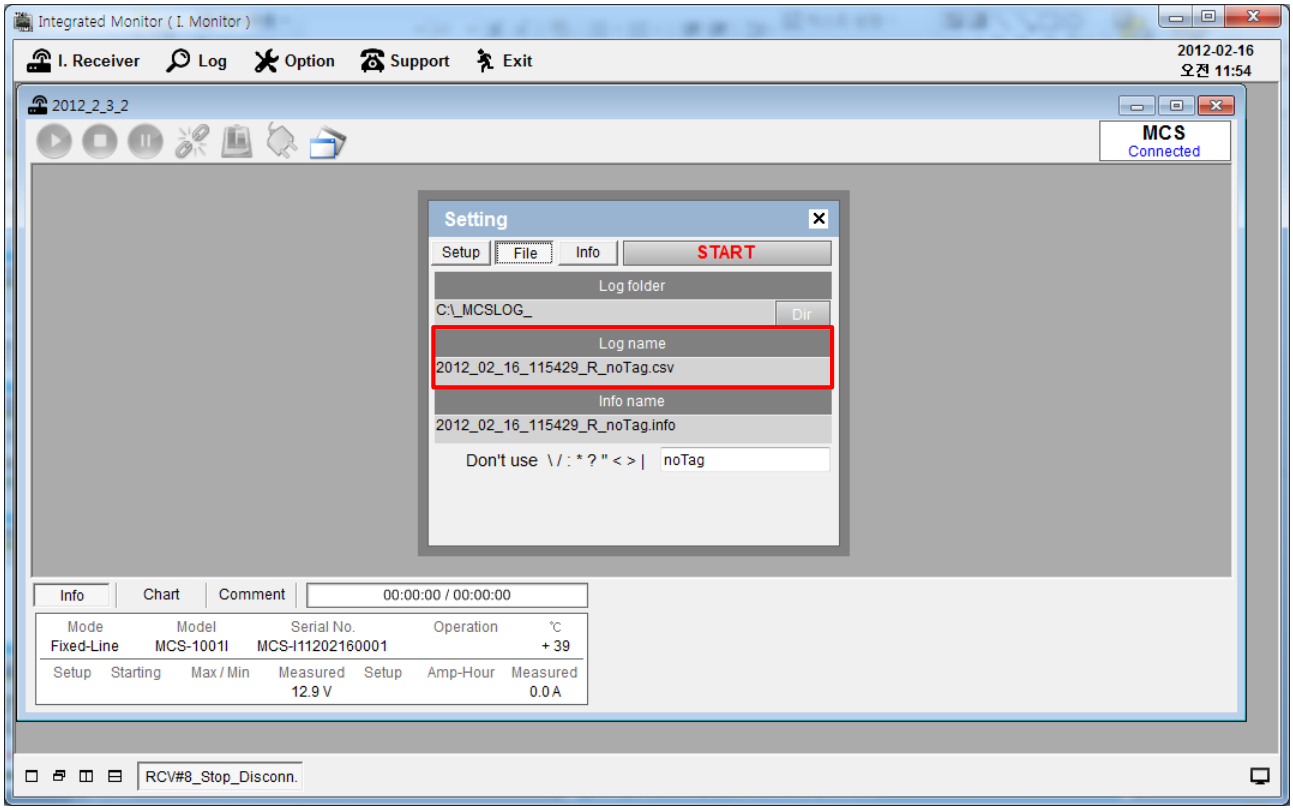


- [℃] Use Celsius at Set Temperature Axis of Chart
- [℉] Use Fahrenheit at Set Temperature Axis of Chart
- [yyyy-MM-dd] Expression style of date for inner clock or Log file name (Year-Month-Day)
- [MM-dd-yyyy] Expression style of date for inner clock or Log file name (Month-Day-Year)
- [dd-MM-yyyy] Expression style of date for inner clock or Log file name.(Day-Month-Year)
- [MCS] Set Folder to save MCS log file
- [BMS] Set Folder to save BMS log file
- [Enable event sound] Set Alarm about when operation is stopped or disconnected or recognizing the lowest Voltage from BMS.

5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM – USEFUL FUNCTIONS

❖ Tag



- Log File is saved in the name of “Date and Time” of operation hour.

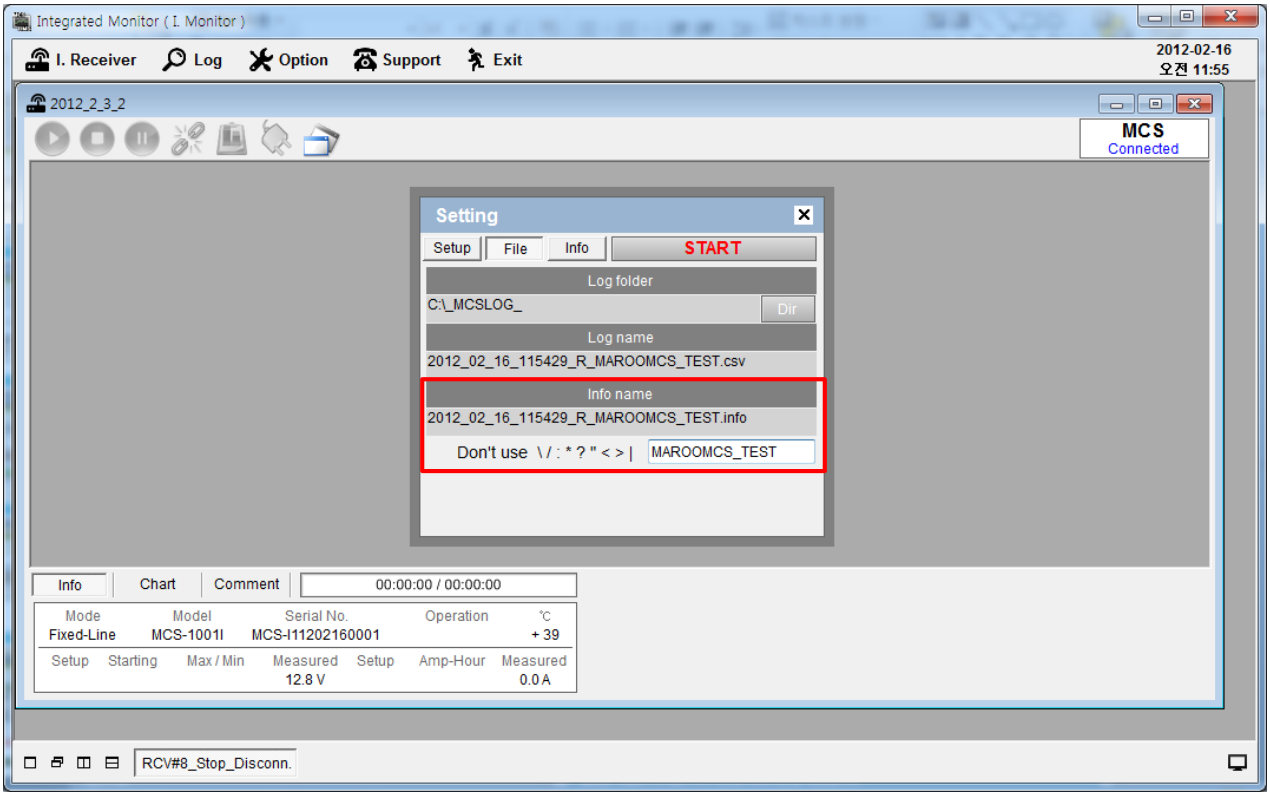
  Example) 2012_02_16_115429_R_noTag.csv : (2012.02.16, 11:54:29 Restoration)

  * **If you have any difficulties searching the Log File of a specific operation, please use the Tag Function to search the Log File conveniently.**

5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM – USEFUL FUNCTIONS

❖ Tag



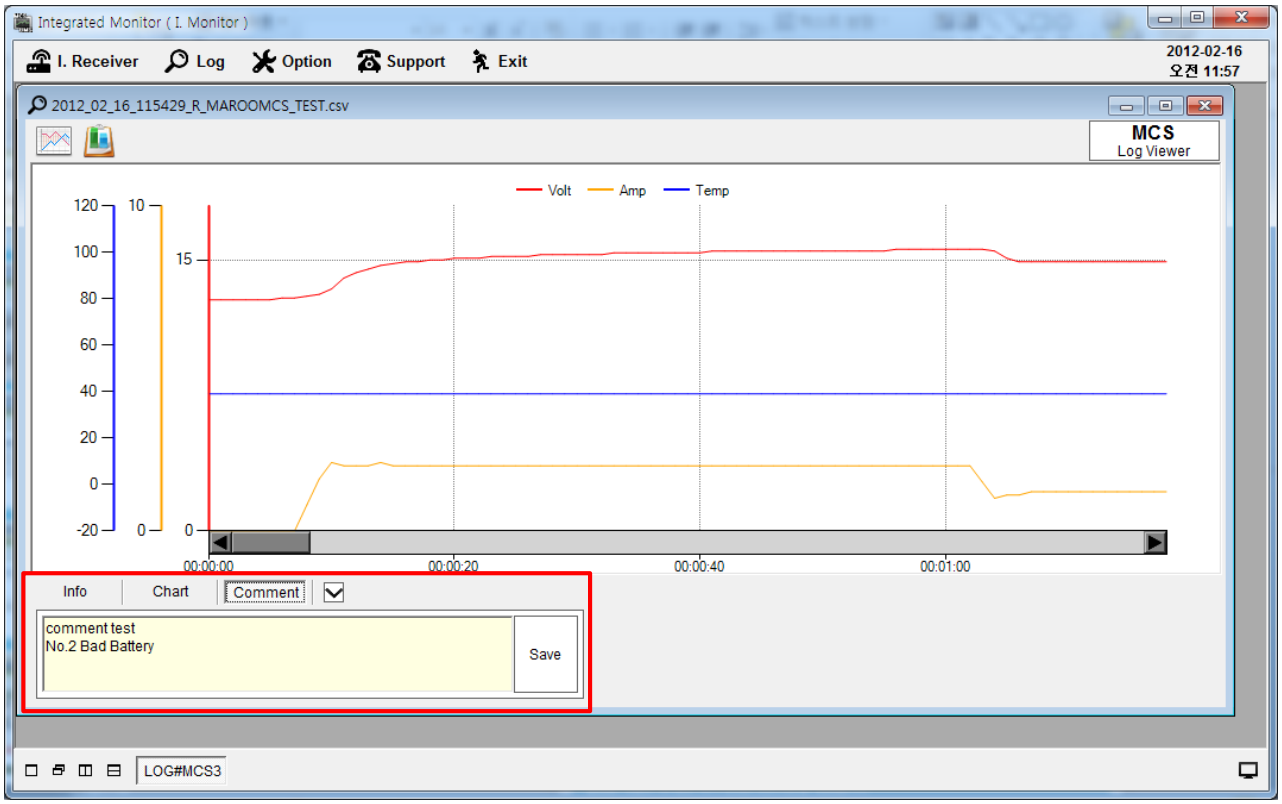
- **Save the log files with Tag (specific name or title)**
- **Special characters won't be input.**



5. Xtender Monitoring Program for PC

● INTEGRATED MONITORING PROGRAM – USEFUL FUNCTIONS

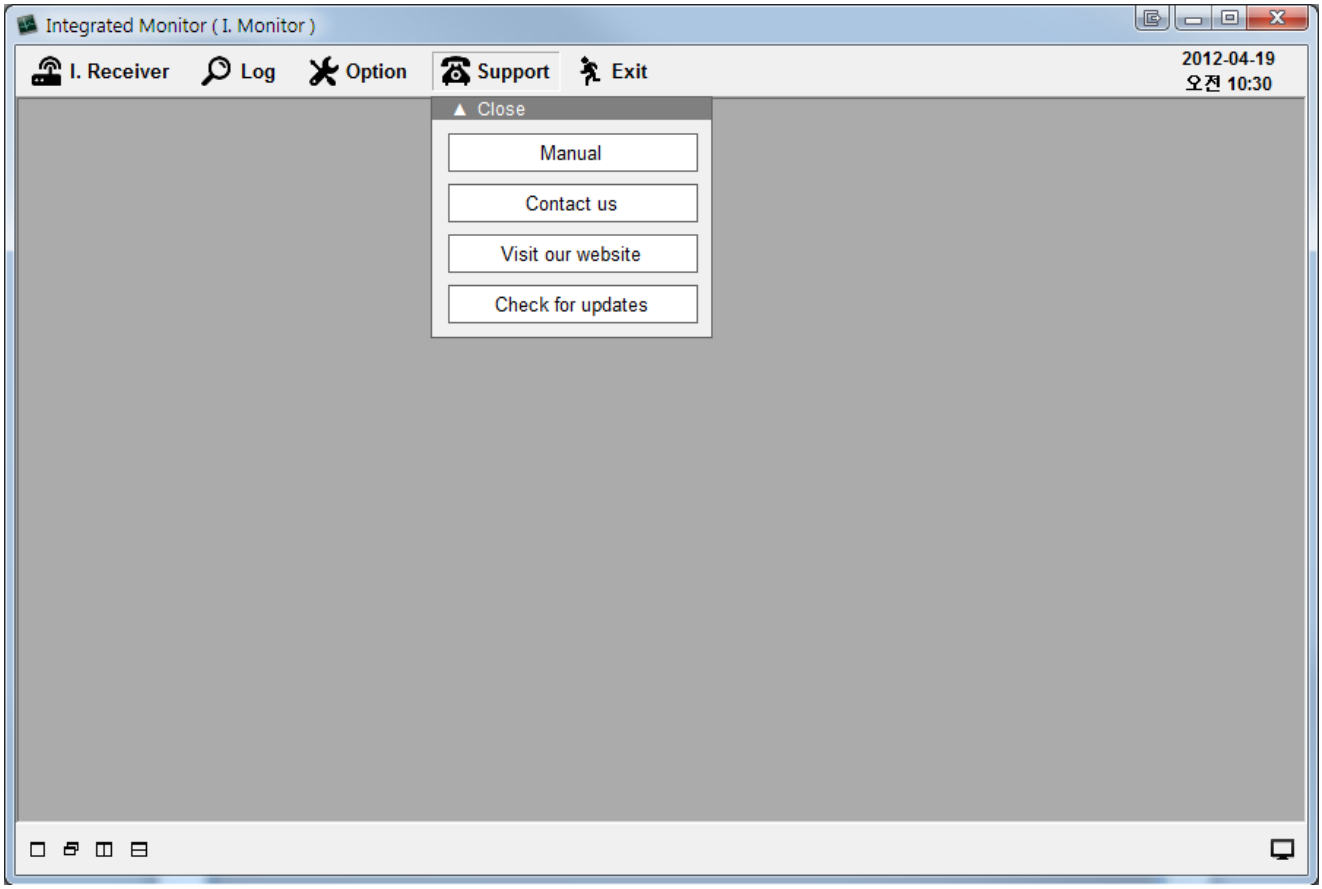
❖ Comment



- **If you enter any notes in the Comment field during the operation of Xtender or BMS, you can review it when you activate the Log files.**

5. Xtender Monitoring Program for PC

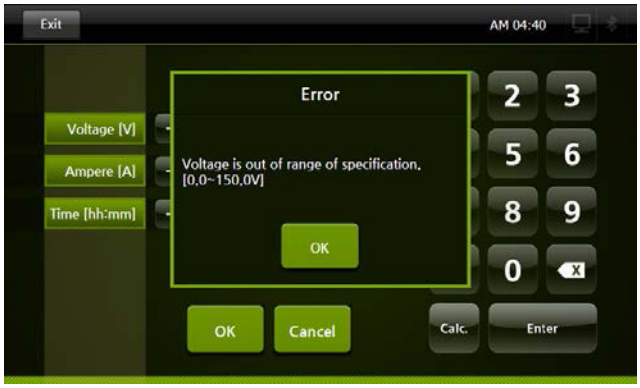
● INTEGRATED MONITORING PROGRAM - SUPPORT



- **[Manual] Operation manual of Xtender & BMS**
- **[Contact us] e-mail address for your inquiry**
- **[Visit our website] website address for firmware update or other information**
- **[Check for update] it will check and upgrade your Xtender automatically.**

6. Important Information

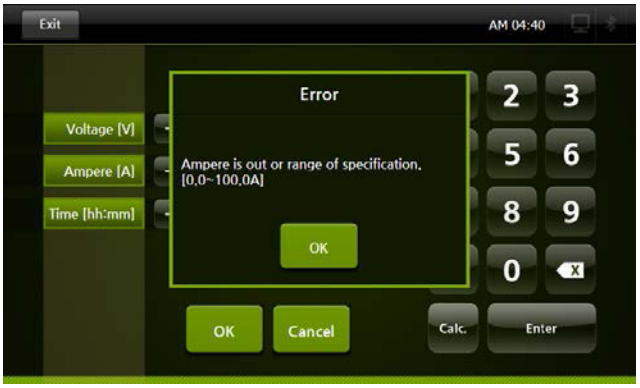
● Xtender : ERROR MESSAGES



❖ **Set Voltage is out of range of specification of Xtender.**

Capacity per Xtender Model (Voltage)

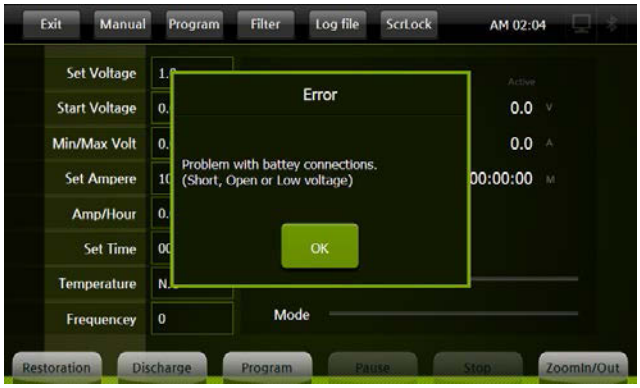
Model	Set Voltage
93-M1001	1.2V ~ 100V
93-M1005	1.2V ~ 120V
93-M1007	1.2V ~ 150V
93-M1009	1.2V ~ 75V



❖ **Set Ampere is out of range of specification of Xtender.**

Capacity per Xtender Model (Ampere)

Model	Set Ampere
93-M1001	0A ~ 30A
93-M1005	0A ~ 50A
93-M1007	0A ~ 100A
93-M1009	0A ~ 300A

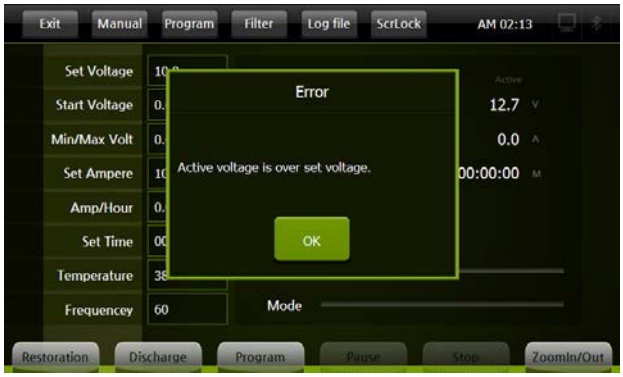


❖ **Battery is not well connected to Xtender for operation (contact failure, low voltage under 5V).**

When any error messages show up on screen during operation, please address as indicated. For additional assistance, please contact FSIP.

6. Important Information

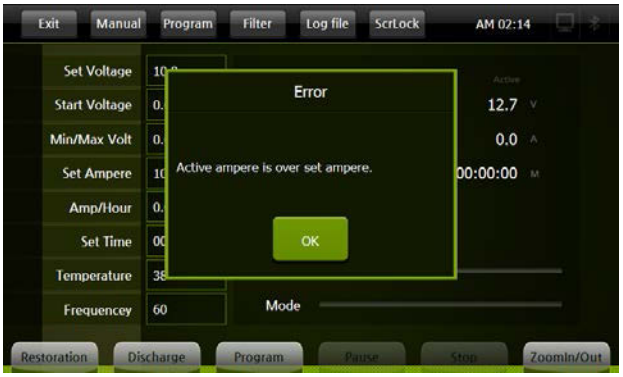
● Xtender : ERROR MESSAGES



❖ **Active Voltage exceeds Max. Voltage during operation.**

Max. Voltage per Xtender Model

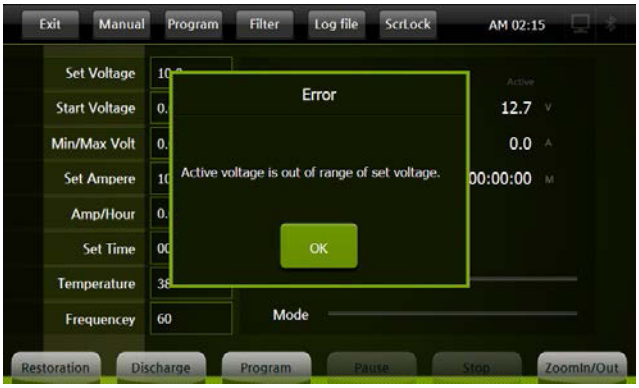
Model	Max. Active Voltage
93-M1001	100V
93-M1005	120V
93-M1007	150V
93-M1009	75V



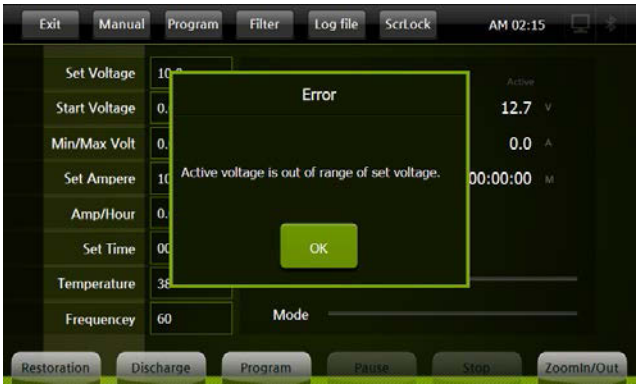
❖ **Active current exceeds Max. Ampere during operation.**

Max. Current per Xtender Model

Model	Max. Active Ampere
93-M1001	30A
93-M1005	50A
93-M1007	100A
93-M1009	300A



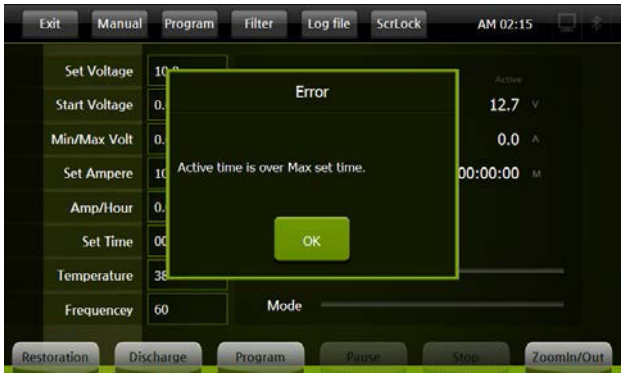
❖ **Actual Voltage is higher than Set Voltage when Xtender starts Restoration.**



❖ **Actual Voltage is lower than Set Voltage when Xtender starts Discharge.**

6. Important Information

● Xtender : ERROR MESSAGES

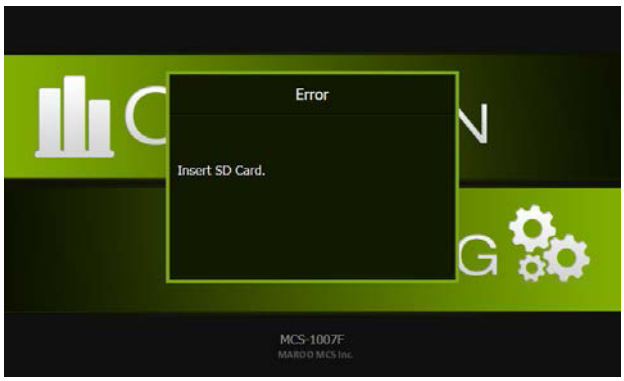


❖ **Active time exceeded possible operating Set time in program mode.**

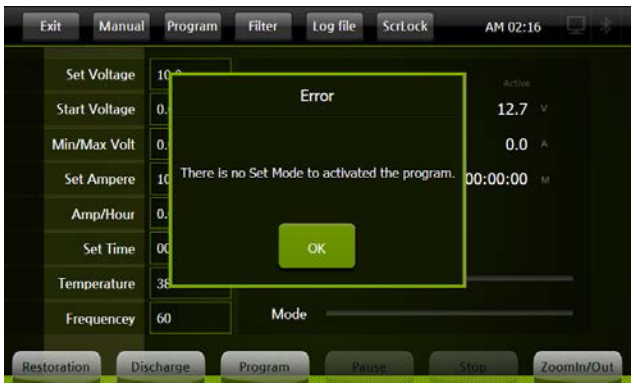


❖ **Active Frequency is different from the Set Frequency of Xtender.**

❖ **You are requested to confirm your local frequency before Xtender operation.**



❖ **SD Card is not in SD Slot.**

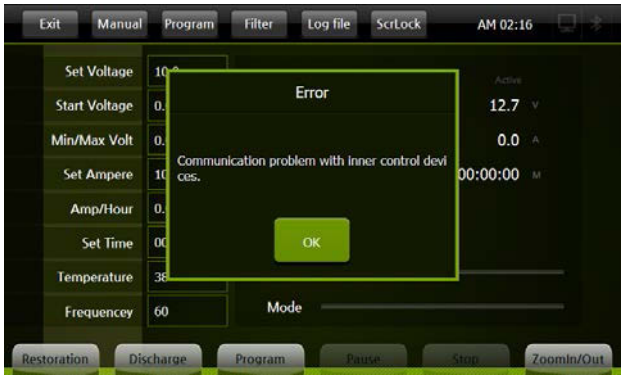


❖ **There is no activation mode at the Program setting.**

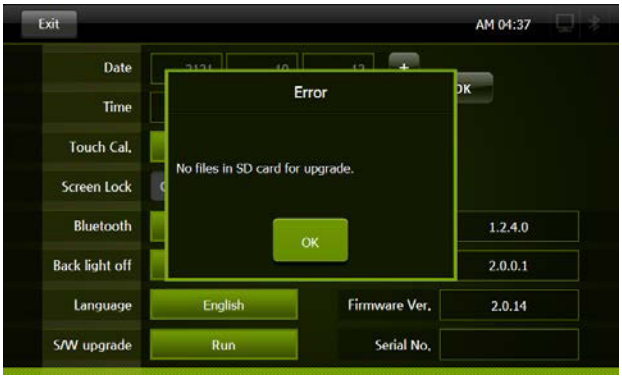
(Any mode is not selected for activation)

6. Important Information

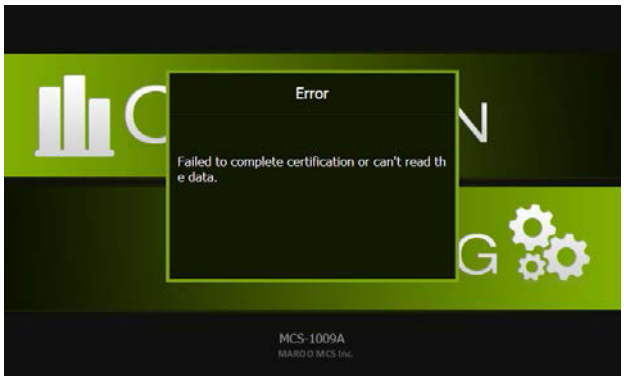
● Xtender : ERROR MESSAGES



❖ **Communication problem in controlling of the inner devices of Xtender.**



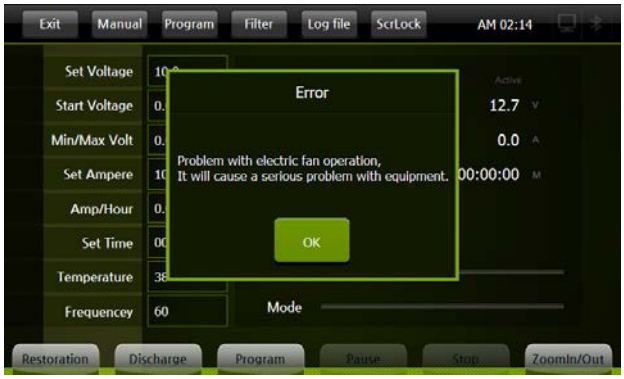
❖ **No files are in SD memory Card for S/W upgrade of Xtender.**



❖ **Files for Xtender operation do not exist on SD memory Card, or SD Card does not work properly.**

6. Important Information

● Xtender : ERROR MESSAGES



❖ The problem with electric fan in the Xtender.



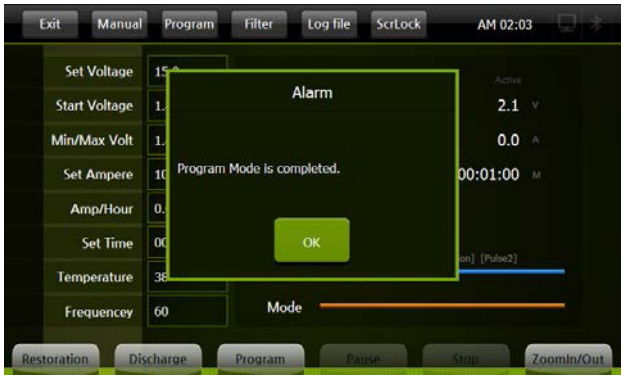
❖ Actual temperature of inner Xtender is over the set temperature.

➔ Stop Xtender operation

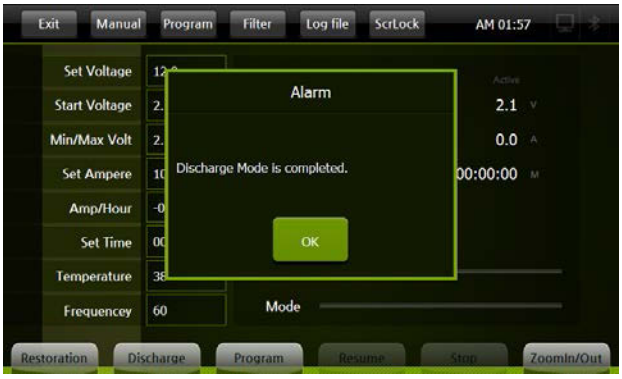
When any Error messages show up on screen during operation, please make proper adjustments. If you need more assist, please contact your Local Dealer or the Head Office.

6. Important Information

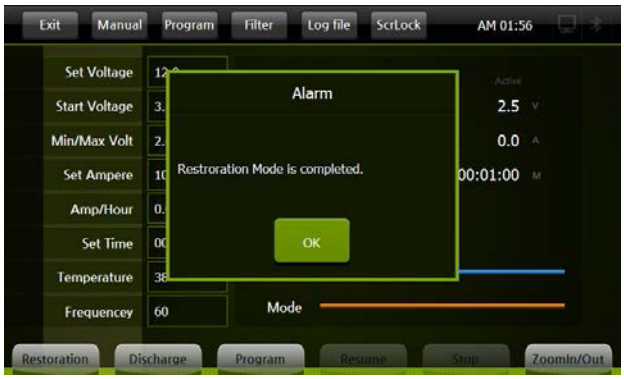
- **Xtender : ALARM MESSAGES**



❖ **Program Mode is completed**



❖ **In Manual mode, Discharge is completed**



❖ **In Manual mode, Restoration is completed**

7. Trouble Shooting

Problem	Treatment
Booting is not completed on LCD monitor.	1. Check connection of electricity of Xtender unit 2. Check the switch to be electric power “On” 3. Check the emergency switch “Off”
Active Voltage or Active Ampere are not displayed.	1. Check CP terminal (Circuit Breaker) of Xtender unit to be “On” 2. Check the connection with batteries
Temperature is not well recognized.	Check the cable of the thermometer sensor to be well connected with the temperature terminal of Xtender unit

8. MET CERTIFICATE

- **Copies of MET certification can be requested by contacting FSIP.**
- **Posted on machine identification label.**

For more information or
technical assistance, please
call us toll-free 1-800-333-1194
or visit us online at shop.fsip.biz