SIMCO ION™
An ITW Company

Simco-Ion Handy Charge Plate Monitor

Model EA-5J

INSTRUCTIONS

Installation/Operation/Maintenance



⚠ CAUTION

It is important that these instructions be read and understood before attempting to install or operate the equipment. Failure to do so could result in serious personal injury and/or damage to the equipment. At the end of this manual, a written warranty is provided. This should be preserved carefully.

Notes to users

WARNING

This equipment is not constructed for classified（hazardous） environment. It cannot be used where it will be exposed to ignitable or corrosive materials and gases.

CAUTION

This equipment is intended for use in electrostatic processes that are free from water, oil, solvent and other conductive contaminants. Exposure to such contaminants will cause failure of the electrical insulation system in the product. Special care should be taken to ensure that there is no dew formation. This equipment should be stored or used in a place less than 60 %RH.

Do not insert any object in the opening for the sensor located at the measuring side of the instrument; no foreign substance should ever enter into the sensor opening.

This equipment should not be operated in an ambient with corrosive fumes of acid/alkali or corrosive gases such as chlorine.

When not in use, please switch off the instrument.

This equipment must have proper grounding for accurate measurement.

This equipment is likely to be damaged by a fall. In such an event, it should be carefully examined and any necessary repairs be made by an authorized technician. This is an electronic instrument and contains sensor that is sensitive to mechanical vibrations and shock. As it also contains a microcomputer chip and electronic circuitry it should not be used in an environment where there is a lot of electromagnetic noise.

Suspend measurement when the voltage reading is outside the measuring range. If the value is exceeds the range there is a possibility of damaging the sensor.

Do not exert any pressure on the LCD display from the top.

Clean the sensor plate and supported insulators for accurate measurement.

The equipment was assembled and inspected at Simco Japan, Inc. Do not attempt to disassemble or modify its construction. If you are not clear about its operation and maintenance, call Simco Japan's authorized agent in your area.

Thank you for buying Simco-Ion products. This equipment will meet your expectations and provide safe operation when it is properly installed and maintained.

Receipt of equipment

Please carefully remove the equipment from the carton and inspect. Note any damage that might have occurred during shipment. Empty the carton to ensure that small parts are not discarded.

If any damage has occurred during shipment, the local carrier should be notified at once. A report should be forwarded to SIMCO JAPAN, INC. The address and other relevant information are written on the back cover page.

Packing articles and accessories

（1） EA-5J Controller ..... 1 pc.

（2） CPM-LPS Plate sensor ..... 1 pc.

（3） Grounding cord, 2 m long ..... 1 pc.

（4） Instructions / Warranty ..... 1 pc.

Option:

（1） USB Cable ..... 1 pc.

（2） USB-AC ADAPTER ..... 1 pc.

（3） Carrying case ..... 1 pc.

（4） Analog output cable ..... 1 pc.

Please check if any part is missing or does not have satisfactory finish. Contact us or our agents immediately in the event of such occurrence.

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Simco-Ion EQUIPMENT REPAIR WARRANTY.....enclosed

Explanation of Symbols:

WARNING

ATTENTION / CAUTION

ELECTRIC SHOCK HAZARD

Section 1. General description

Simco-Ion Model EA-5J Charge Plate Monitor（CPM） is a compact instrument used for measuring the ionizer's performance. It is small, portable, handy and easy to use.

It was designed to provide quantitative, accurate measurements for a variety of air ionization tests. It can be easily used for Discharge time（Decay time） and Ion Balance measurements for the ionizers. It is the most suitable for the routine inspection as a support for the maintenance of ionizers, the selection and the evaluation of the ionizers and soon.

It has a micro-computer inside and it is a multi-function instrument. Seven color button switches placed on the surface make measurements easy.

There are two measurement modes such as Manual mode and automatic mode（Auto mode）.

Manual mode is used for individual measurement（Discharge time / Ion Balance）. The measurement conditions can be changed by a SET button placed below LCD.

In Auto mode, both measurements of discharge time and ion balance can be done automatically by pressing a Plate Control button once. The measurement conditions are according as the set in the manual mode. After the measurements, each measuring data can be memorized up to 1,000 by pressing a SAVE button. The saved data can be down-loaded to a personal computer as CSV or TXT form using a USB cable. It will be help for reduction of the input work to a personal computer of the measurement data.

A large digital LCD helps to confirm the measured value. The plastic enclosure must be grounded using a grounding lead provided for accurate measuring.

Section 2. Features

The special features of EA-5J are;

- **Compact and light body**
- **Multi function micro-computer chip**
- **Large digital display**
- **Rechargeable battery**
- **Automatic mode for continuously measurement**
- **1,000 data saving into an internal memory**
- **Measuring time can be chosen**
- **The stop voltage can be set from 5 to 100 volts at intervals of 5 volts in decay time measuring mode**
- **Analog output terminal**
- **"ERROR" display for sensor fault**
- **LED assisted button switches indication**
- **Battery condition display（4 stages）**

Section 3. Specification

3.1 Controller EA-5J

Measurement mode: Manual mode, Auto mode and PC mode

［Manual mode］

① Ion balance mode: Display shows the plate voltage.

- LCD display renewal rate can be set: 0.2, 1, 5 and 10 seconds.
  - 0.2 sec.: Average value of 10 points data excluded the maximum and minimum value for 20 ms is showed on the display.
  - 1 sec.: Average value of 50 points data excluded the maximum and minimum value for 20 ms is showed on the display.
  - 5 sec.: Average value of 250 points data excluded the maximum and minimum value for 20 ms is showed on the display.
  - 10 sec.: Average value of 500 points data excluded the maximum and minimum value for 20 ms is showed on the display.
- Measuring time can be set: 10, 30, 60 seconds and continuous.
  After measurement, average value, peak value and valley value in the set time are showed on the display.

② Decay time mode: Display shows the plate voltage and the decay time.

- During measurement: Display shows average value of the plate voltage.
  Averaged value of 5 points data excluded the maximum and minimum value for 20 ms.
- The end of measurement: Display shows the decay time.
  Fast mode: 0.1 ～ 99.9 seconds, Slow mode: 100 ～ 300 seconds.
- Measuring time can be set: 10, 30, 60, 120 and 300 seconds.
- The polarity can be chosen: The decay time can be measured at the positive and the negative polarity.
- The stop voltage can be set from 5 to 100 volts in 5 volts increments.

［Auto mode］

① Decay time measurement: Measurement under the conditions of the set time and stop voltage. It measures and saves the data automatically at the both polarity of negative and positive.

② Ion balance measurement: Measurement continuously within the time set. The case of continuous（con） setting, the time is 120 seconds. Average value, peak value（maximum value） and valley value（minimum value） are saved in the memory.

③ Data saving: After measurement, all value are saved in the internal memory by pressing the SAVE button. Data can be saved up to 1000.

［PC mode］

Data transfer: The memorized data can be copied in CSV format by connecting with a personal computer using a USB cable.

LCD display: Digital numerical value, character, illustration and bar graph are displayed.

Bar graph: It shows the plate voltage and the decay time.

Right side; red LCD for positive polarity

Left side; blue LCD for negative polarity

Resolution of a bar: The value of a bar can be set.

Ion balance measurement: Four types.

15（1 V per a bar）, 30（2 V per a bar）,

150（10 V per a bar）, 300（20 V per a bar）

Decay time measurement: Five types.

10 s（1 second per a bar）, 30 s（2 seconds per a bar）,

60 s（4 seconds per a bar）, 120 s（8 seconds per a bar）,

300 s（20 seconds per a bar）

Digital display: Numerical value or character is displayed.

Plate voltage: □□□ V ⇒ 0 ～ ± 999 V

□.□□ kV ⇒ ± 1.00 kV ～ ± 1.50 kV

Decay time: □□.□ s ⇒ 0.0 ～ 99.9 seconds

□□□ s ⇒ 100 ～ 300 seconds

Mode display: Au, Ma, ib［Ion Balance］, +/- dE［Decay time］

The end of measurement: End（in Auto mode）

Time over: out（The plate voltage could not reach to the stop voltage within the setting time during decay time measurement）

Error indication: □ ⇒ 0 or 1

Various mode displays: Character or illustration is displayed.

［IB］; Ion balance measurement mode

［HOLD］; Retains display after a measurement

［ERROR］; Error sign if sensor is damaged

Battery condition display（4 stages）.

LED display: HV OUT; High voltage is supplying to the plate.

GND; The plate is grounded.

+Decay, -Decay and IB; Each LED in the buttons lights in the mode.

CHARGE; Red LED: Built-in battery is charging

Green LED: Completely charged

Maximum supply voltage: +/- 1,200 V

Accuracy: +/- 10%, +/- 1 digit（Indicated value）

Ambient conditions: 10 ～ 40 ℃ and less than 60 %RH

Beep sounds: Beep sounds when Power is turned on or the measurement end.

Interface: In accordance with USB 2.0.

Analog output: Voltage output（Load resistance 20 k Ω or more）
Plate voltage 1V / Output voltage 1 mV（0.001 V）

Digital zero: The digital display and the bar graph are adjusted to zero automatically by grounding the plate as initializing when the measurement starts.

External connectors: ① Signal connectors for the plate sensor.
② HV connector for supplying high voltage to the plate sensor.
③ USB terminal（Type: Mini-B）
Data transfer and battery charging by connecting to a personal computer or an exclusive AC/DC adapter.
④ Analog output terminal（mini-Jack 3.5 mm dia.）
⑤ Ground（GND） terminal（Banana jack）

Power: A personal computer or an exclusive AC/DC adapter.

Operable time: Approx. 30 hours in Ion balance measurement

Overall size: 117（W）× 228（D）× 47（H）［mm］

Weight: Approx. 410 g

Case material: ABS resin, UL-94B

3.2 Sensor plate CPM−LPS

Plate size: 150 × 150 mm, t = 0.8 mm

Plate capacity: 20 pF +/- 2 pF

Insulation resistance: >1 × 10^{14} Ω

Cable length: Signal cable and HV cable; 1.5 m

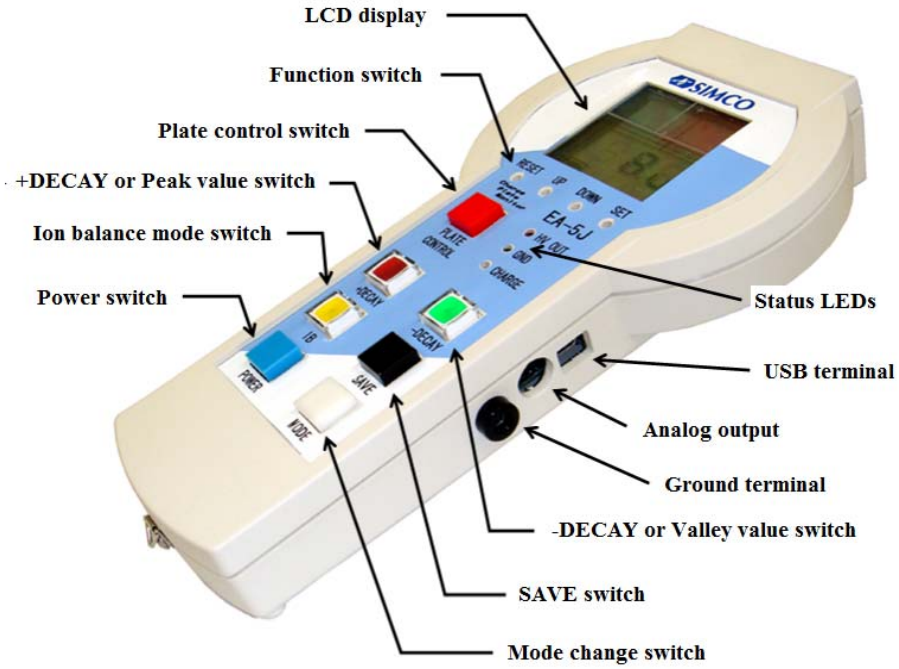
Overall size: 160（W）× 190（D）× 26（H）［mm］

Weight: Approx. 510 g（with cable）

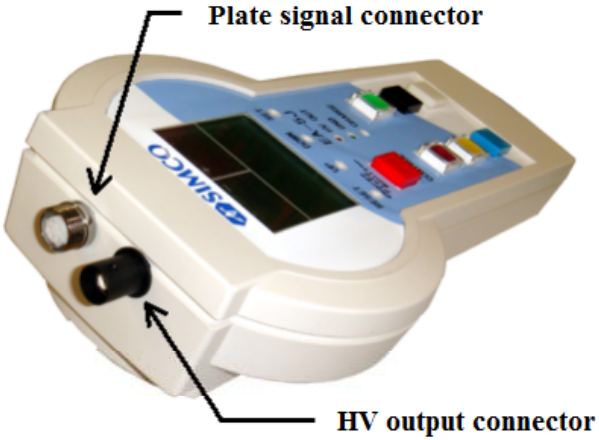
Case material: Stainless steel（plate and sensor enclosure） and aluminum（rear panel）

Standards: Meets ANSI/ESD-STM3.1-2000 requirements.

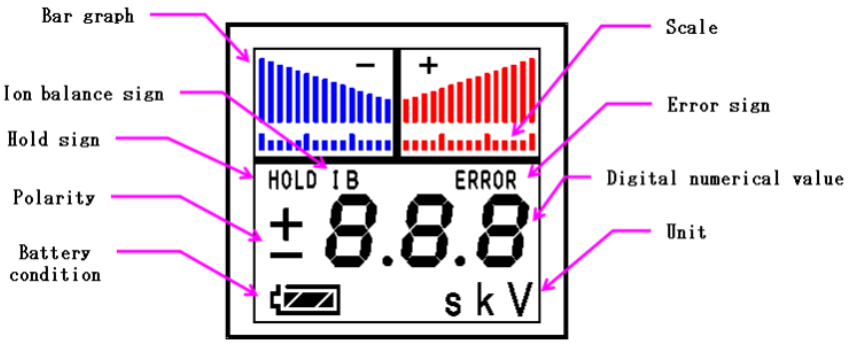
Section 4. External view



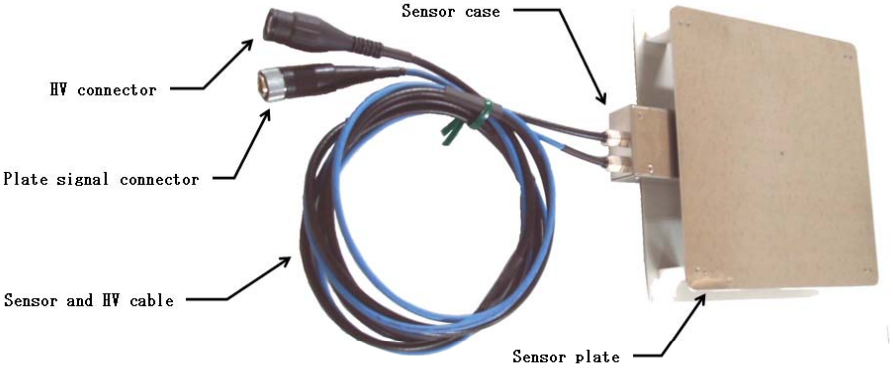
Front view



Connector side



LCD display



Sensor plate CPM-LPS

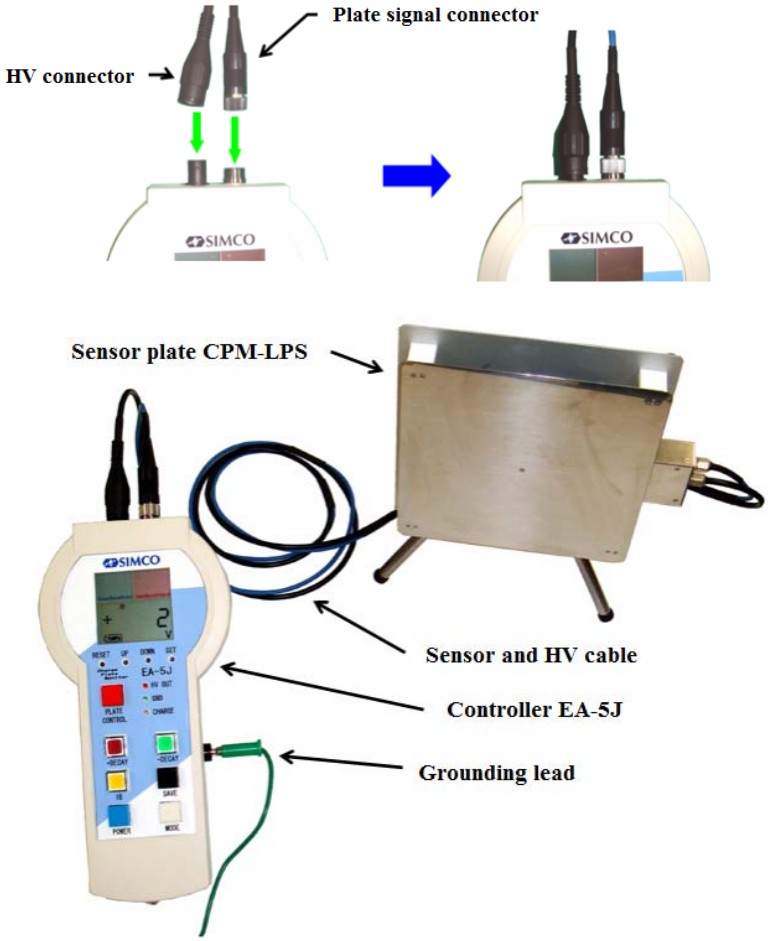
Section 5. Setup

5.1 Setup

Connect the sensor plate to the controller. Be sure that the Plate signal connector and the HV connector are connected to the controller correctly. For proper measurement, EA-5J should be grounded on the right side grounding terminal by the grounding lead provided with the equipment.

⚠ CAUTION

If the sensor plate is not connected, the condition setting etc. cannot be done. In this case, when power is on "ERROR 0" will be displayed.



Connection of the sensor plate

5.2 Battery charging

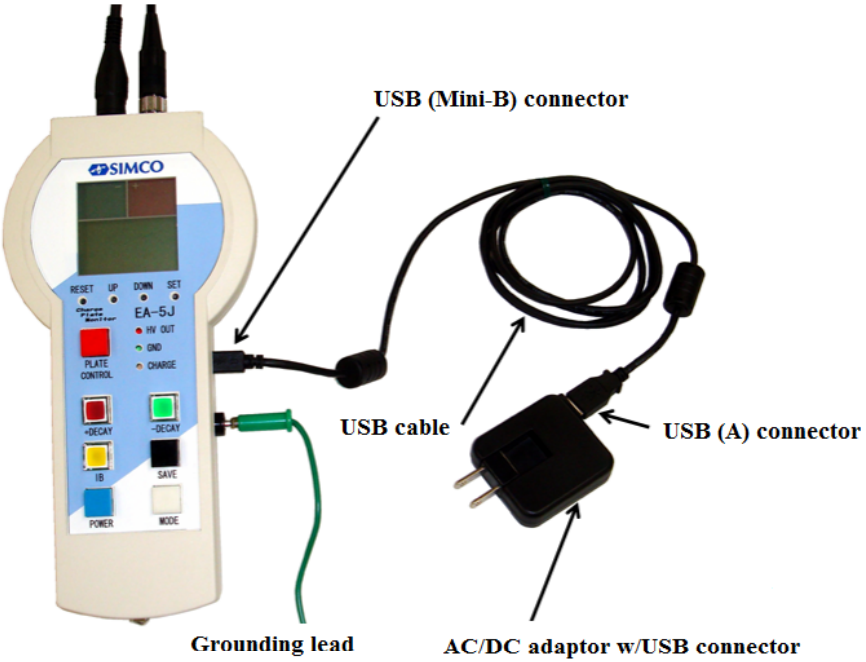
EA-5J has an internal battery. It can be charged by the USB terminal on the right side. Even charging the measurement can be done. When the POWER button（blue） is pressed, the battery condition is displayed on the left side of LCD as shown in the figure below. Charge the battery when display shows the battery to be empty. The charging should be done by using a USB cable to connect to an AC/DC adaptor with USB terminal or a personal computer. A CHARGE LED lights up in red when charging. It lights up in green when charging is complete.



Battery condition display

CAUTION

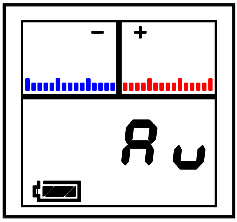
The battery condition display indicator on the display is not proportional to the remaining energy. The battery might rapidly decrease by the battery conditions.



Charge with battery

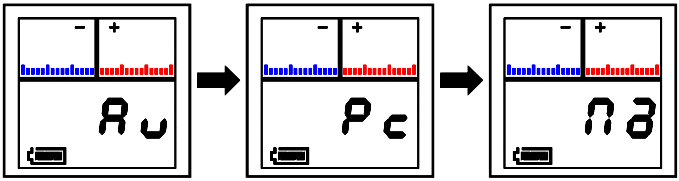
5.3 Initial screen

As POWER button (blue) is pressed, the sensor plate is grounded and automatic measurement mode (Au) is displayed as shown in the right figure. The measurement mode can be changed by pressing MODE button (white) as shown in the figure below.



Initial display

Auto mode (Au) ⇒ PC Mode (Pc) ⇒ Manual mode (Ma)

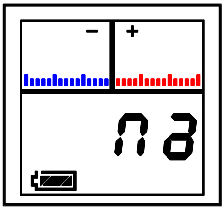


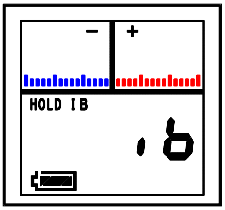
Mode display

5.4 Measurement condition setting

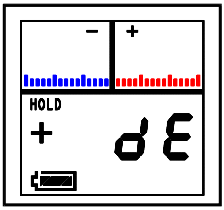
Measurement condition setting can be done in ion balance measurement mode [ib] (yellow) and decay time measurement mode [dE] (red /+ Decay or green /- Decay) in the manual mode.

Manual mode screen

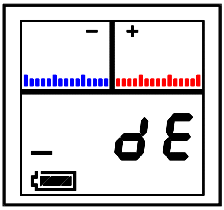




Ion balance mode screen (IB button)



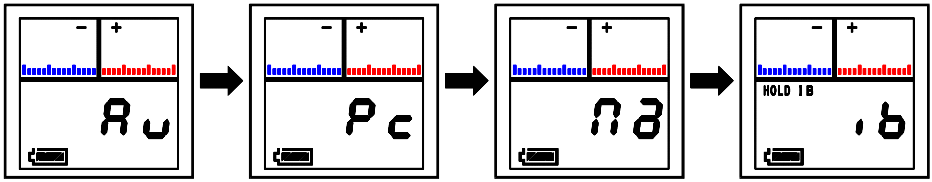
Positive Decay time mode screen (+DECAY button)



Negative Decay time mode screen (−DECAY button)

5.4.1 Measurement condition setting in ion balance measurement mode

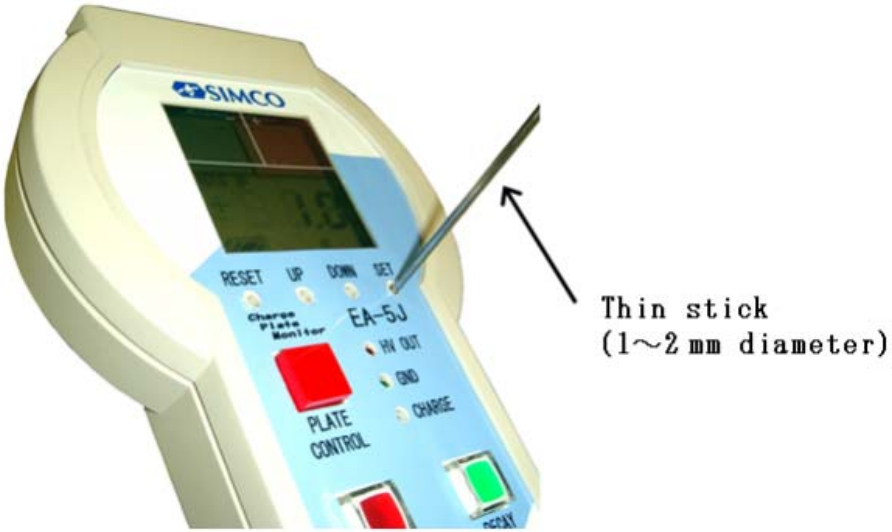
When manual mode（Ma） is displayed, the measurement mode can be changed to ion balance mode（ib） by pressing the ion balance mode button IB（yellow）.



Auto mode　　PC mode　　Manual mode　　Ion balance mode

Flow of LCD display

Press SET button（function switch） by a thin stick（1 ～ 2 mm diameter）. The three measurement condition（①～③） can be set with the following procedure. After choosing by pressing UP/DOWN buttons, each setting is saved in the internal memory by pressing SET button again. When all setting is complete, ion balance measurement mode（ib） is displayed again. If MODE button（white） is pressed the display will return to manual mode（Ma）.



How to press the measurement condition setting button（SET）

① LCD display renewal rate setting

EA-5J converts the analog signal from the sensor to digital signal every 20 ms. The digital signal is calculated automatically except the maximum and the minimum value according as following four kinds of renewal rate for the length of time.

LCD display : Renewal rate（number of points）

0.2 : 0.2 seconds（10 points）

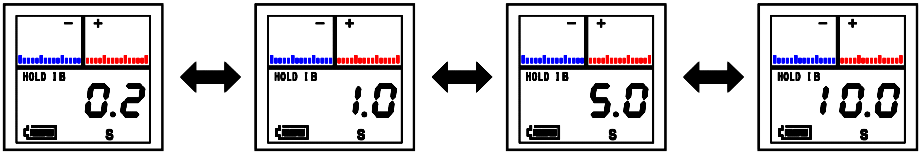
1.0 : 1.0 second（50 points）

5.0 : 5.0 seconds（250 points）

10.0 : 10.0 seconds（500 points）

（Default setting: 0.2）

LCD display shows the calculated average value except for the maximum and minimum at every selected time base.



LCD display

② Measuring time setting

The measuring time for ion balance can be chosen from following four kinds of setting.

LCD display : Measuring time

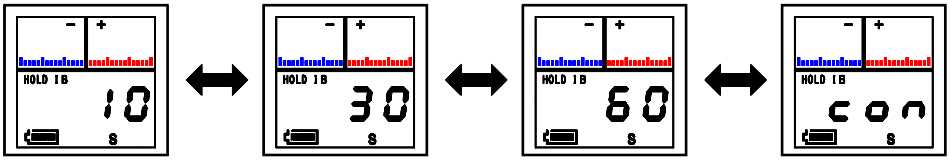
10 : 10 seconds

30 : 30 seconds

60 : 60 seconds

con : Continuous

（Default setting: 10）



LCD display

③ Bar graph setting

The correspondence of each bar of the bar graph（15 pcs. for each polarity） to the voltage can be chosen from following four kinds of setting.

LCD display : Voltage per one bar

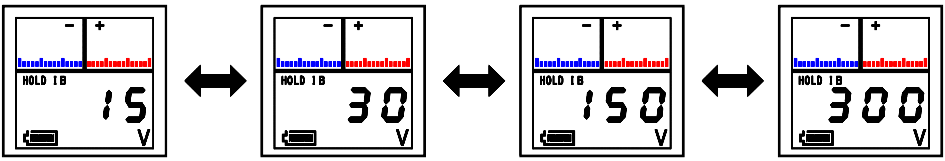
15 : 1V

30 : 2V

150 : 10V

300 : 20V

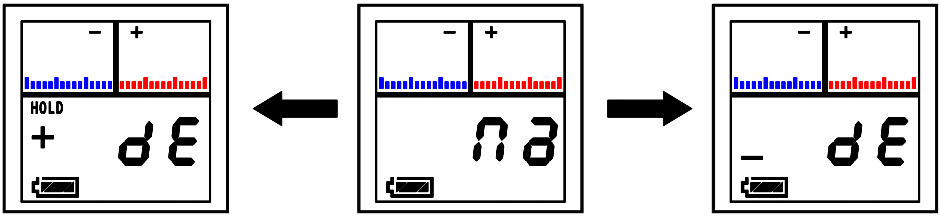
（Default setting: 15）



LCD display

5.4.2 Measurement condition setting for decay time measurement mode

When manual mode（Ma） is displayed, the measurement mode can be changed to decay time measurement mode （+dE or -dE） by pressing the decay time mode button（red /+ Decay or green /- Decay）.



Positive decay time measurement mode

Manual mode

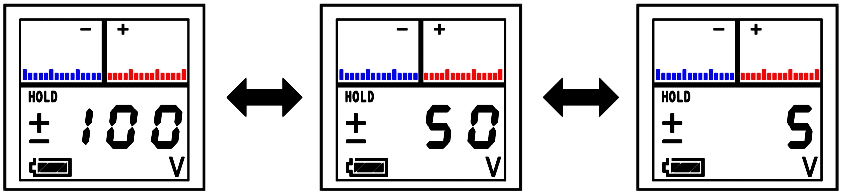
Negative decay time measurement mode

LCD display

Press SET button with a thin stick. The two measurement conditions（①, ②） can be set with the following procedure. After choosing by pressing UP/DOWN buttons, each setting is saved in the internal memory by pressing SET button again.（The measurement conditions are the same setting for both polarity.） When all setting is complete, decay time measurement mode（+dE or -dE） is displayed again. If MODE button（white） is pressed the display will return to manual mode（Ma）.

① Stop voltage setting

In the decay time measurement, the EA-5J monitors the time taken for the plate to discharge from the start voltage（1,000 V） to the stop voltage. This stop voltage can be set from 5 to 100 V in 5 V increments or decrements by pressing UP/DOWN button.（Default setting: 100 V）



LCD display

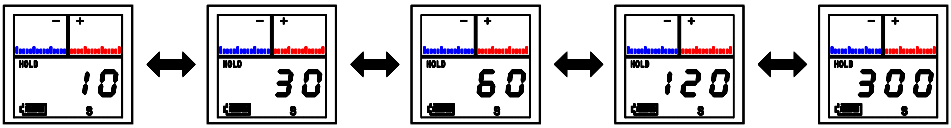
② Measuring time setting

The measuring time for the decay time can be chosen from five kinds of the following setting.

LCD display : Measuring time

10 : 10 seconds
30 : 30 seconds
60 : 60 seconds
120 : 120 seconds
300 : 300 seconds

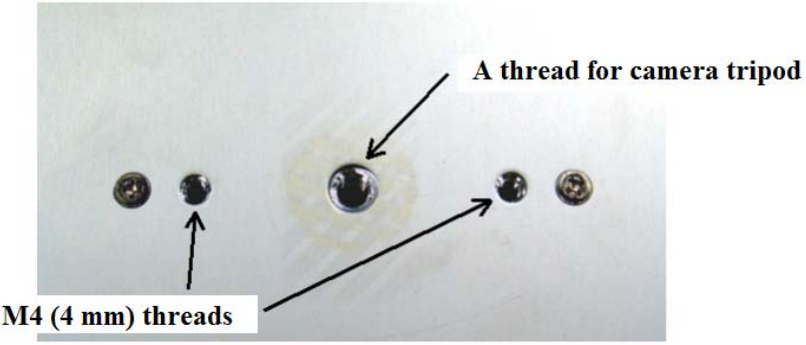
（Default setting: 10）



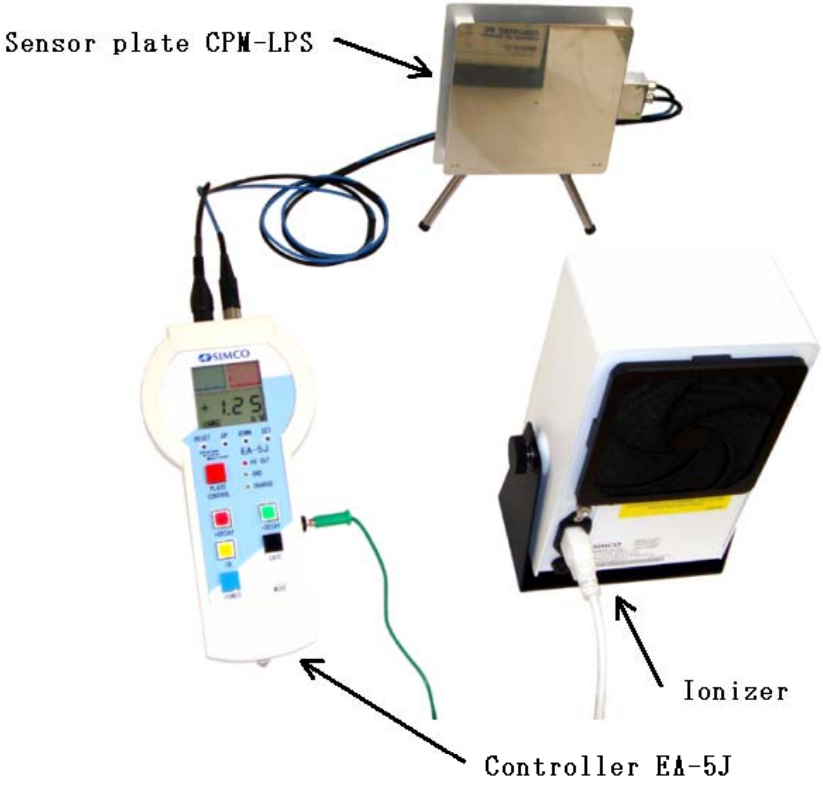
LCD display

5.5 Sensor plate placement

After all settings are complete, turn the power off by pressing POWER button（blue）. Place the sensor plate in front of an ionizer for the measurement. Refer the standard like "ANSI/ESD-STM3.1-2000" to confirm positions and the distance from the ionizer to the sensor plate. Use threads on the back of the sensor plate for installing a tripod of camera etc. See a photograph in the next page for reference about the position of the ionizer, EA-5J controller and the sensor plate.



Threads on the back of the sensor plate



Measurement scenery

Section 6. Manual mode measurement

6.1 Ground connections

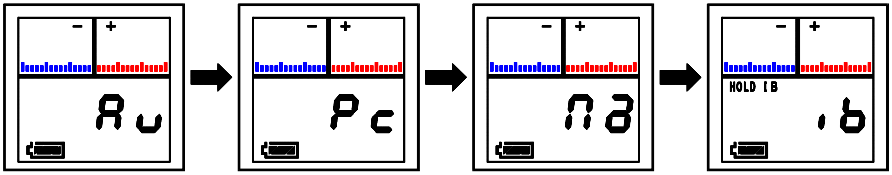
During measurement of the ionizer performance, the accuracy might be affected by the static charge on the person and objects of circumference. Ground the person using a wrist strap etc. EA-5J must be also grounded by connecting a grounding lead to the ground terminal on EA-5J. Then, set up the sensor plate and ionizer referring to "Section 5. Setup".

⚠ CAUTION

EA-5J has a ground terminal on the right side of the plastic enclosure. It is used as the ground level for the internal circuit. It must have proper grounding for accurate measurement.

6.2 Ion balance measurement mode

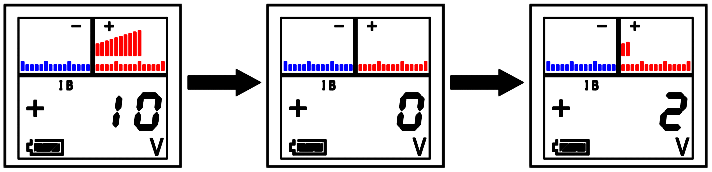
① Turn the power on by pressing POWER button (blue). Press MODE button twice. The LCD display shows manual mode (Ma). Press IB button (yellow) to enter the ion balance measurement mode. The display shows (ib). Be sure a LED light in the button is illuminating.



Auto mode PC mode Manual mode Ion balance mode

Flow of LCD display

② Turn on the power of the ionizer. Press PLATE CONTROL button (red). The sensor plate is automatically grounded, GND lamp lights and digital zero operations is activated.



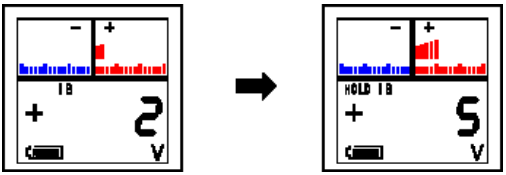
Immediately after pressing PLATE CONTROL button

Digital zero activation

Measurement start

Flow of LCD display

③ The measurement is continued until the setting time. Press PLATE CONTROL button (red) again to stop measuring if the setting time is continuous [con]. HOLD sign is displayed on the LCD at the end of the measurement.

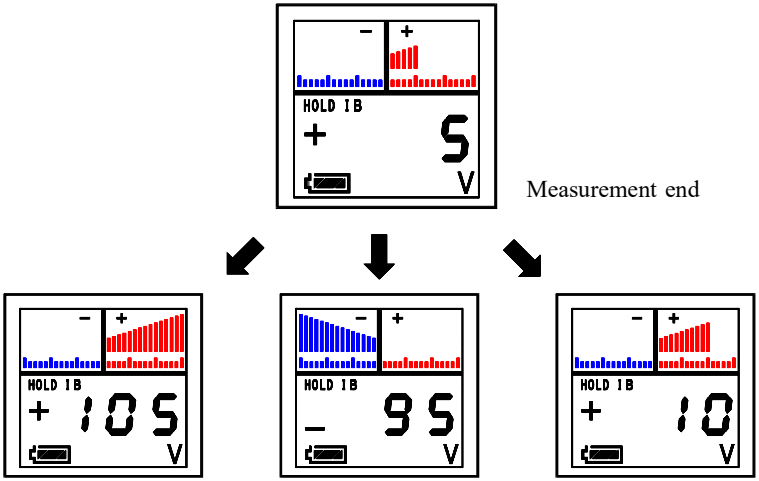


During measurement　　Measurement end

LCD display

④ After the measurement, if the following buttons are pressed, each measured data will be displayed.

+ DECAY button (red) : Maximum voltage (peak value)
- DECAY button (green) : Minimum voltage (valley value)
IB button (yellow) : Average voltage in measuring time



+DECAY button (red)
Maximum voltage
(peak value)

-DECAY button (green)
Minimum voltage
(valley value)

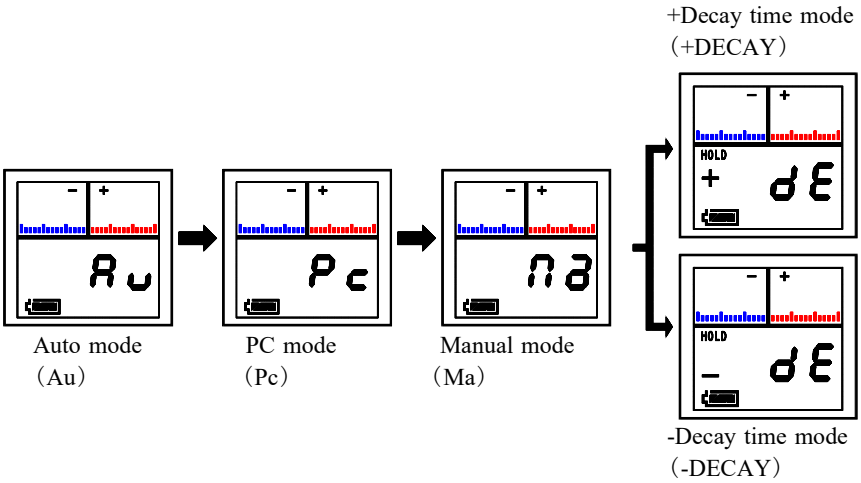
IB button (yellow)
Average voltage

LCD display

⑤ Press PLATE CONTROL button（red） to measure again, if needed. If MODE button is pressed, it returns to the manual mode（Ma）.

6.3 Decay time measurement mode

① Turn the power on by pressing POWER button（blue）. Press MODE button twice. The LCD display shows manual mode （Ma）. Press + DECAY button（red） or -DECAY button（green） to enter the decay time measurement mode. The display shows（+dE） or（-dE）. Make sure an LED light in the button is illuminating.



Flow of LCD display

② Turn on the power of the ionizer. Press PLATE CONTROL button（red）. The sensor plate is automatically grounded, GND lamp lights and digital zero operations is activated.

③ DC high voltage is applied to the sensor plate. A red LED, HV OUT lights during high voltage is applied.

CAUTION

Normally, DC high voltage is applied in an instant. Therefore, the red LED, HV OUT lights for a moment. It is not a Failure on the LED.

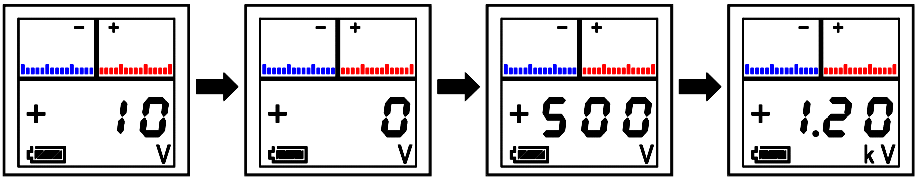
CAUTION

In the decay time measurement, it is necessary to apply DC high voltage to the plate. The voltage should be 1,000 V or higher. If the insulation resistance of the sensor plate is low by dirt or short circuit of conductive lint such as hair etc., it is not reached to the enough voltage then the red LED, HV OUT lights continuously. In this case, the measurement cannot be started.

ERROR 1 is displayed on the LCD when it passes one second or longer with the red LED illuminating. Press POWER button again to suspend measuring.

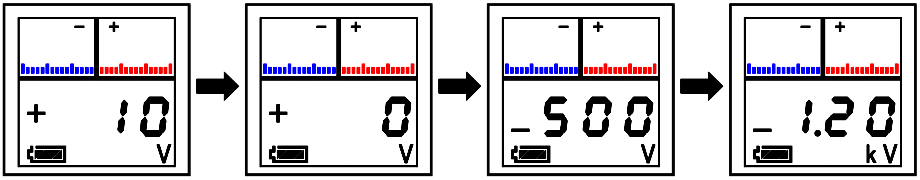
Check the sensor plate after powered off. Clean the plate and supporting insulators using IPA with soft cloth etc. Remove any lint between the sensor plate and the back plate. Let it dry completely before power is turned on.

+Decay time measurement mode (+DECAY)



(a) (b) (c) (d)

-Decay time measurement mode (-DECAY)



(a) (b) (c) (d)

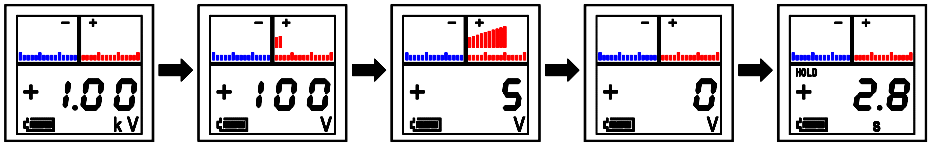
(a) Immediately after pressing PLATE CONTROL button.
(b) The plate is grounded and digital zero activation. GND lamp lights.
(c) On charging the sensor plate. HV OUT lamp lights.
(d) End of the charging. HV OUT lamp off.

Flow of LCD display

④ The sensor plate is isolated after the end of charging if the charged voltage reaches to the enough voltage. The plate voltage will be decreased by airflow of ions from the ionizer. The internal discharge timer will start when the plate voltage reaches 1,000 volts. At this time, each bar of the bar graph corresponds to the time of 1/10 between the measurement time.

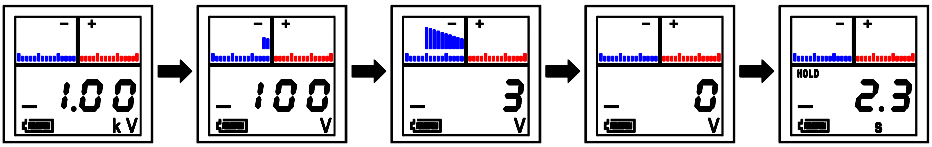
The timer will stop when the plate voltage reaches the setting voltage (default setting is 100 V). Then the timer measures the time from start to stop. The display shows the discharged time (decay time) in seconds after the end of the setting time.

+Decay time measurement mode (+DECAY)



(a) (b) (c) (d) (e)

-Decay time measurement mode (-DECAY)



(a) (b) (c) (d) (e)

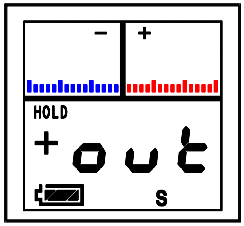
(a) Internal timer ON
(b) Internal timer OFF
(c) The display shows the sensor plate voltage until the end of the setting time.
(d) The plate is grounded and digital zero activation. GND lamp lights.
(e) The display shows the decay time in seconds.

Flow of LCD display

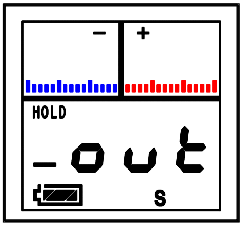
CAUTION

The timer starts when the plate voltage reaches 1,000 volts and it stops when the plate voltage reaches the setting voltage. If there are insufficient ions because of the ionizer failure etc., the timer cannot stop by the fact that the plate voltage does not reach the setting voltage. In this case, press POWER button again to suspend measurement and investigate the ionizer.

If the decay time exceeds the setting time of measurement, the display shows "out" as shown in the figure below.



(a)



(b)

(a) Overtime in positive decay time measurement
(b) Overtime in negative decay time measurement

LCD display when overtime

⑤ Press PLATE CONTROL button (red) to measure again.

⑥ Press MODE button to return to manual mode (Ma) and press another DECAY button for the decay time measurement of opposite polarity.

Section 7. Auto mode measurement

7.1 Ground connections

① During measurement of the ionizer performance, the accuracy might be affected by the static charge on the person and objects of circumference. Ground the person using a wrist strap etc. EA-5J must be also grounded by connecting a grounding lead to the ground terminal on EA-5J. Then, set up the sensor plate and ionizer referring to "Section 5. Setup".

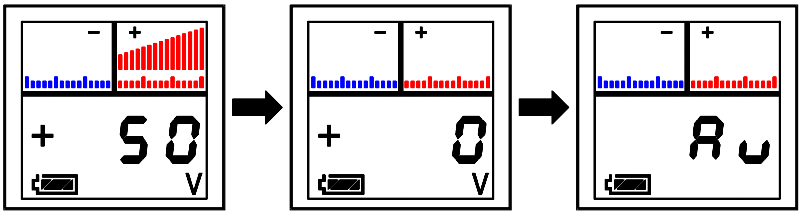
⚠ CAUTION

EA-5J has a ground terminal on the right side of the plastic enclosure. It is used as the ground level for the internal circuit. It must have proper grounding for accurate measurement.

② Automatic mode is available for the decay time measurement and the ion balance measurement. In this mode three kinds of measurements can be automatically done by pressing one button. The measurement condition is based on the setting in the manual mode. However, the measurement of ion balance stops in 120 seconds even if the setting is continuous. The measured data is saved in internal memory by pressing SAVE button (black). The saved data can be down-loaded to a personal computer as CSV or TXT form. Note, this saving can be done only in auto mode. It cannot be done in manual mode.

7.2 Measurement

① Turn the power on by pressing POWER button (blue). Be sure that the LCD display shows auto mode (Au).

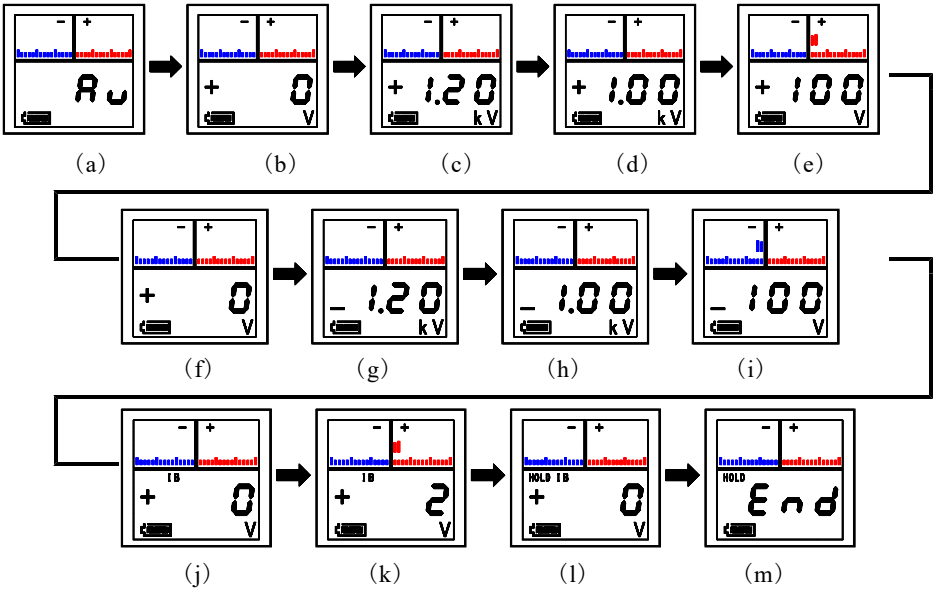


(a) (b) (c)

(a) Immediately after power on
(b) The plate is grounded and digital zero activation. GND lamp lights.
(c) LCD display shows auto measurement mode (Au).

Flow of LCD display

② Turn on the power of an ionizer. Press PLATE CONTROL button（red）. The measurements start automatically in order of positive decay time, negative decay time and ion balance.



（a） （b） （c） （d） （e）

（f） （g） （h） （i）

（j） （k） （l） （m）

（a） Press PLATE CONTROL button（red） when auto mode is displayed.

Positive decay time measurement starts（A LED in +DECAY button lights）

（b） The plate is grounded and digital zero activation. GND lamp lights.

（c） Positive high voltage is applied to the sensor plate. HV OUT lamp lights.

（d） Internal timer ON when the plate voltage reaches +1,000 V.

（e） Internal timer OFF when the plate voltage reaches +100 V（or setting voltage）.

（f） The plate is grounded and digital zero activation. GND lamp lights.

Negative decay time measurement starts（A LED in -DECAY button lights）

（g） Negative high voltage is applied to the sensor plate. HV OUT lamp lights.

（h） Internal timer ON when the plate voltage reaches -1,000 V.

（i） Internal timer OFF when the plate voltage reaches -100 V（or setting voltage）.

（j） The plate is grounded and digital zero activation. GND lamp lights.

Ion balance measurement starts（A LED in IB button lights）

（k） During ion balance measurement.

（l） The end of ion balance measurement. The LED in IB button lights off. The plate is grounded and digital zero activation. GND lamp lights.

（m） The end of all measurements. Buzzer beeps once.

Flow of LCD display

CAUTION

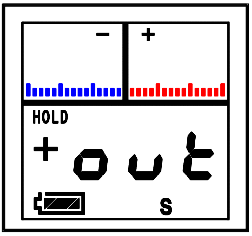
In the decay time measurement, it is necessary to apply DC high voltage to the plate. The voltage should be 1,000 V or higher. If the insulation resistance of the sensor plate is low by dirt or short circuit of conductive lint such as hair etc., it is not reached to the enough voltage then the red LED, HV OUT lights continuously. In this case, the measurement cannot be started.

ERROR 1 is displayed on the LCD when it passes one second or longer with the red LED illuminating. Press POWER button again to suspend measuring.

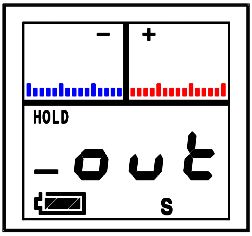
Check the sensor plate after power off. Clean the plate and supporting insulators using IPA with soft cloth etc. Remove any lint between the sensor plate and the back plate. Let it dry completely before power is turned on.

The timer starts when the plate voltage reaches 1,000 volts and it stops when the plate voltage reaches the setting voltage. If there are insufficient ions because of the ionizer failure etc., the timer cannot stop by the fact the plate voltage does not reach the setting voltage. In this case, press POWER button again to suspend measurement and investigate the ionizer.

If the decay time exceeds the setting time of measurement, the display shows "out" as shown in the figure below.



(a)



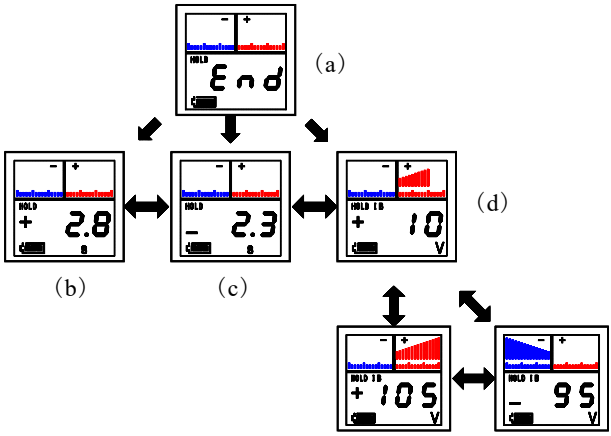
(b)

(a) Overtime in positive decay time measurement
(b) Overtime in negative decay time measurement

LCD display when overtime

③ The buzzer beeps once at the end of all measurements. LCD display shows "End".

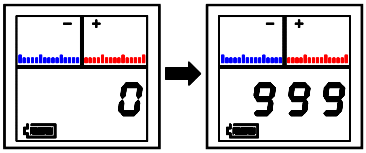
④ After the measurements, if the following buttons are pressed, each LED in the button lights and each measured data will be displayed. As the LED in IB button lights, if + DECAY button or -DECAY button is pressed, the maximum voltage（peak value） or the minimum voltage（valley value） of ion balance will be displayed. Press IB button once again and press +DECAY or -DECAY button to be displayed the decay time data again.



（a） Measurement end
（b） +DECAY button（red）: Positive decay time
（c） -DECAY button（green）: Negative decay time
（d） IB button（yellow）: Average voltage of ion balance
（e） +DECAY button（red）: Maximum voltage of ion balance（peak value）
（f） -DECAY button（green）: Minimum voltage of ion balance（valley value）

LCD display for measured data

⑤ Press SAVE button（black） to save measured data into internal memory. At this time, the number of preserved data is shown on the display. The numerical value increases by 1 whenever the data is saved.



The number of saved data

⑥ Press MODE button to return to auto mode（Au）. Press PLATE CONTROL button to measure again if needed.

Section 8. Saved data copy

8.1 Cable connections

① The saved data in auto mode can be copied in CSV or TXT format by connecting EA-5J with a personal computer. Prepare a USB cable（USB(A)- USB(Mini-B)）. Connect USB(Mini-B) of the cable to a USB terminal on the EA-5J and connect the USB(A) to the computer.

⚠ CAUTION

Windows 2000 or later operating system is required for this saved data copy. It cannot be done by earlier operating system.

② Turn on the power of EA-5J with connecting the plate sensor（CPM-LPS）.

8.2 Setup of the computer

① Turn on the power of the computer. If there is no USB driver in the computer, it may request to install the driver. In this case, install the USB driver properly.

② Load a Window's software "Hyper Terminal" in the computer. It can be found by clicking in the following order. **"Start" - "Program" - "Accessories" - "Communication" - "Hyper Terminal".**



③ At the first time, the computer shows "New connection" as shown below. Input suitable name, chose Icon as you like and click "OK" button.



④ In next screen, specify COM3, COM4 or COM5 in a column of "Connect using". Click "OK" button.

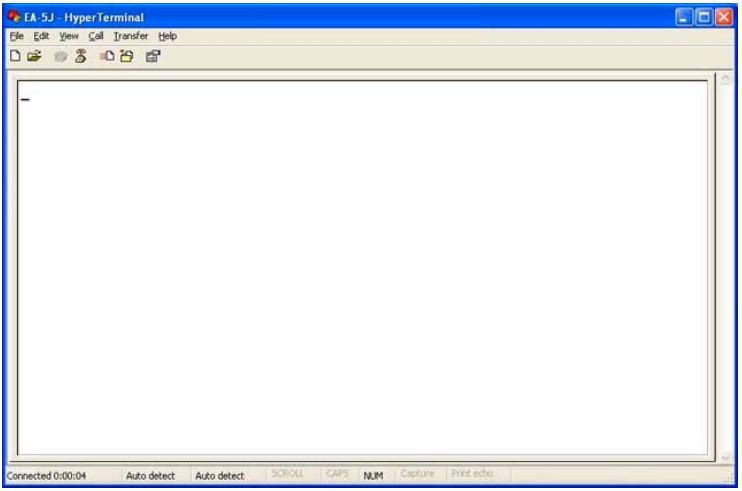


⑤ When "COM* Properties" is displayed, specify all of properties in the "Port Settings" as follows;

Bit per second	**:**	**9600**
Data bits	**:**	**8**
Parity	**:**	**None**
Stop bits	**:**	**1**
Flow control	**:**	**None**

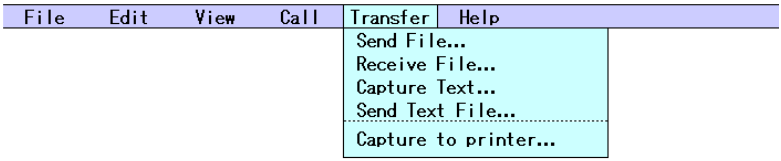


⑥ If all of the setting is complete, click "OK" button. Then, the initial screen will be displayed.

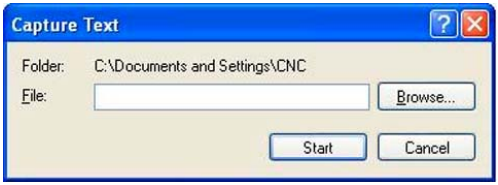


8.3 Saved data copy

① Click "Capture Text" in the "Transfer" as shown below.

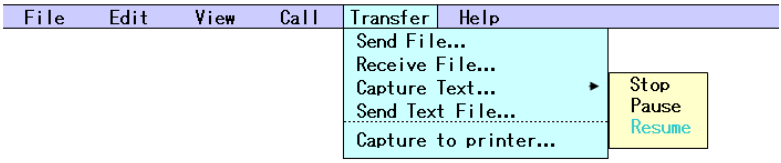


② Input a suitable file name and click "Start" button.

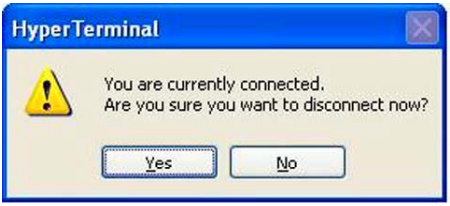


③ The initial screen is displayed again. Press keys "Shift + D" on the key board. The saved data in EA-5J will be immediately copied and indicated on the screen.

④ Click in order "Transfer" → "Capture Text" → "Stop" as shown below. All of saved data in EA-5J will be copied and saved in the computer as a file.



⑤ Click "End" in the "File" to close "Hyper Terminal". At the time, a confirmation dialogue will appear as shown below. Click "Yes".



⑥ The saved file is in ".csv" or ".txt" format and the data is in order of follows.

Storage number, Positive Decay time, Negative Decay time, Average voltage of Ion balance, Maximum voltage of Ion balance（Peak value）, Minimum voltage of Ion balance（valley value）

CAUTION

If there is a case of overtime in the decay time measurement, the data will be saved as "0.-1".

8.4 Deletion of saved data in EA-5J

The data saved in EA-5J can be deleted by following procedures.

① Turn the power on by pressing POWER button（blue）. Be sure that the LCD display shows auto mode（Au）.

② Press SAVE button. At this time, the number one added to saved data is shown on the display.

③ Press RESET button by a thin stick（1 ～ 2 mm diameter）. Then all of the saved data will be deleted completely.

④ The number of saved data is restarted from "0" when data is saved in next auto mode measurement.

Section 9. Tables of functions

9.1 Button switches

Character (color)	Operations	Unit	Additional character
POWER (Blue)	Ready to start (when power on)	Non	Non
	Measurement stop or compulsion end after power on		
MODE (White)	Mode can be changed whenever the button is pressed. Manual, PC and Auto	Non	Non
IB (Yellow)	Ion balance measurement in manual mode	V	IB
+DECAY (Red)	Positive decay time measurement in manual mode	kV, V, s	IB, HOLD
	Indication of the maximum voltage after ion balance measurement		
-DECAY (Green)	Negative decay time measurement in manual mode	kV, V, s	IB, HOLD
	Indication of the minimum voltage after ion balance measurement		
SAVE (Black)	Measured data saving in auto mode	Non	Non
PLATE CONTROL (Red)	Start measurement in each mode	kV, V, s	IB, HOLD
	Stop continuous measurement in ion balance mode		

9.2 Function switches

Character of switches	Operation
SET	Alteration or saving the measurement condition setting
DOWN or UP	Alteration of the setting point
RESET	Deletion of saved data in EA-5J

9.3 Beep sounds

Once, [Pi], 0.25 seconds		Continuous, [Piii]
Power ON	Measurement end in manual mode or auto mode	Measuring range exceeded

9.4 Lighting of LEDs

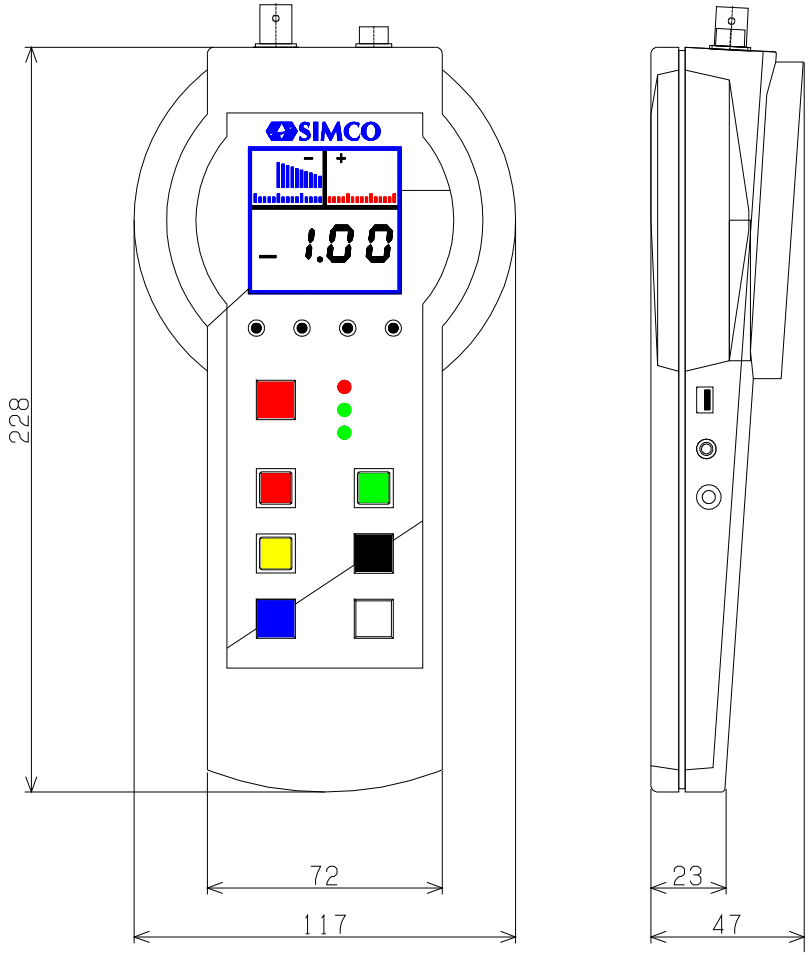
LED positions	HV OUT	GND	CHARGE	In each button		
				+DECAY	-DECAY	IB
State	Applying HV to the sensor plate	Grounding the sensor plate	Red: charging Green: complete	During the time of measurement		
				Positive decay time	Negative decay time	Ion balance

Section 10. Troubleshooting

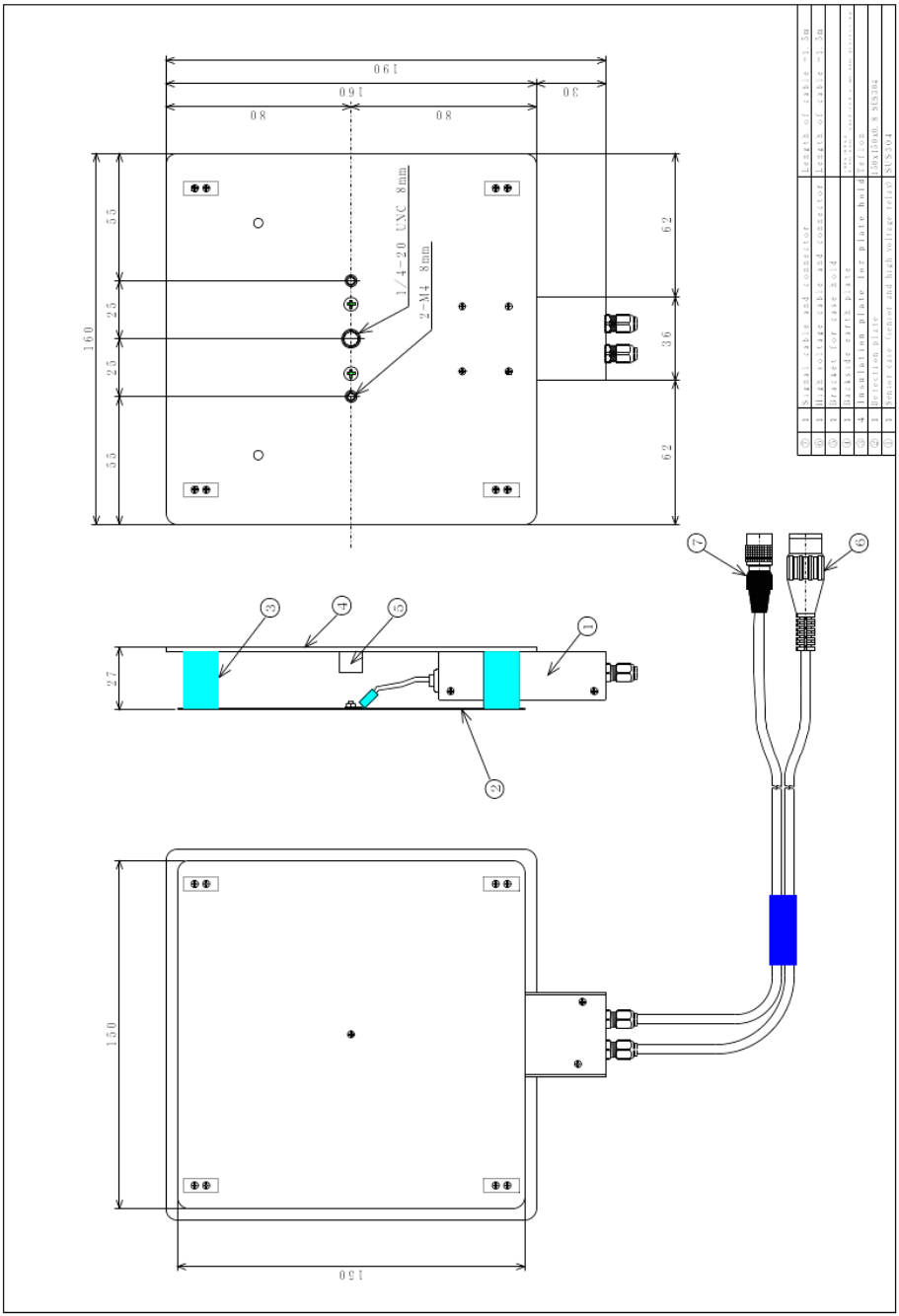
Trouble		Cause	Countermeasure
LCD shows nothing or a part is missing.		No battery or low battery	Charge the battery.
		Malfunction of the battery	Repair or replacement of the battery is needed.
		Malfunction of the LCD	Repair or replacement of the LCD or PCB is needed.
Display shows ERROR	Error code 0	Malfunction of the sensor	Repair or replacement of the sensor is needed.
	Error code 1	The sensor plate cannot be charged up to 1 kV.	Clean the plate and insulators and dry completely in a desiccator or in a poly bag using desiccant.
			Repair or replacement is needed because of malfunction of the HV unit or the wirings, if no improvement is noticed after cleaning and drying.
Beep sound does not activate		Malfunction of the buzzer or the circuit.	Repair or replacement of the buzzer or PCB is needed.
Display shows dwindle voltage without ionization in the decay time measurement mode. Indicated voltage is low in ion balance mode.		Insulation resistance of the plate sensor is low because of adhesion of dirt or condensation on the plate insulation.	Clean the plate and insulators and dry completely in a desiccator or in a poly bag using desiccant.
			Repair or replacement is needed, if no improvement is noticed after cleaning and drying.

If the countermeasures fail readjustment, repair or replacement is needed stop using the product and please contact SIMCO JAPAN with the product's serial number and information on the failure.

Section 11. Dimensional drawings



Controller EA-5J


190
160
30
80
80
1/4-20 UNC 8mm
2-M4 8mm
55
25
25
55
160
62
36
62
27
150
150

Simco-Ion EQUIPMENT REPAIR WARRANTY

Simco-Ion equipment has been carefully tested and inspected at the factory and is warranted to be free from any defects in materials or workmanship.

Simco Japan, Inc. will, under this warranty, repair or replace any equipment, which proves upon their examination, to have become defective within the Warranty period from the date of shipment. A one year Warranty applies to all Simco-Ion equipment. The equipment is to be returned by the purchaser to Simco Japan, Inc. or authorized agent of Simco-Ion, transportation prepaid and insured for its full purchase price. Prior to returning any goods for any reason, contact Simco Japan, Inc. or authorized agent for a Return Authorization Number. This number must accompany all returns.

The Warranty does not apply when the equipment has been tampered with, misused, improperly installed, altered, has received damage through abuse, carelessness, accident, connected to improper line voltage, or has been serviced by anyone other than an authorized factory representative. The warranty does not apply when Simco-Ion parts and equipment have been energized by other than appropriate Simco-Ion Power unit or generator, or when Simco-Ion Power unit or generator has been used to energize other than Simco-Ion parts and equipment.

Simco Japan, Inc. makes no Warranty, expressed or implied, nor accepts any obligation, liabilities or responsibility in connection with the use of this product other than the repair or replacement of parts as stated herein.

Product Name	***Simco-Ion Handy* Charge Plate Monitor** *EA−5J*		
Delivery Date	Product's serial number contains information on the shipping date.	Warranty Period	***A one year Warranty***

SIMCO ION™
An ITW Company



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