USER'S MANUAL

ELECTRONIC SEPARATOR

Model ES315

No. CAT.ES31515Ce

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Important Notes

Do not adjust sensitivity too high.

If the sensitivity control is set too high (near to 'MAX'), the equipment may not work properly. If sensitivity is set too high, the clamp may not be opened when the START button is pressed, because this condition could be same that the red cells are passing in tubing so the clamp should keep closed. Decrease the sensitivity control at rear panel. Refer to Section 5-3 for details.

Caution

The pressing plate is supported by a strong spring. Hold the handle securely.
Don't place fingers in the tube clamp as it may hurt fingers.

Connection of multiple units

Where dozens of this Electronic Separator should be used in a room, the units can be powered in series. Each separator has two power jacks, the one is to take power from an AC power adapter and the other is to supply power to the next adjacent unit. One AC power adapter can power up to five separators. Refer to Section 5-4 for details.

Cleaning Instructions

Use a soft cloth and mild detergent to clean the equipment. DO NOT use paint thinner, benzene, solvent or strong detergent.
The slots in opto-sensor should be kept free of any obstacle.

Keeping

Avoid using or leaving the machine in a location where the temperature is higher than 122 °F (50 °C). Keep it away from any heating source or direct sunlight.

1. Scope

1-1. Features

Electronic Separator model ES-315 is an electromechanical device that enables easy separation of blood components. It is semiautomatic equipment to separate blood into red cells and plasma.

Conventional separators, or plasma extractors, are simple devices that have mechanical structures only. Those conventional plasma separators request operators close watch all the time to stop the blood flow. This electronic separator is equipped with an opto-sensor and a tube clamp. Watching blood components flowing in tubing, the device closes tube clamp immediately when the opto-sensor senses red cells passing.

After tubing loaded between the sensors, sensing starts to work by pressing START button. A green LED lamp indicates sensing is working. When red cells start passing through tubing at sensor point, the sensor senses red cells and closes tube clamp immediately. A beep sounds, a red lamp is lit.

At rear panel is a small control shaft, marked as SENSITIVITY. This potentiometer control adjusts sensitivity of the opto-sensor.

In general, a blood center uses dozens of this Electronic Separator in a room. Not to use dozens of the AC power adapter in a room, each separator has two power jacks, the one is to take power from an AC power adapter and the other is to supply power to the next adjacent unit. One AC power adapter can power up to five separators.

To collect a fixed amount of platelet from plasma, a Weight Sensor model ES-355 can be connected with this electronic separator. It is an electronic scale that works with this separator through a cable. Operators can set a figure to collect and, when change of weight reaches the preset figure, ES-355 sends a command signal to the separator and to make the clamp be closed.

1-2. Accessories

The Electronic Separator ES-315 includes the items listed below.

Electronic Separator Stand, ES-315	1
Power Adapter	1
Jumper Cable	1
User's Manual	1

2. Specifications

a. Sensor type ; Infra-red beam interruption sensor

b. Clamping power source ; Geared motor

c. Clamp closing speed ; In about 1 second from sensing

d. Controls ; POWER, OPEN, CLOSE, START, SENSITIVITY

e. Indication lamps ; POWER, CLOSE, START

f. Power source ; AC power adapter (AC 100-120 or 220-240 VAC in, 18 V out)

g. Power consumption ; 10 watts max.

h. Dimensions ; W 165 x H 240 x D 230 mm

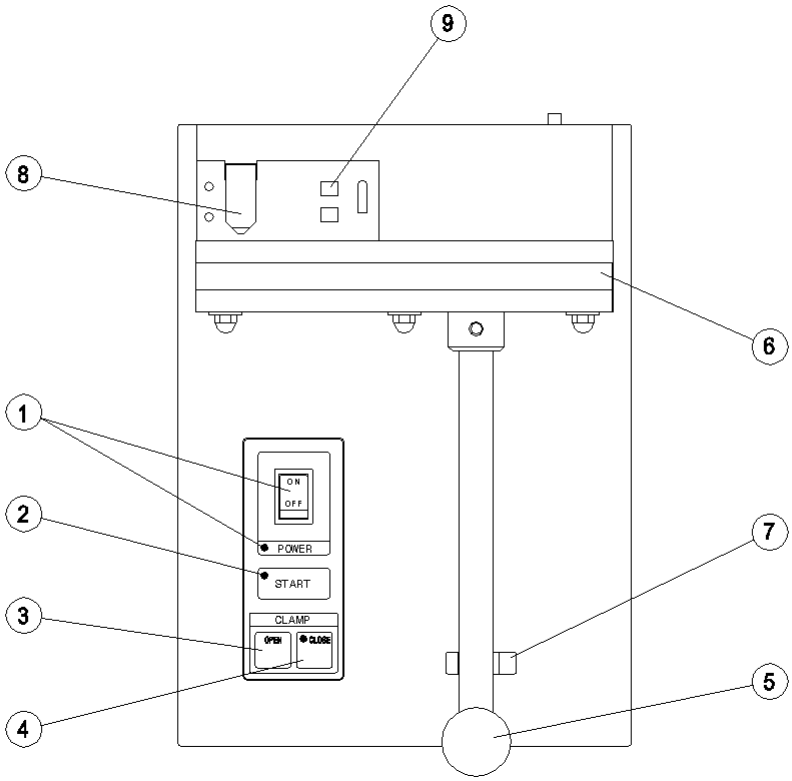
i. Weight ; 3.2 Kg

j. Temperature characteristics ;

Operating	0 ~ 40 ^{o}C	(32 ~ 104 ^{o}F)
Storage	- 20 ~ 70 ^{o}C	(- 4 ~ 158 ^{o}F)

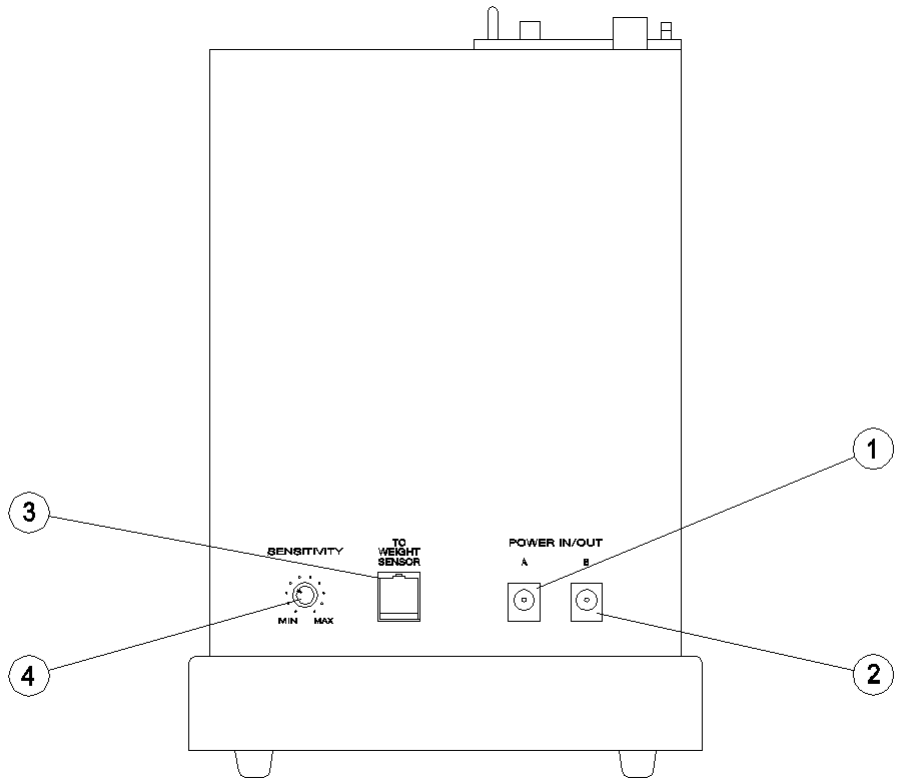
3. Views and Locations

3-1. Top and Control Panel



(1) [POWER] Switch and Lamp
(2) [START] Switch and Lamp
(3) [OPEN] Switch
(4) [CLOSE] Switch and Lamp
(5) Handle
(6) Pressing Plate
(7) Hook
(8) Tube Clamp
(9) Opto-Sensor

3-2. Rear Panel



(1) Power In/Out Connector (A)
(2) Power In/Out Connector (B)
(3) Connector for Weight Sensor
(4) [SENSITIVITY] Control

4. Functional Descriptions

[The figure in Section 3-1. Top and Control Panel]

(1) [POWER] Switch and Lamp - turns equipment power on and off, and indicates power is being applied. It's red.
(2) [START] Switch and Lamp - The opto-sensor starts to work when this switch is pressed. Green lamp indicates sensor is working. If the clamp closes at the moment when this button is pressed, it is opened. When red cells are detected, the clamp closes and the lamp is turned off to indicate sensor is not working.
(3) [OPEN] Switch - opens tube clamp.
(4) [CLOSE] Switch and Lamp - This switch closes the clamp. Lamp is lit while clamp is closed.
(5) Handle - is a movable iron bar.
(6) Pressing Plate - is a thick, transparent plate that squeezes blood bag.
(7) Hook - is to hold the handle while loading a blood bag.
(8) Tube Clamp - opens when OPEN button is pressed or when START button is pressed. It closes when CLOSE button is pressed or when the opto-sensor senses red cells. It closes too when a command signal comes from the Weight Sensor.
(9) Opto-sensor - emits and receives infra-red beam. As red cells in blood bag tubing interrupts more beams than plasma, receiving level drops when red cells come. Its sensitivity can be adjusted by users at rear panel.

[The figure in Section 3-2. Rear Panel]

(1) Power In/Out Connectors (A) - can be either a power inlet or a power outlet. It takes power if an AC power adapter is plugged in, or it supplies power to the next adjacent unit if a jumper cable is connected.
(2) Power In/Out Connectors (B) - is identical as the connector (A).
(3) Weight Sensor Connector - has 4 pins. Power is supplied to and command signal is fed from Weight Sensor through the connector.
(4) [SENSITIVITY] Control - is a potentiometer, which changes sensitivity of the opto-sensor. Turning it clockwise (to MAX) increases sensitivity.

(*) Connection of multiple units ;

When multiple units are used together, power can be supplied from a neighbor unit in stead of using individual power adapters. Five units can be powered together by one power adapter and four jumper wires. Refer to Section 5-4 for details.

5. How to Use Equipment

5-1. Preparation before Use

(1) Connect the adapter plug to either A or B of the POWER IN/OUT jack at rear panel.

(2) Turn the power switch on.

(3) If you are going to use this separator first time, or to use new type of blood bags, adjust the sensitivity. Refer to Section 5-3 for procedures.

5-2. How to Use This Separator

(1) Hold the handle or hook it, and place a centrifuged blood bag between pressing plate and panel.

(2) Break the nipple valve at top of blood bag (or do as required in accordance with the type of blood bags), and check that plasma starts to flow into tubing.

(3) Inspect carefully that air bubbles or flakes of red cells remain in tubing.
If any airs or red cells remain in tubing between blood bag nipple and the sensor, remove it by pressing the blood bag to flow a little more amount.

[Note] The sensor senses air bubbles too, and makes tube clamp close. Air bubbles should not remain in tubing.

(4) Route tubing between sensor slot and under the clamp. And press CLOSE button.

* Clamp closes and red CLOSE lamp is lit.

(5) Release handle from hook, and press START button.

* Clamp is opened, CLOSE lamp is turned off.
* Sensing starts to work, green lamp is turned on.
* Plasma starts to flow into satellite bag.

[Note 1] If sensitivity is adjusted too high, small moving of tubing may trigger the sensor and close clamp. Reduce sensitivity to get stable operation. Refer to Section 5-3 to adjust it.

[Note 2] When you press START button, if clamp is not opened even though START lamp is turned on, it means sensitivity is set at higher value than necessary. Reduce sensitivity a little and then, press CLOSE button. (CLOSE button should be pressed to terminate sensing process.) Press START button again.

[Note 3] When the opto-sensor senses air bubbles moving in tubing, clamp is also closed. If clamp closes by air bubbles, reduce sensitivity a little. Press START button again to continue.

Now the separator is working.
When the opto-sensor senses any darker or thicker stuff passing through sensor,
* Clamp closes immediately.
* CLOSE lamp turns on and buzzer sounds.
* Sensor stops working.

(6) Seal blood bag tubing.

(7) Press OPEN button to open the now-closed clamp.

* Clamp is opened, CLOSE lamp is turned off.

(8) Unload the blood bags.

5-3. How to Adjust Sensitivity

Sensitivity of opto-sensor should be adjusted carefully. If it is set too low, clamping action may be delayed or may not be closed.

If it is set too high, clamping action may become unstable as noted in the [Note 1], [Note 2] and [Note 3] in Section 5-2 ;

* Small moving of tubing may trigger the sensor.
* Clamp may not be opened by START button.
* Air bubbles in tubing may trigger the sensor.

SENSITIVITY control is located at rear panel. It is a single-turn potentiometer.
To increase sensitivity, turn it clockwise to MAX.
To decrease sensitivity, turn it counter-clockwise to MIN.

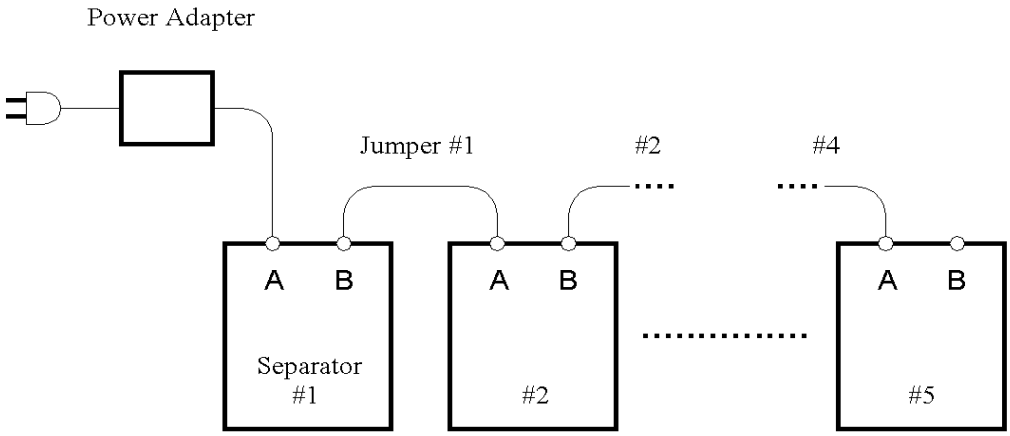
When a different type of blood bags are to be used, sensitivity should be adjusted again.

5-4. How to Connect Multiple Units

In most blood banks, many units of plasma separator are used together. As each separator should use a power adapter, users need to prepare same numbers of wall outlets or multi-tap adapters. To reduce of AC outlets to be prepared, up to five units of separators can be powered by one power adapter with use of jumper cables.

Do not connect more than five units with one AC power adapter. If users experience any malfunctioning in clamp action, reduce the number of units connected.

Following diagram shows inter-connection.



6. Maintenance

6-1. Troubleshooting

The following table covers common problems and suggested solutions:

Symptom	Likely Cause	Solution
Power switch is on, but no lamp comes on.	No power connection	Check power adapter connection.
	Equipment malfunction	Ask service. Call your distributor.
Clamp closes not by red cells.	Air bubble passed	Refer to [Note 3] in Sec. 5-2.
	Sensitivity too high	Refer to [Note 1] in Sec. 5-2.
Clamping is too slow so red cells passes clamp too much.	Sensitivity too low	Refer to Section 5-3.
Clamp doesn't open when START pressed.	Sensitivity too high	Refer to [Note 2] in Sec. 5-2.
OPEN button doesn't work.	Sensing procedures not ended	Press CLOSE button first. Refer to [Note 2] in Sec. 5-3.

Other problems should be corrected by authorized service personnel.
Contact your distributor for service.

6-2. Cleaning

The opto-sensor senses optical transparency of plasma and red cells, and compares each other. The sensor should be kept clean and free of dirt or obstacles.
Use a soft cloth and mild detergent to clean the unit. Do not use paint thinner, benzene, solvent or strong detergent.

6-3. Service Call

If the equipment does not operate properly, or if you need assistance, contact your distributor or the manufacturer: