
Instruction Manual

Mini Submerge Type Electrophoresis System

Built in Power Supply

WSE-1710

Submerge-Mini

7th Edition, May 12th 2016



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Introduction

Thank you for purchasing ATTO' s mini submerge type electrophoresis system "WSE-1710 Submerge-Mini" . This instruction manual (i.e. this document) is delivered to you together with the system is that you can make full of the system. Not only those of you who use this system for the first time, but also those who have used it before, should read this document carefully to understand the contents. If you use this system for the first time, please read this document from the beginning in serial order. In addition to how to use it, this document contains information related to maintenance and guarantee as well. Please keep it handy all the time to make its full use. If you have any inquiries on your purchased product or the instruction manual, please feel free to contact your distributor or us (Please refer to the back cover).

About this manual

Before using the product, please read this document carefully. After reading it, please be sure to keep it for your future reference. When you relocate this system, be sure to attach this document to it. If there is any defect in this document such as misplaced or missing pages, or if this document is lost or stained, we will replace it with a new one. Please take a moment to contact the distributor you purchased the product from or our company' s customer service department (Please refer to the back cover). At that time, please inform us of your product name and model. This document was created with our most careful attention; however, should you find any queries, errors or omissions, please inform our company' s customer service department (please refer to the back cover).

Safety precautions

To use this system safely, it is a must to operate it properly. Do not use this product until you read this document carefully and understand the content sufficiently. Precautions on usage and safety described in this document are applied to the use of this system only for the specified purpose of use. Do not use this system for any other purpose than described here, or do not use this system by any other method than described here. If you use this system for any other purpose or by any other method than described in this manual, you will be held responsible for all necessary safety measures as operator. If you operate the system for the first time, you need to be given instructions from an experienced operator with proper knowledge, and to understand its principle and method. Not only people who operate the system for the first time but also people who have ever used it after receiving professional education should keep this instruction manual handy to make its effective use. In order to prevent any electric shock or any damage to the system, please understand and follow the correct operation method shown in this manual. If you have questions or concerns related to the principle of the system, maintenance or inspection, feel free to contact your distributor or our company (Please refer to the back cover).

Safety symbols

To use this system safely and maintain the safe status, the following symbols are indicated in the instruction manual and on the system' s main unit. Please note the meaning of each symbol and observe each item.

Symbol	Description
 Danger	This symbol indicates emergent danger, such as death or heavy injury caused by ignoring the symbol and mishandling the system.
 Warning	This symbol indicates possibility of danger, such as death or injury, caused by ignoring the symbol and mishandling the system.
 Caution	This symbol indicates possible occurrence of physical damage caused by ignoring the symbol and mishandling the system.
	This symbol indicates prohibition.
	This symbol indicates an important matter.
	This symbol indicates a tip related to operation.

Operation precautions

These are precautions for preventing fire, electric shock and other accident or failure. Read and understand the information well, and be sure to observe it.

Danger

Power supply connection  	Do not use a deformed or corroded electrode terminal, AC adapter, power cable whose insulation coating is peeled off, or damaged power cable. Do not connect any power supply other than the power supply attached to this system. Before operating this system, check and confirm that there is no damage to it. Otherwise, it may catch fire or cause electric shock due to loose connection. If there is any damage, stop using this system and contact your distributor or our company. (please refer to the back cover). After use, be sure to turn off the power switch and disconnect it from the outlet. When disconnecting AC adapter from the outlet, be sure to turn off the power switch, and then disconnect it by holding the AC adapter instead of pulling the cable.
Not wet hand  	When handling this system, keep your hands dry. Do not touch AC adapter or connection terminal with wet hands. If you do, electric shock or failure may be caused. If power supply part or AC adapter gets wet, do not use it. If you do, electric shock or failure may be caused. If wetted, stop using it and contact your distributor or our company (please refer to the back cover).
Main unit 	Do not put any foreign object into this system. If you do, electric shock or failure may be caused. If the external surface of this system gets wet, do not use it. If you do, electric shock or failure may be caused. When using it, wipe moisture off the surface and dry it.
Maintenance  	If an error or if there seems to be an error or failure while this system is being used, stop using it immediately. If you find any defect at the time of inspection, do not use this system. If you do, electric shock or defect may be caused. While this system is in use, check if there is any error, such as abnormal sound or smoking etc. by regular visual inspection. If you find an error, failure or defect, stop using it and contact your distributor or our company (please refer to the back cover).
Heat alert 	Electrode liquid may be hot while or after using this system. Do not allow them direct contact to human body. It may cause any accident or heavy injury such as burn.
Reagent 	For the electrophoresis and blotting, deleterious substance, dangerous substance or carcinogenic material may be used for preparation of buffer solution, staining or decolorizing operation. Do not allow them direct contact to human body. If you do, fatal accident or body injury, like burn, may be caused. When using chemicals, protect your body with gloves and a mask. Carefully read and observe precautions on handling attached to the chemicals.

Warning

Installation 	Do not install the system on an unstable table, tilted place or a heavily vibrating place. Install it on an experimental table with horizontal, stable and solid surface. Otherwise, electric shock due to falling or liquid leakage may be caused. Do not put any object on this system. If you do, electric shock due to falling may be caused.
Main unit 	This is not of explosion-proof structure. Install it at the place where there is no exposure to fire or combustible gas. When taking this system out of a low-temperature room for use, take measures against dew condensation before moving it. If condensation is seen, dry it completely. Otherwise, electric shock or failure may be caused.
Transfer 	While this system is in operation, do not touch any parts other than control panel, nor move it. Also, electric cords may get tangled and the system may fall. When moving this system, be sure to turn off the power switch and disconnect AC adapter, and then disconnect all wiring cables.
Maintenance 	When you conduct maintenance or cleaning, be sure to turn off the switch of the power supply and disconnect AC adapter. To maintain good performance and safety of this product, please ask us for periodical maintenance, inspection and calibration (please refer to the back cover).

Warning

Disassembly 	Do not disassembly or remodel the system. Do not remove the external cover. Adjustment or repair of this product should be made by our engineers. If you ask for it, please contact us (refer to the back cover). Our company will not accept any responsibility for any accident or failure caused by disassembly or modification done by you.
Sticker 	Do not peel off the warning stickers. They indicate a dangerous section of this system. If it is peeled off or cannot be read due to stain, please contact us, referring to the back cover.
Power cable 	Do not use the power cable for any purpose other than operation of this system. If you do, failure or accident may be caused. We will not accept responsibility for any accident or failure caused by using the power supply and AC adapter of this system for any system other than this one. If this system is used outside Japan, prepare the conversion adapter complying with standards of the country where you use it. If a non-standard adapter is used, heat generation or ignition may occur. If you have any inquiries, please contact your distributor or us (please refer to the back cover).

Caution

Sticker	The name plate stickers show important information for maintenance and management of product. Do not peel it off.
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Notices

Application	This system is physical chemical equipment for research. It is not medical equipment. Therefore it cannot be used for medical practices, such as medical care-related judgement or treatment effect checking.
Export	Export of certain services or cargos is controlled by the foreign exchange law and the government decree or ministerial ordinance of foreign trade control law of Japan. The product is subject to such regulations. Even if the product is not pertinent to the government decree, it is necessary to submit the document to the customs office to that effect. If the product is pertinent, it is necessary to obtain the export license from the Ministry of Economy, Trade and Industry and submit the license to the customs office. When you export our company's product, please contact the distributor or our company's customer department in advance (please refer to the back cover).
Trademarks/ Copyright	Reprint or copy of a part or whole of the instruction manual would require the permission of the copyright. The specification of the product and the contents of the instruction manual may be changed without prior notice.

1 Overview

1.1 Purpose

WSE-1710 Submerge-Mini is the device to separate nucleic acid with agarose gel by electrophoresis. Agarose gel made by attached gel casting kit is used for electrophoresis.

1.2 Principle

This system supplies electric power through electrode liquid from power supply unit attached to electrophoresis chamber. Nucleic acid sample applied to well of gel is electrified to be negative, so it move to anode side by electricity. Nucleic acid is separated to each band depending on the size of nucleic acid.

2 Inspection when unpacking the product

2.1 Inspection at unpacking

When you receive the product, check if the main unit and the accessories are properly packed and there is no damage. If you find any defect or damage, please contact the distributor you purchased the product from or our company immediately (please refer to the back cover). Carry out the inspection at the time of unpacking within one week after you receive the product. After one week elapses, damage or parts shortage may not be recovered.

2.2 Equipment configuration

The product consists of main unit and accessories.

Main unit

Model	WSE-1710
Product No.	2322100
Main unit	Submerge-Mini

Accessories

Product name	Amount
Electrophoresis apparatus	1
Power cable	1
Gel stand S	1
Gel stand L	1
Gel tray S	4
Gel tray L	2
Comb S	2
Comb L	2
Instruction manual	1

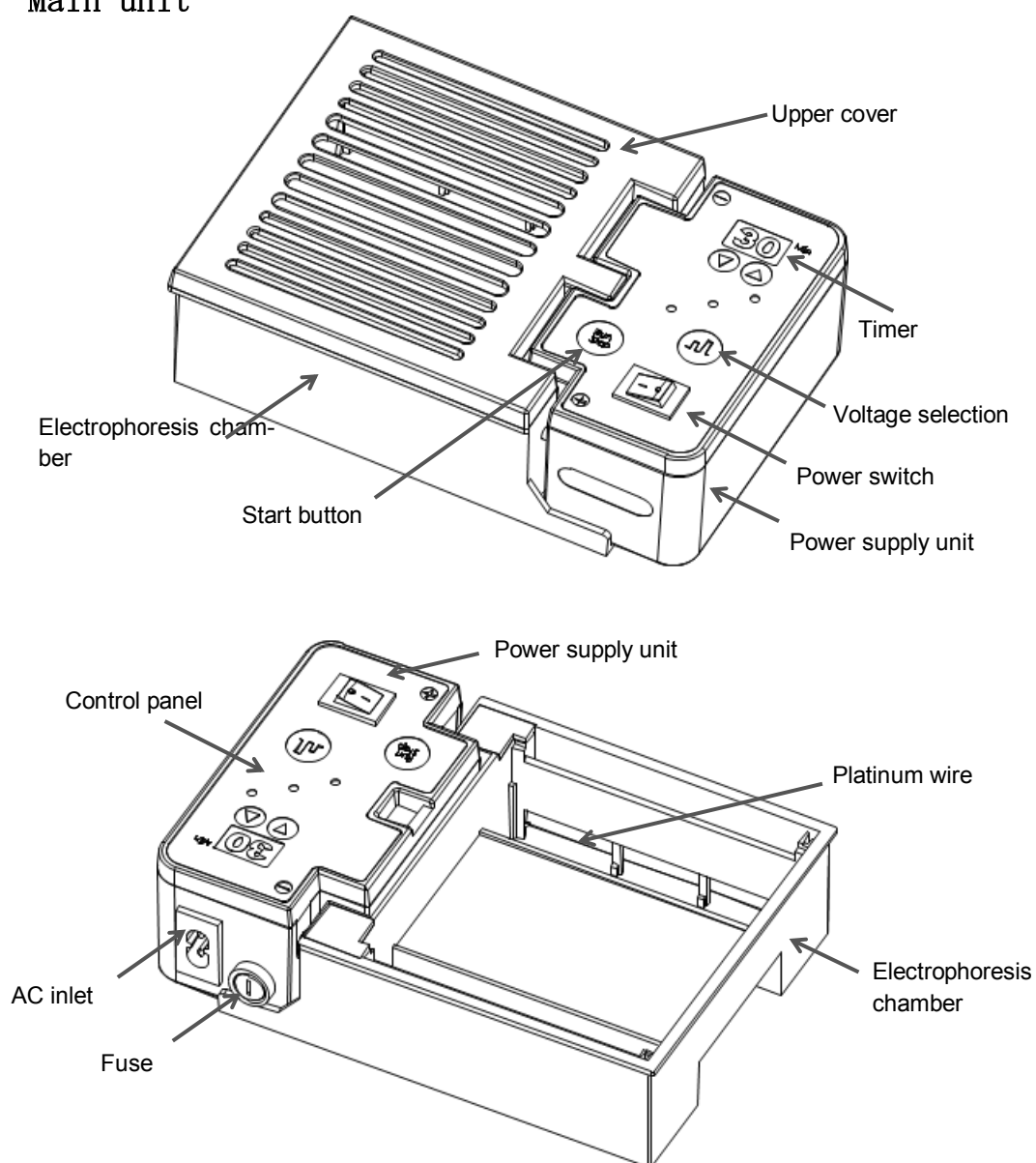
Option

Product name	Product No.
220V Voltage Transformer	2322106
Gel casting kit S for WSE-1710	2322107
Gel casting kit L for WSE-1710	2322108
Gel casting kit S & L for WSE-1710	2322109

- * Gel casting kit S consists gel stand S x1, gel tray S x4 and Comb S x2.
- * Gel casting kit L consists gel stand L x1, gel tray L x2 and Comb L x2.
- * Gel casting kit S & L consists gel casting kit S and gel casting kit L.

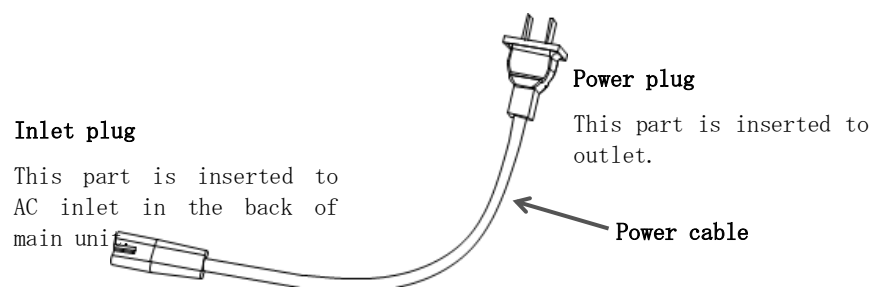
3 Part name and function

3.1 Main unit



3.2 Power cable

This power cable is available from AC 100V to 120V.

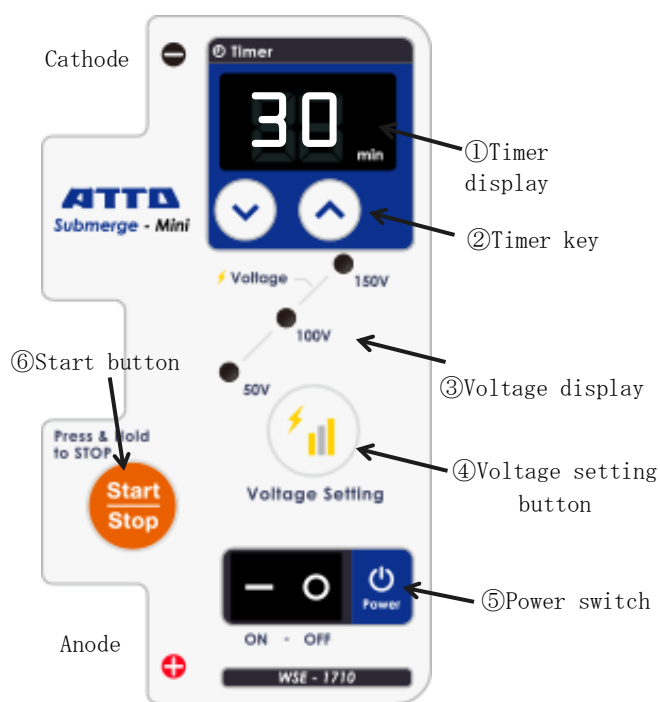


3.3 Gel casting kit

This kit which consists gel stands, gel trays and combs is for casting agarose gel. The gel trays are made of UV transmission resin.



3.4 Control panel



①Timer display

Time display shows setting time (at the time of setting) and remaining time (at the time of running, countdown).

If timer is set as "0 min", you can use it in timer-free.

②Timer key

Timer key is used for setting a running time.

Press arrow key and setting time is increased or decreased.

③Voltage display

LED of which you set voltage lights up.

④Voltage setting button

Press the button and the setting for voltage is changed.

LED voltage display is changed.

⑤Power switch

The switch is for turning the system ON/OFF.

⑥Start button

Press the button and running starts.

If you do a long press of it while running,

4 Preparation

4.1 Installation environment

Please use this system under the following condition.

Location	Inside a room only
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Warning

Do not install the product in combustible gas atmosphere. It is not of explosion-proof structure, so the product may cause explosion or fire. Install it in an environment that does not contact combustible gas.

Do not install the product in corrosive gas environment. This is because it can cause corrosion of conductor inside this product or contact failure of connector, which may lead to malfunction or failure.

Do not install the product in an environment with much dust or dirt. Dust or dirt may get attached to the product, which can cause electric shock, fire or failure.

Caution

Do not use the product at a place where there is strong magnetic field or electric field around, or a place where there is much waveform strain of input power supply or noise. Malfunction may be caused.

Do not install the product where it is exposed to direct sunlight, where temperature suddenly changes, or where humidity is high. If dew condensation occurs, do not use this product. This system cannot be used outdoors. It is designed so that safety and performance can be ensured under the environmental conditions: ambient temperature 5°C~30°C, relative humidity 5%~70% (No dew condensation).

4.2 Pretreatment of reagent

Standard running buffer for electrophoresis is TAE and TBE. TAE is suitable for separation of long DNA (more than several kbp), and TBE is suitable for separation of short DNA. The component of reagent used for electrophoresis is as the following.

Gel buffer and Running buffer

50x TAE (room temperature storage)

2 M	Tris base
1 M	Acetic acid
50 mM	EDTA

OR

10x TBE (Room temperature storage)

500 mM	Tri base
485 mM	Boric acid
20 mM	EDTA

5x Gel loading solution (refrigerated storage)

0.25%	BPB (Bromophenol blue)
40%	Saccharose

DNA stain (storage at cool and dark place)

0.2 mL	10mg/mL Ethidium bromide
200mL	1xTAE or 1xTBE

Warning

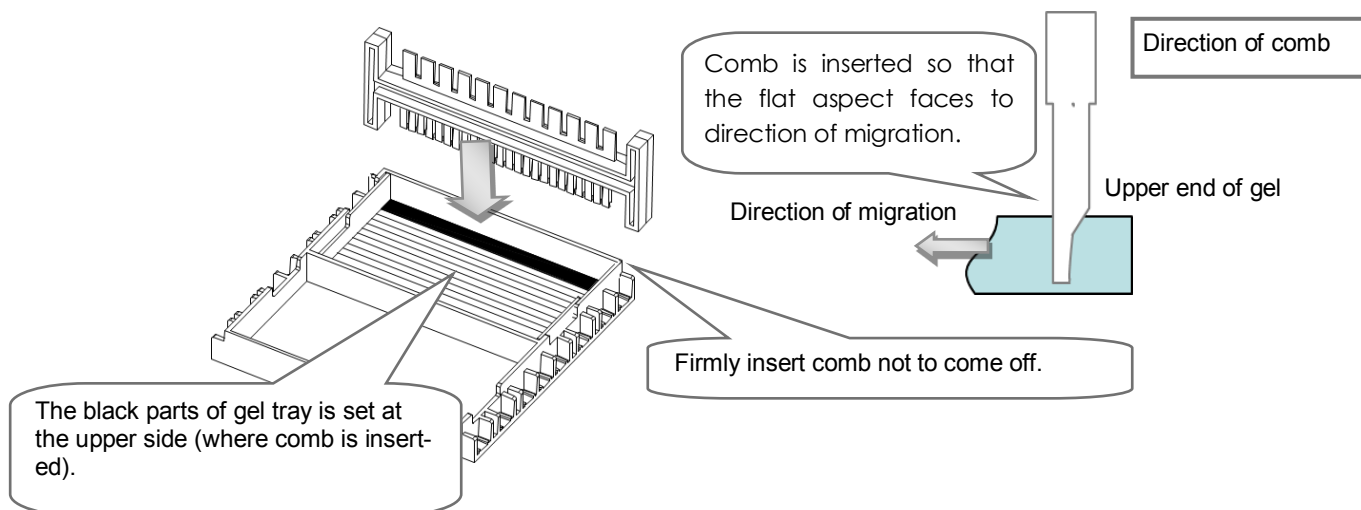
For electrophoresis, deleterious substance, dangerous substance or carcinogenic material may be used for preparation of buffer solution, staining or decolorizing operation. Do not allow them direct contact to human body. If you do, fatal accident or body injury, like burn, may be caused. When using chemicals, read the manual attached to reagent and protect your body with gloves and a mask.

Concentration of Agarose gel (w/v)	Size of DNA (bp)
0.6%	1,000-20,000
0.7%	800-100,00
1.0%	500-7,000
1.2%	400-6,000
1.5%	200-3,000
2.0%	100-2,000

Concentration of agarose gel is selected depending on size of DNA which is separated. Table on the left shows indication of concentration suitable to size of DNA.

4.3 Assembling gel casting kit

- ① Put gel tray into gel stand.
- ② Set flat aspect of comb so that it faces to direction of migration, and insert it to gel tray.

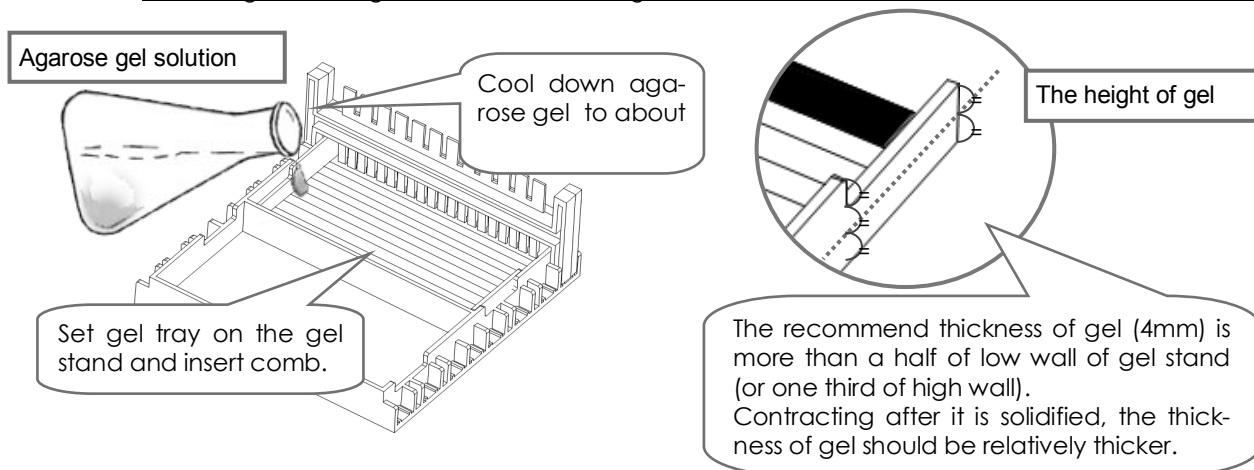


4.4 Casting agarose gel

- ① Measure weight of agarose according to the size of separated DNA (Refer to the table on chapter 4.2(1)), and add necessary amount of 1xTAE or 1xTBE to it.
- ② Heat and boil agarose by microwave oven or water bath so that it completely melts.
- ③ Cool down the gel solution to about 60°C.
- ④ Pour gently agarose gel solution to gel casting kit.

※The necessary amount of agarose gel solution is 25~40 mL per 1 sheet of gel tray L; 15~20 mL per 1 sheet of gel tray S. The proper gel thickness is 4~6mm.

※The height of solid gel is lower than that of gel solution because it contracts a bit when it is solidified.



Warning

Agarose gel after dissolved may bump and cause burn because it is very high temperature. Protect human body with heat-resist gloves and handle with care.

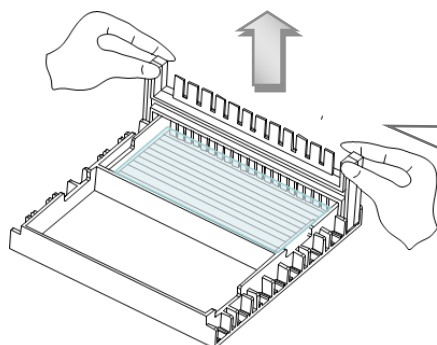


Caution

If agarose gel at the high temperature is poured to gel tray, it may be deformed. Be sure to cool down the gel to moderate temperature (around 60°C) and pour it.

⑤ Leave gel to be solidified in 30-60 min at room temperature.

⑥ Hold both ends of comb and pull it up.

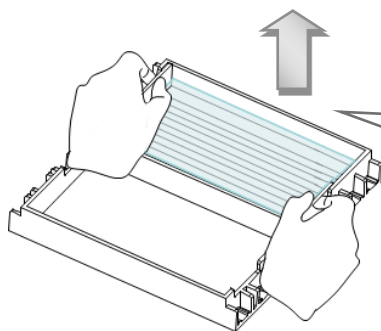


Pull up the comb vertically and remove it.

Be careful not to get out of shape of the well.

⑦ Remove gel with gel tray from the stand.

※ Hand-made agarose gel can be refrigerated in 1 x TAE or 1 x TBE buffer for about 1 week.



Hold gel tray and remove it from the stand.

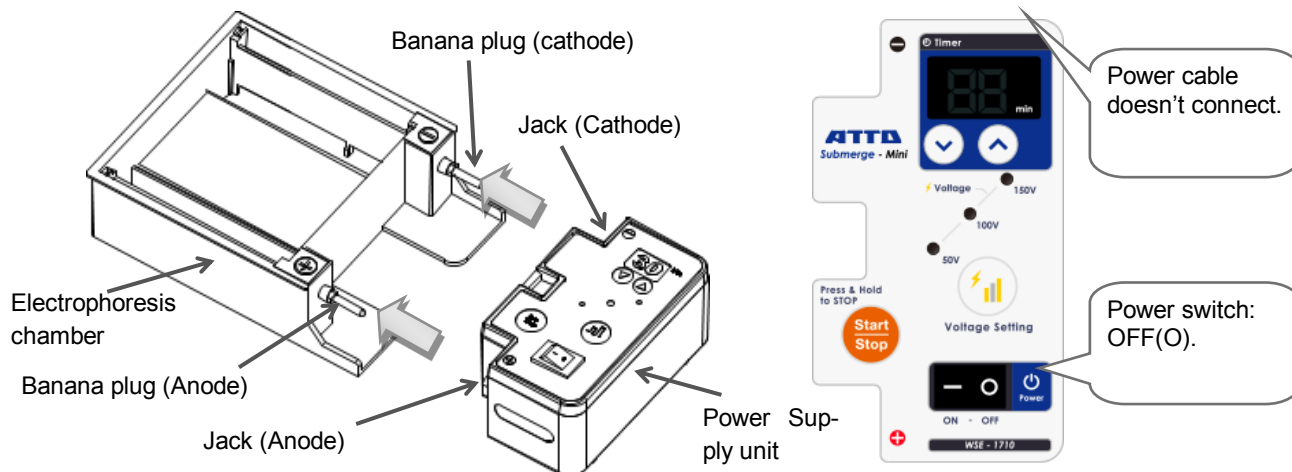
Be sure not to slip out the gel.

5 Operation

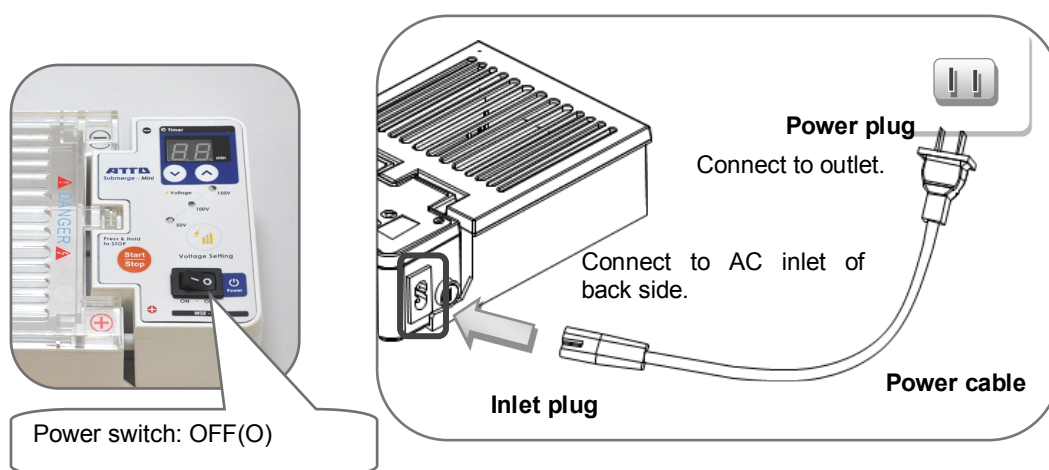
5.1 Starting operation

- ① Confirm power cable does not connect.
- ② Confirm power switch of the top surface is off (O).
- ③ Connect electrophoresis chamber to power supply part.

※ Insert firmly banana plug of the chamber into jack of the power supply unit.



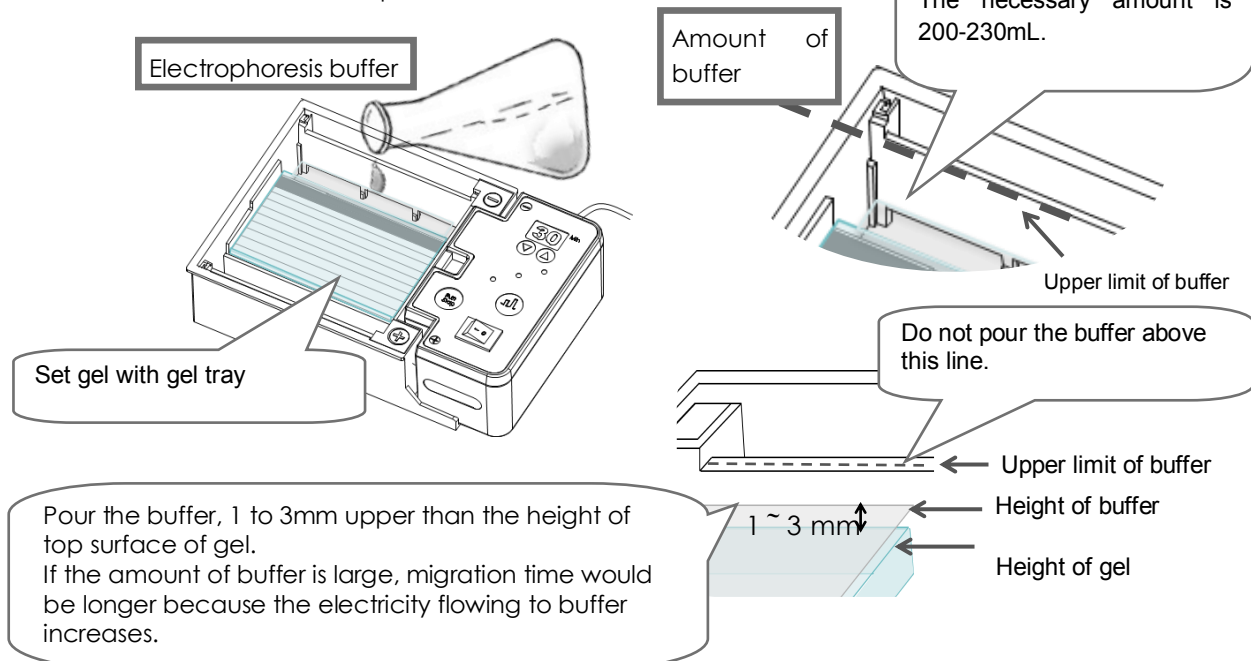
- ⑤ Connect inlet plug of power cable to AC inlet of the back side of power supply part.
- ⑥ Connect power plug to outlet.



⚠ Warning

Do not use a deformed or corroded electrode terminal, AC adapter, power cable whose insulation coating is peeled off, or damaged power cable. Also do not connect any power cable other than the one attached to this system.

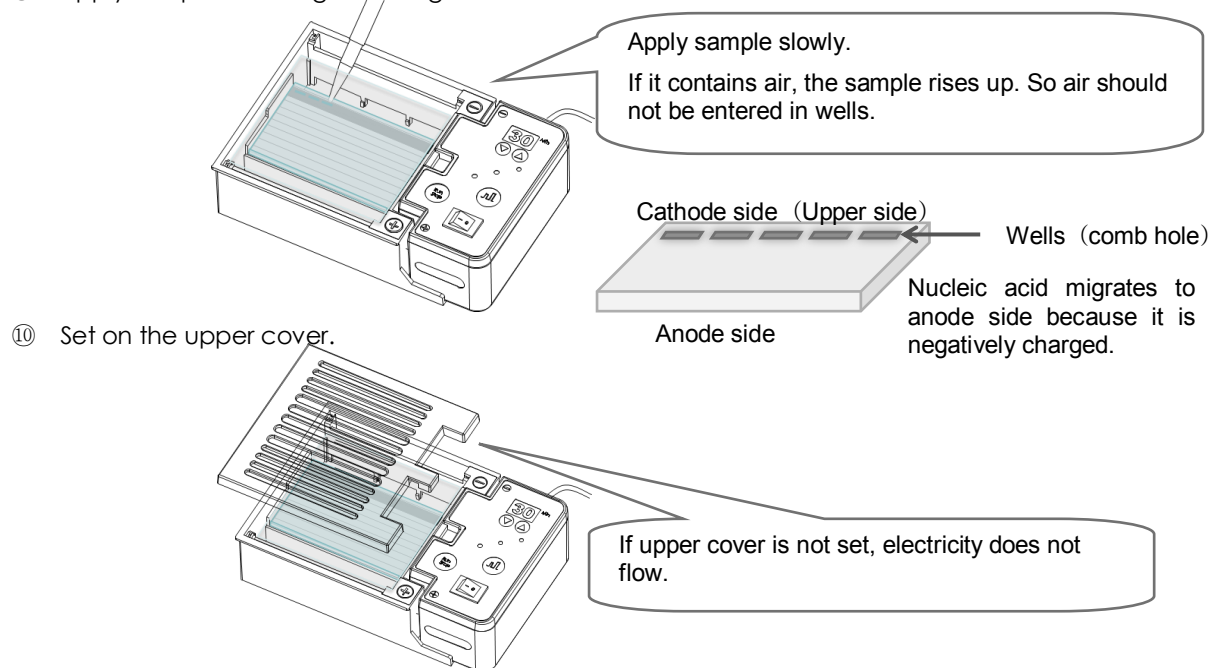
- ⑦ Set agarose gel with gel tray on the electrophoresis chamber.
- ⑧ Pour 200-230mL electrophoresis buffer to the chamber.



⚠ Caution

Do not pour electrophoresis buffer more than 230mL. Also pour the buffer so as to immerse the top surface of gel completely. If you do not put adequate amount of buffer, it may cause disordered electrophoresis pattern, the slow electrophoresis speed or buffer overflowing during electrophoresis.

- ⑨ Apply sample added gel loading solution to wells.



⚠ Caution

Be sure to set on the upper cover. Also do not insert or put a object through the space of the cover during running the system. It may cause ignition and shock hazard.

- ⑪ Switch on the power switch (-).

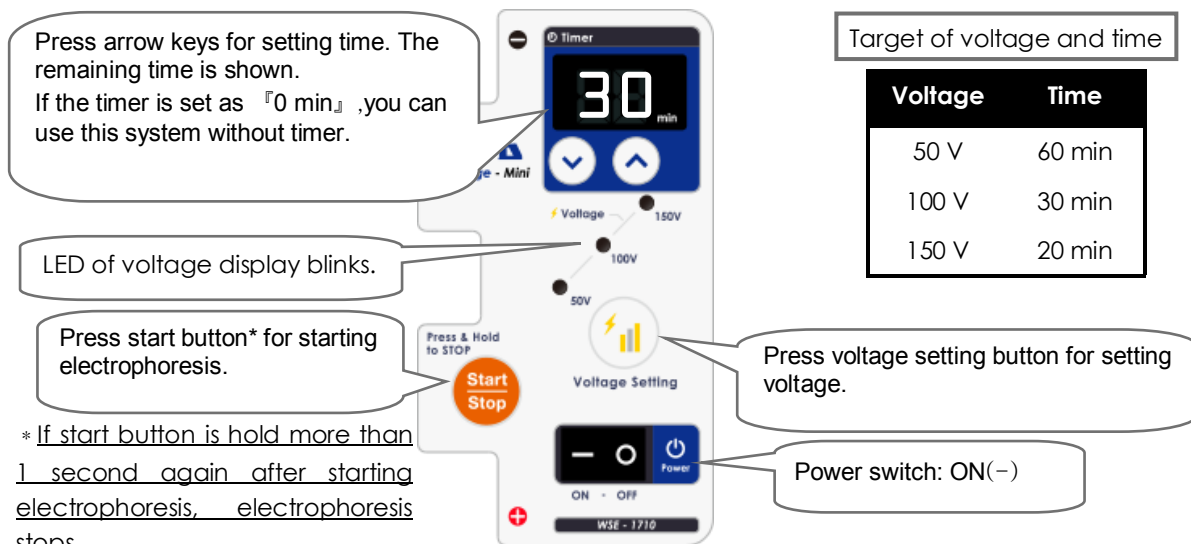
※Timer is shown and LED of voltage display blinks.

- ⑫ Set voltage and time.

※Refer to the table on the below for setting value. The time is shown by countdown. The remaining time is shown.

- ⑬ Press start button and start electrophoresis.

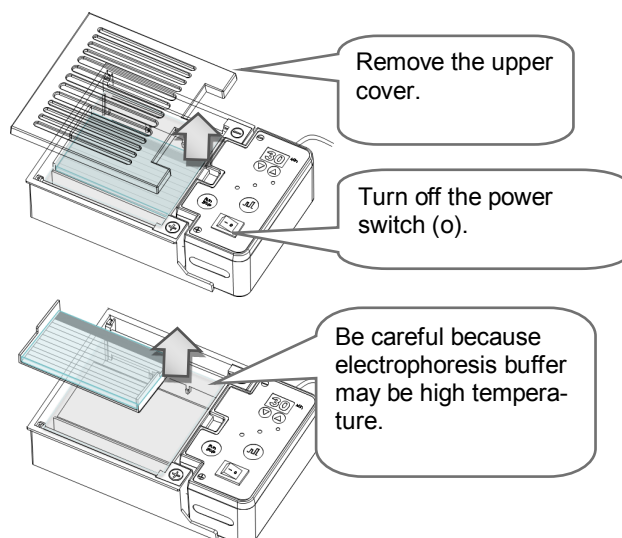
※If start button is hold more than 1 second again after starting electrophoresis, electro-



If electrophoresis is performed under 150V setting, the temperature of buffer may become high as 40-50°C. If agarose gel whose melting point is low is used, be careful because it may be af-

5.2 Finishing operation

- ① When setting time is over, alarm rings.
- ② Turn off the power switch (o) of the power supply part.
- ③ Pull power cable out of outlet.
- ④ Pull inlet plug out of AC inlet.
- ⑤ Remove the upper cover.
- ⑥ Take the gel with gel tray out from the chamber.
- ⑦ Remove gel from the tray and stain/decolor it.
- ⑧ Detect migration pattern of DNA band.



The temperature of buffer may be high as 40-50°C just after operation finishes. Put on gloves and prevent human body from touching electrophoresis apparatus directly. It may cause an accident or disorder such as burns.



Dangerous substance or carcinogenic material may be used for staining or decolorizing operation. Do not allow them direct contact to human body and read the manual attached to reagent thoroughly.

6 Trouble shooting

	Cause	Solution
Display is not shown.	Connection failure of power cable. Power switch is off.	Remove power cable from power supply part and connect it again. Confirm the cable is connected properly without slack.
Migration does not start.	Power switch is off. Power supply part is not connected.	Turn on the power switch. Confirm power supply part is connected to the chamber properly. If this problem is not solved by the solution, contact our company (Please refer to the back cover).
Migration distance is abnormal.	Setting of voltage and time is mistaken. The amount of buffer is incorrect. The buffer is reused.	Confirm the setting of voltage and time again. Use adequate amount of buffer (200-230mL). Also pour the buffer so as to immerse the gel completely. Use new buffer.
Error [E1] is shown.	Upper cover is moved (opened) while migration.	Set the upper cover properly again. Migration restarts automatically.
Error [E3] is shown.	Upper cover is opened.	Turn off the power switch and set the cover properly. And then press start button.
Error [E5] is shown.	Buffer is not in the chamber. (Open Error)	Pour adequate amount of buffer (200-230mL) .
Error [E7] is shown.	Overcurrent is applied. (Overload)	Concentration of buffer may be high or the amount may be too much. Confirm the concentration and volume of the buffer are correct.
No reaction is shown even though button is pressed.	The system has an abnormality such as connection failure or others.	Stop using the system immediately and contact our company (Please refer to the back cover).
Power is not supplied.	Connection failure of power cable. Power switch is off. Fuse blows.	Replace the fuse by new one. Please contact our company (refer to the back cover) for confirming the method to replace it.

7 Maintenance

7.1 Cleaning

Electrophoresis chamber	Remove the power supply part at first. Clean the chamber with soft sponge, water and neutral detergent. There is platinum wire at the bottom of the chamber so be careful not
Gel stand/Gel tray/Comb	Clean gel stand, gel tray and comb with soft sponge, water and neutral detergent.
Power supply part/Power cable	If the surface gets dirty, wipe it softly by soft cloth with neutral detergent diluted with water. Do not use until it gets dry completely.



Caution

- Do not use highly concentrated alcohol or caustic detergent for cleaning unit and the attachment.
- Be careful not to disconnect platinum wire at the bottom of electrophoresis chamber.
- Turn off the power switch and remove power cable before cleaning.

7.2 Inspection

Due to periodical inspection and maintenance, you can use the system and equipment safely and prevent failure and accident beforehand. We recommend you inspect the system and equipment periodically in accordance with frequency or time to use, for maintaining the efficiency. If abnormality or trouble such as following occurs, please contact our company.

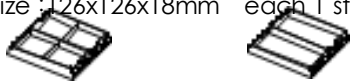
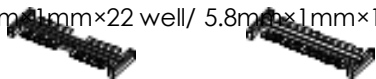
Main unit	Confirm by visual observation there is no damage, deformation or corroded power jack .
Power cable	Confirm by visual observation there is no damage, deformation or insulation coating which is



Caution

- Turn off the power switch and remove power cable before inspecting main unit.
- Remove power cable from main unit and outlet before inspecting it.

8 Specification

Product name	<i>Submerge-Mini</i>
Model	WSE-1710
Dimension, weight	190x130x60mm 0.45kg(without AC)
Size of electrophoresis chamber	110x121x43mm (inside dimension)
Volume of buffer	200-230mL
Outside dimension of cover	130x130x8 mm
Dimension of power supply part	70x120x60 mm
Input	AC100-120V, 50/60Hz, 1A
Output	DC50V / DC100V / DC150V 40W
Timer	0-99 min Alarm ([0 min] setting: continuous output)
Display	LED (Time: min, at the end: Ed, No cover: E1)
Safety mechanism	If safety cover is not set, output stops and alarm notifies. Fuse : 250V-1.6A fast-blow fuse type, Midget form
Gel stand	For S size, L size :126x126x18mm each 1 stand 
Gel tray	For S size: 54x60 mm x4, For L size: 110x60 mm x2, UV transmittance 
Comb	For S size: 3mm×1mm×18 well/ 5.8mm×1mm×10 well x2 For L size: 3mm×1mm×22 well/ 5.8mm×1mm×12 well x2 



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