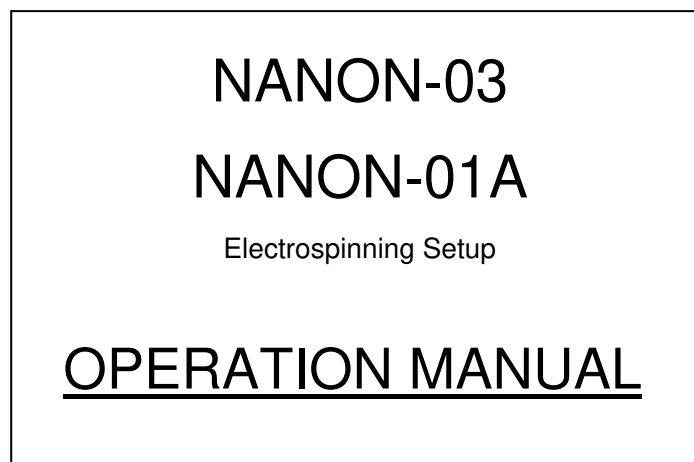


Document No. 273040127

Date of creation May.19, 2010

Date of revision Nov.22.2018

MODEL



- Be sure to read this manual before operating the equipment.  
Please read the safety instructions thoroughly before operation.
- Please keep this manual to review anytime.

**MECC CO., LTD.**

196-1 FUKUDO OGORI-SHI,  
FUKUOKA 838-0137 JAPAN

PHONE: 0942-41-2101 FAX: 0942-41-2105

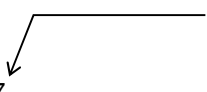
# NOTICE

- (1) All rights about this document are reserved by MECC CO., LTD. It is strictly prohibited to copy or transfer a part or all of this document.
- (2) Contents of this document may change without a prior notice.
- (3) We at MECC try our best efforts in creating this document. However, if incorrect, missing or unclear descriptions are found, please do not hesitate to let us know.

## HISTORY OF REVISION

The last number of the document number on the cover sheet represents the revision number of the document.

Document No. 273040127      Revision number ( "7" in this case )



Revision number	Date of revision	Revised page / Description
	May.19, 2010	1 <sup>st</sup> edition
	Aug.26, 2010	2-5,2-8,2-12,4-1
	Oct.26, 2010	2-4
	May.10, 2011	2-2-1
	June.28, 2011	2-2-1 2-1-1
	Oct.28, 2011	2-2-1
	Apr.16.2014	2-2-4
	May.10,2014	3.2-4
	Nov.22.2018	Full review

For Safety Operation .....	1
Safety Precautions .....	2

**CHAPTER1 Before Operation**

1-1. Confirmation of main unit and accessories .....	1-1
1-2. Functions of the NANON .....	1-1
1-2-1. FRONT PANEL .....	1-2
1-2-2. REAR PANEL .....	1-4
1-2-3. SIDE PANEL .....	1-4
1-2-4. Accessories .....	1-4

**CHAPTER2 Operation**

2-1. How to operate the operation unit .....	2-1
2-1-1. Main menu .....	2-1
2-1-2. Display during spinning .....	2-3
2-2. Procedure of fiber sample preparation .....	2-4
2-2-1. Preparation for spinning .....	2-4
2-2-2. Creation of fiber samples .....	2-11
2-2-3. Care after fiber sample preparation .....	2-12
2-2-4. Procedure of the filter exchange .....	2-13
2-2-5. Indications at errors and counter measures .....	2-14

**CHAPTER3 Maintenance**

3-1. Cleaning .....	3-1
---------------------	-----

**CHAPTER4 Troubleshooting**

4-1. Troubleshooting .....	4-1
----------------------------	-----

**Limited Warranty Policy****Outline Drawing**

# For Safety Operation

---

(1) Symbols for safety operations in this document

In this document warns dangerous operations to protect human bodies and properties from hazards and damages with the following symbols. Read through all the contents for full understanding.



**WARNING**

Death or serious injuries may result if mishandling of the equipment is made by ignoring this symbol.



**CAUTION**

Injuries or damage on properties may result mishandling of the equipment is made by ignoring this symbol.

(2) Descriptions of symbols



⊘ represents "Prohibition".

This symbol means "Don't disassemble".



△ represents "Caution" (including warning) .

Contents to be pay attention to is shown in the triangle.

This symbol means "Be careful of electric shock."



△ represents "Caution" (including warning) .

This symbol means "(general) Caution."



The symbol represents a protective ground terminal.

Be sure to connect it to the ground (earth) before operations.

I

This symbol means "POWER ON".

O

This symbol means "POWER OFF".

# Safety Precautions

## Safety Precautions



**WARNING**

Stop operations if the equipment generates smoke, odd smell or strange noise. It may cause electric shock and/or fire.

Shut off the power immediately and disconnect the AC power plug.

Contact our sales representative shown at the end of this manual.

Note: Don't try to disassemble and repair the equipment by yourself.

It is very dangerous!



**ELECTRIC SHOCK**

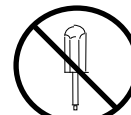
Don't touch any terminals while power is on.

It may cause electric shock.



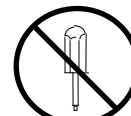
**ELECTRIC SHOCK**

Don't disassemble the equipment or touch the inside of the equipment while power is on. It may cause electric shock.



**ELECTRIC SHOCK**

Don't disassemble or modify the equipment except as mentioned in this manual. It may cause injuries, electric shock and/or fire.



**ELECTRIC SHOCK**

Do not use the power source out of the rated range.

It may cause electric shock and/or fire.

Secure rated voltage inputs in unstable power-supplying environments.



**ELECTRIC SHOCK**

This equipment employs a three-prong plug with a ground terminal.

Be sure to connect the plug to a receptacle with a protective ground terminal. If a two-prong plug has to be used, be sure to ground the protective ground terminal of the equipment to avoid electric shock and/or fire by leakage.



**ELECTRIC SHOCK**

# Safety Precautions



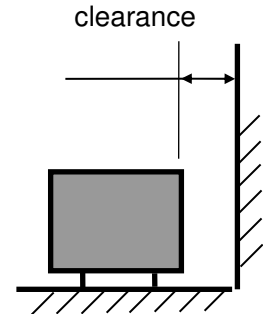
Do not block the ventilator when an exhaust hose is not fixed to the NANON.

Blocking of the ventilator may hinder smooth exhaust inside of the spinning chamber.

Do not put an article, especially flammable materials such as paper and plastics, on the intake duct.

Do not turn the equipment upside down or over sideways.

Have a certain clearance for ventilations when the equipment is installed along the wall.



Do not insert or drop any metal or flammable articles in the rear of the main unit/ inside of mounting boards unit. It may cause electric shock and/or fire.

If any articles enter the equipment, shut off the power immediately and disconnect a power plug from the receptacle.

Then, contact our sales representative shown at the end of this manual.



Spilling water or chemical over in the rear of the main unit/ in side of mounting boards unit may cause electric shock and/or fire. If some liquid is spilled, shut off the power immediately and disconnect a power plug from the receptacle.

Then, contact our sales representative shown at the end of this manual.



Do not use a damaged power cord to avoid electric shock and/or fire.

Follow the instructions below.

- Do not modify the power cord.
- Do not put heavy objects on the power cord.
- Do not strain or bend the cord forcedly.

If the cord is damaged, please contact our sales representative shown at the end of this manual.



Don't connect too many power cords to one receptacle.

It may cause fire.



Mishandling of an AC power plug may cause fire.

Follow the instructions below.

- Don't insert a plug with dust to a receptacle.
- Insert a plug to a receptacle until the end securely.




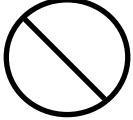
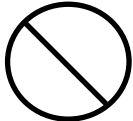
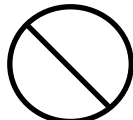





Please do not place combustibles, such as an organic solvents on a collector when electro spinning.

Electric discharge may cause ignition.

We at MECC cannot owe any responsibility for damage and injury occurred in the above usage.



## Safety Precautions

 <b>CAUTION</b>	
<p>Do not install the equipment on unstable places such as on unstable tables or inclined locations. It may cause rollover of the equipment and injuries.</p>	 <b>INJURY</b>
<p>Do not put heavy articles on the equipment. Do not ride or stand on the equipment. It may cause rollover of the equipment and injuries.</p>	 <b>INJURY</b>
<p>Do not operate in the area of high humidity or with much dust. It may cause electric shock and/or fire.</p>	 <b>INJURY</b>
<p>Be sure to use original power cords and connection cables. Use of substitutes may cause short circuits, discharge, electric shock, fire and/or malfunctions.</p>	 <b>ELECTRIC SHOCK</b>
<p>Each connection cable has a part of high voltage output. Be sure to turn off the power before connecting/disconnecting cables. It may cause electric shock. Be sure to confirm that cables are locked before connecting/disconnecting cables.</p>	 <b>ELECTRIC SHOCK</b>
<p>Don't handle power plugs with a wet hand. It may cause electric shock.</p>	 <b>ELECTRIC SHOCK</b>
<p>Don't strain the AC cord forcedly to disconnect. Damage on the cord may cause fire and/or electric shock. Grab the plug to disconnect the cord.</p>	 <b>ELECTRIC SHOCK</b>
<p>Be sure to shut off the power, pull out the AC plug and disconnect all the cables before moving the equipment. Otherwise, it may damage cables and cause electric shock and/or fire due to damages on cables.</p>	 <b>ELECTRIC SHOCK</b>

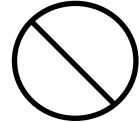
## Safety Precautions

---



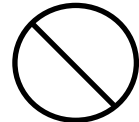
**CAUTION**

Install the equipment on the floor with no vibrations from other machines.  
It may cause injuries by moving or fall of the equipment.



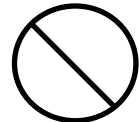
**INJURY**

Unpack and/or carry the equipment by more than two persons as it is heavy.  
Otherwise, it may cause injury due to fall or rollover of the equipment.



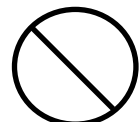
**INJURY**

Be careful so as not to involve something with a rotating collector when the collector is used. Otherwise, involved things flew apart.  
It may cause break of parts or injury.



**INJURY**

Do not open the door of spinning chamber during spinning.  
Otherwise, it may cause leakage gas, which is inside of the spinning chamber, in the laboratory.



**INJURY**

Use the AC receptacle close to the equipment to prevent fire.



**FIRE**

Connect or mount optional units or cables properly following directions in this manual. Incorrect connections or mounting may cause malfunctions of the equipment and/or electric shock.



**MALFUNCTION**

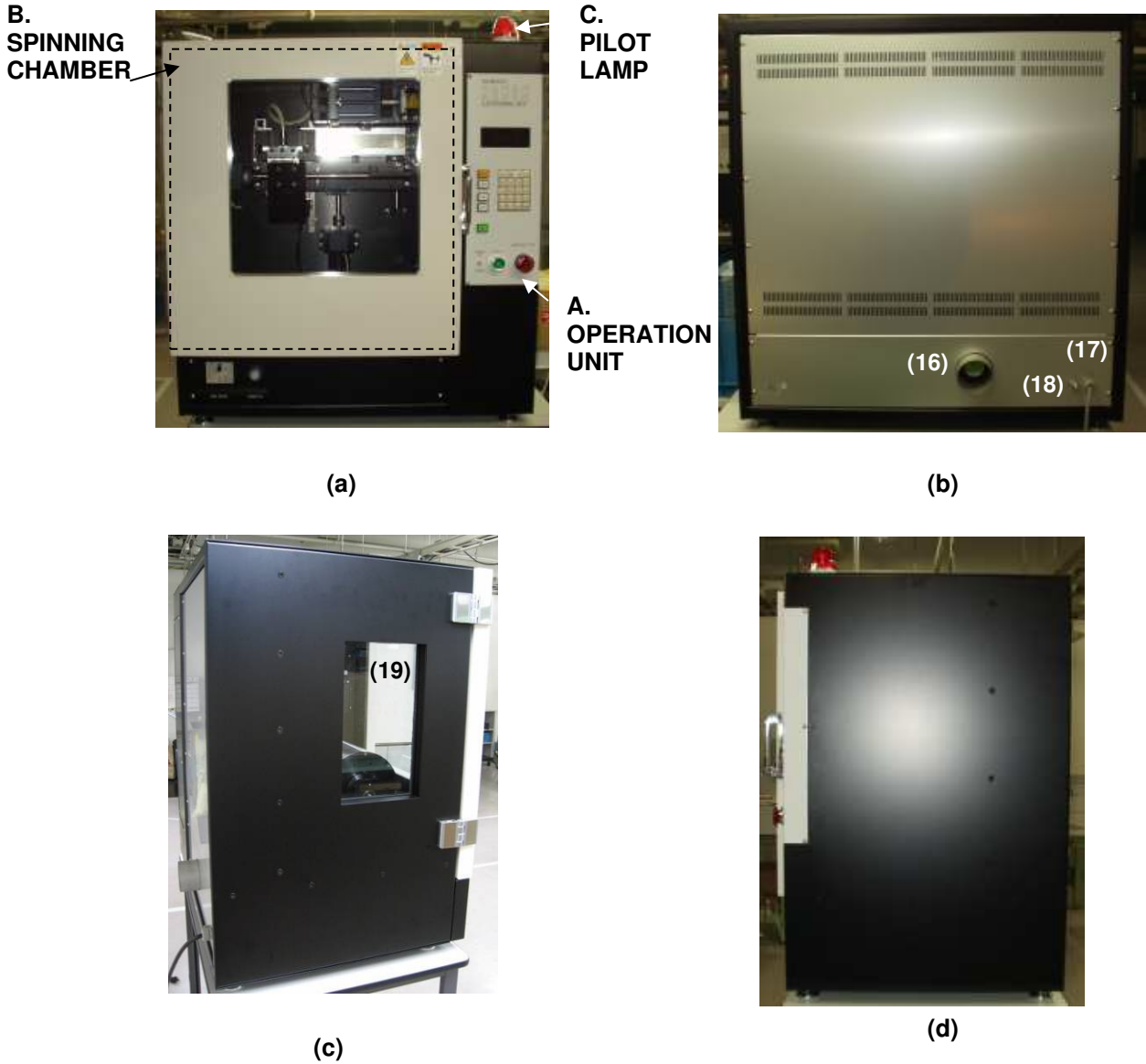


**Chapter1: Before Operation**

1-1. Confirmation of main unit and accessories

Check the NANON and accessories external and internal damages.  
Refer to 1-2-4. accessories about accessories.

1-2. Functions of the NANON



**Figure1-1. NANON outline picture**  
**(a)FRONT PANEL**  
**(b)REAR PANEL**  
**(c)SIDE PANEL (LEFT)**  
**(d)SIDE PANEL (RIGHT)**

1-2-1. FRONT PANEL (Figure 1-1 (a) )

A. OPERATION UNIT

Enter parameter values about spinning and program operation of the NANON.

(1) Parameter display

- VFD (Vacuum Fluorescent Display)
- :indicates spinning parameters and operation conditions.

(2) Keypad

- "CL"
  - : This key has two functions.
    - a. cleans the tip of needle during spinning standby and spinning.
    - b. moves a slider arm to the spinneret fitting position.
- "STORE"
  - : Use "STORE" when the set spinning parameters are stored.
- Right/Left arrow keys
  - : This key has two functions.
    - a. moves the pusher block of syringe pump to accommodate the syringe during spinning standby (at blinking "START" button)
    - b. moves the spinneret position to the right and left when set 'spinneret distance' or 'spinneret speed' at 0 position.
- Ten-key
  - : Use for numerical entries.
- Up/down arrow keys
  - : The menu displayed on the parameter window acts as a continuous loop. The Up/down arrow keys are used to move around the loop.
- "BS"
  - : A backspace key
- "ESC"
  - : Cancel the entering values.
- "ENTER"
  - : Determine the entered values.
- "START"
  - : Pressing "START" once may lead to spinning standby ("START" is blinking.) and a syringe pump can be performed. A tip of the nozzle can be cleaned by pressing "CL" during this condition. Start spinning by another pressing. "Start" lights during spinning.
- "STOP"
  - : Spinning is stopped. The pusher block returns to the home position by pressing "STOP" again when spinning is stopped.
- "FAN"
  - : Press "FAN" ( when "Power" is off), then operation rate of the fan becomes 100%. This button lights when the fan works under this condition.
- "LIGHT"
  - : A nozzle tip is lit by the light when "LIGHT" is pressed. The button lights when it is ON.
- " ⏻ (POWER)"
  - : The system works when " ⏻ " is pressed. This button lights during ON.
- RESET
  - : Press "RESET" button after turning on the breaker or emergency stop.
- EMERGENCY STOP
  - : All functions of the system stops by depressing EMERGENCY STOP button. Turn the button clockwise to release.
- SLIDER UP/DOWN
  - : The vertical motion of the slider is operated with this switch. It is possible to operate it with the door closed.

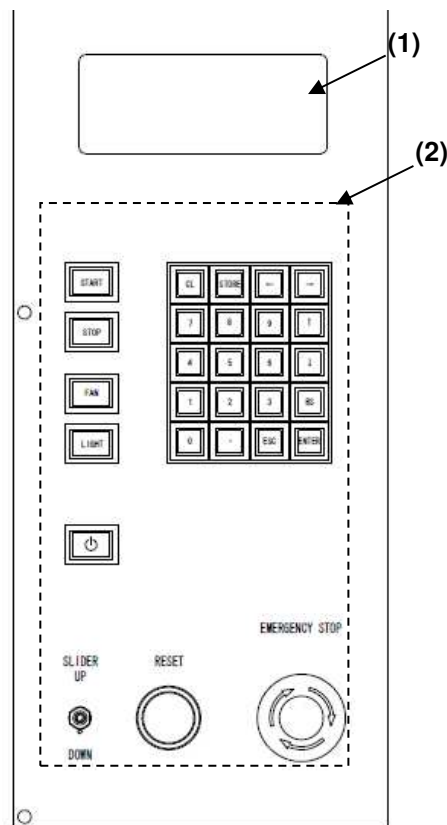


Figure1-2. OPERATION UNIT

B. SPINNING CHAMBER

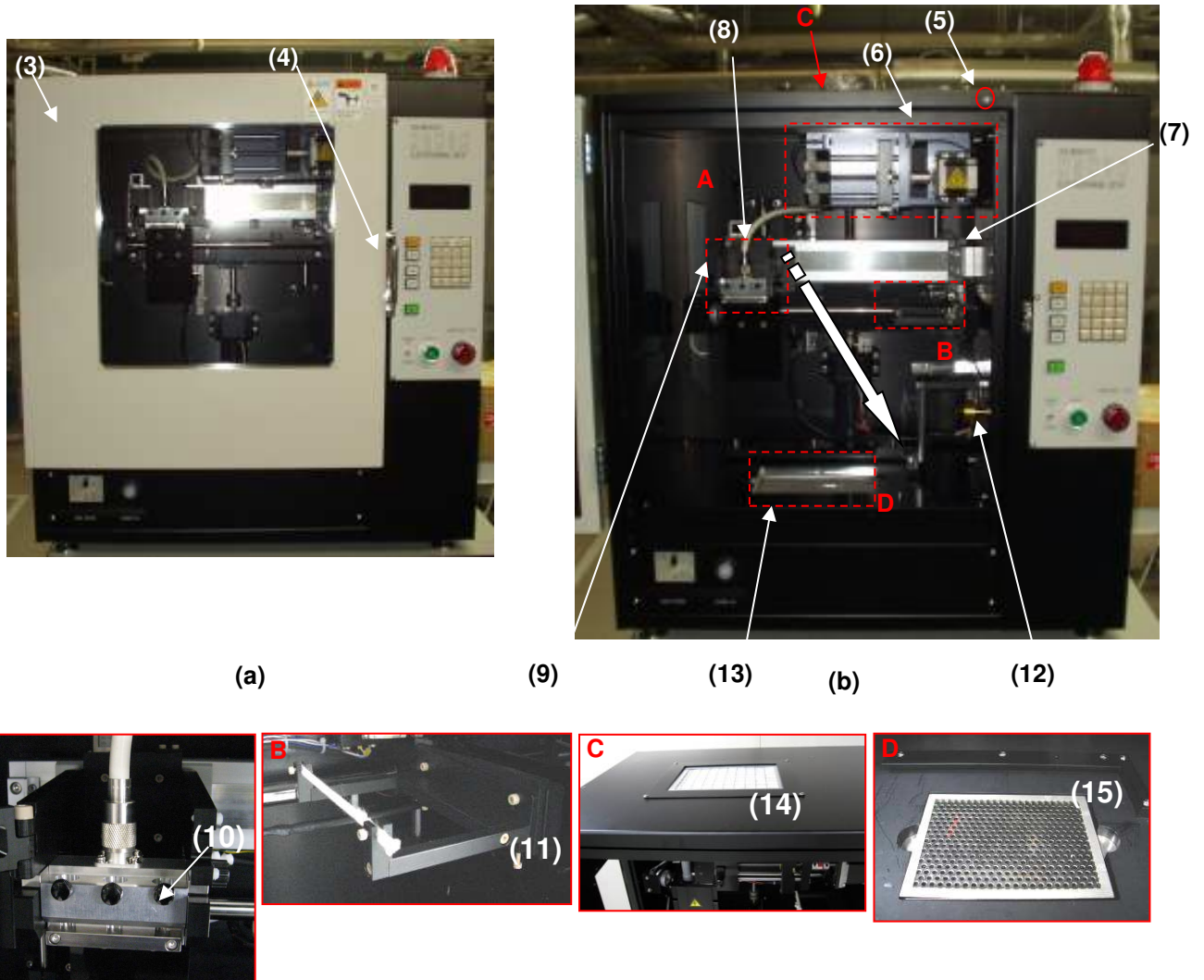


Figure1-3. SPINNING CHAMBER :

(a) External view

(b) Internal view

- (3) Door : A door of the spinning chamber. It has hardened glass in the center of the door.
- (4) Handle : A handle of the door with lock mechanism for the spinning chamber.
- (5) Safety Lock : It detects opening/closing of the door. "START" and "CL" button are available when the door is closed.
- (6) Syringe pump : A pump to place syringes. It supplies the nozzle with the spinning solution.
- (7) Slider : A slider to move a spinneret arm in X direction.
- (8) Slider arm : An arm to place a spinneret.

- (9) Light for confirming initial jet : The light for a nozzle tip.
- (10) Spinneret : A block to connect an nozzle and a tube from the syringe. The voltage is applied to the block.
- (11) Jig for cleaning : A jig to set a string for cleaning of a nozzle.
- (12) Motor shaft : A shaft to connect a collector shaft via a coupling.
- (13) Collector space : Space to mount collector
- (14) Intake duct : A duct with a pre-filter to get external air.
- (15) Ventilator : A ventilator with a cleanup filter and a cover for the filter to exhaust gas in the spinning chamber.

**C. PILOT LAMP**

Lighting: High voltage is outputted.

Blinking: Error

**1-2-2. REAR PANEL (Figure1-1(b) )**

- (16) Exhaust duct tube : A junction for the exhaust hose.
- (17) AC INPUT : An AC power cable
- (18) GND : Be sure to connect with the earth to prevent electric shock.

**1-2-3. SIDE PANEL (Figure1-1(c) )**

- (19) Side window (**Optional**) : A window to observe inside of spinning chamber.

**1-2-4. Accessories**

Table1. List of accessories

Item	Model	Quantity
Pre-filter		
Activated charcoal filter		
Neutral filter		
HEPA filter		
ULPA filter		
Spinneret		
Tray for solution		
Plate collector		
Disc collector		
Drum collector		
Chemical-resistant tube for connecting between a syringe and a spinneret.		40cm x 3
Plastic connectors		3
Needles		3
Syringes		3
Table to mount NANON		
Exhaust hose		2m

Chapter2: How to Operate

2-1. How to operate the operation unit

2-1-1. Main menu

A main menu is displayed after power is ON. The main menu consists of eleven variables (see the below table), one of which is displayed at all times as shown in Figure 2-1(a). The variable to be changed can be selected with the up/down arrow keys. Table2 shows display range of each parameter, resolution and default values. “Displaying parameter number/ the number of total parameter” is displayed at the upper-right corner of screen (ex. 1/9) when parameter is except “Recall Preset” or “Total & Filter”.

<pre> Recall Preset No. 0 1.0 10.0 100.0 1.0 1000.0 10000.0 1.00 0.0 100.0                     </pre>	<p>: Load the saved data.                      Select the data number to load with ten-key and press “ENTER” key when No. is blinking.                      The Preset Recall screen displays each parameter which is shown at figure2-2 (b).</p>
<pre> Stop: -----[01/09] HVPS Voltage 0.5 [ kV ]                     </pre>	<p>: Program the applying voltage value during spinning.</p>
<pre> Stop: -----[02/09] Solution Volume 0.1 [ mL ]                     </pre>	<p>: Program the solution volume to spin.                      Spinning finishes automatically when the programmed target volume is reached. The syringe pump keeps track of the volume dispensed. HVPS, syringe pump, slider and motor for collector are OFF.</p>
<pre> Stop: -----[03/09] Feed Rate 0.01 [ mL/h ]                     </pre>	<p>: Program flowrate of solution at the tip of nozzle during spinning.</p>
<pre> Stop: -----[04/09] Syringe Diameter 13.1 [ mm ]                     </pre>	<p>: Program the using syringe inner diameter.</p>
<pre> Stop: -----[05/09] Rotation Speed 1000 [ rpm ]                     </pre>	<p>: Program rotation speed of the collector.</p>
<pre> Stop: -----[06/09] Spinneret Width 0 [ mm ]                     </pre>	<p>: Program the slide width of spinneret during spinning.</p>
<pre> Stop: -----[07/09] Spinneret Speed 50 [ mm/sec ]                     </pre>	<p>: Program slide speed of the spinneret.</p>
<pre> Stop: -----[08/09] Cleaning Frequency 10:00                     </pre>	<p>: Program the cleaning cycle of the nozzle tip.</p>
<pre> Stop: -----[09/09] Cleaning Interval 0.1 [ Sec ]                     </pre>	<p>: Program the interval time after the nozzle is cleaned.</p>
<pre> Stop: ----- Total : 0017:22:57 Filter: 0982:37:02                     </pre>	<p>: The total spinning time (Total), filter changing time are displayed.                      A message as below is displayed just after pressing START (before working the syringe pump) when it becomes expiry day.</p>

-----  
 Filter OK ?  
  
 STOP :Continue  
 -----

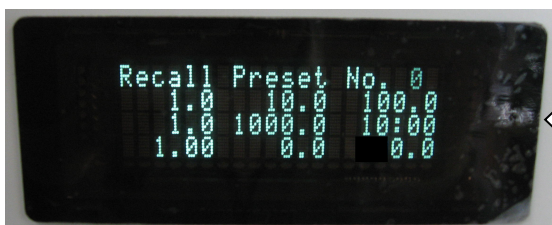
Exchange the filter when the counter is 0 (Filter:0000:00:00) and the above message is displayed. To reset the counter of the filter, hold the “CL” key and press the “START” key. A message “Filter:100:00:00” is displayed and operation moves to spinning.  
 \*Reset is available when the above message is displayed.

Preservation of parameter

- A. Press “STORE” key.
- B. Please select the preset No.0-9 preservation ahead.
- C. Press “ENTER” Key.

Table2. Display range of each parameter, resolution and default values

Display parameter	Programmed value		Resolution	Recommended value at spinning	Factory default value
	Minimum	Maximum			
HVPS Voltage	0.5 kV	30 kV	0.5 kV	-	1.0 kV
Solution Volume	0.1 ml	10 ml	0.1 ml	-	1.0 ml
Feed Rate	0.1 ml/hr	99.9 ml/hr	0.1 ml/hr	-	1.0 ml/hr
Syringe Diameter	5 mm	30 mm	0.1 mm	-	10.0 mm
Rotation Speed					
•When using a drum collector	0 rpm	3000 rpm	50 rpm	1000-3000 rpm	1000 rpm
•When using a disk collector.	0 rpm	3000 rpm	50 rpm	1000 to2000 rpm	1000 rpm
Spinneret Width	0 mm	200 mm	1 mm	-	0 mm
Spinneret Speed	0 mm/s	300 mm/s	1 mm/s	50 to 80 mm/s	100 mm/s
Cleaning Frequency	5 s	59min 59s	1 s	-	10 min
Cleaning Interval	0 s	9.9s	0.1s	-	0s



Recall Preset No.		
HVPS Voltage	Syringe Diameter	Spinneret Speed
Solution Volume	Rotation Speed	Cleaning Frequency
Feed Rate	Spinneret Width	Cleaning Interval

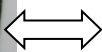


Figure2-1. Indication items at Recall Preset

2-1-2. View during spinning

The remaining spinning time, the set voltage and feed rate are displayed during spinning as shown in Figure 2-1.

Voltage and feed rate can be changed with ten-keys 7 & 9 and 1 & 3.

(Caution) Spinning time is displayed as “Unlimited” when Feed Rate is changed by ten-key during spinning. Spinning does not stop automatically in this case.

Changes the screen with up/down key and it displays applying voltage during spinning and current monitor value.



Initial view

In case that rotating collector is used, accelerating speed is displayed after [START] is pressed twice.

Once rotating speed is reached set value, information such as spinning time, applied voltage and feed rate are shown.

Monitored values of voltage and electric current are confirmed by pressing down key.

Figure2-2. Indication items at Standby and during spinning.

2-2. Procedure of fiber samples creation

2-2-1. Preparation for spinning.



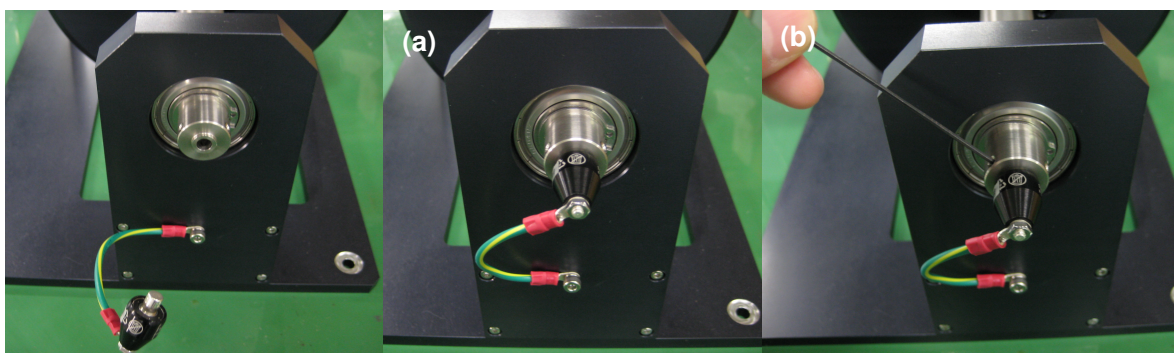
Please do not place combustibles, such as an organic solvents on a collector when electro spinning.  
 Electric discharge may cause ignition.  
 We at MECC cannot owe any responsibility for damage and injury occurred in the above usage.

Setup the collector

Example of a drum collector setup

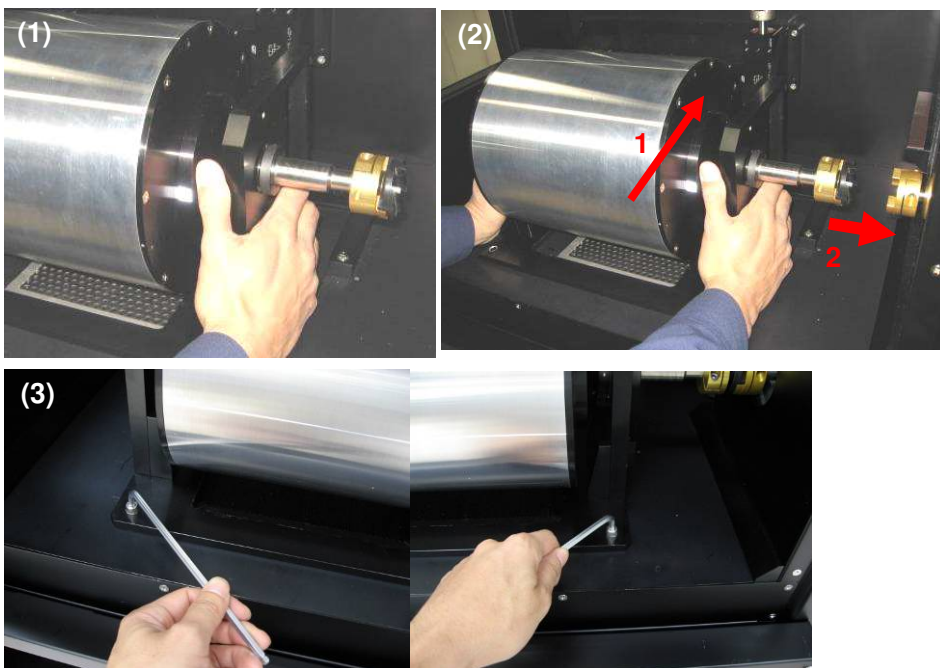
Please make sure that the rotary connector is properly connected. If not, please follow the procedure below.

- (a) Fully insert the axis of the coupler in the central hole of driving shaft.
- (b) Tighten three tiny screws on the wall of driving shaft.

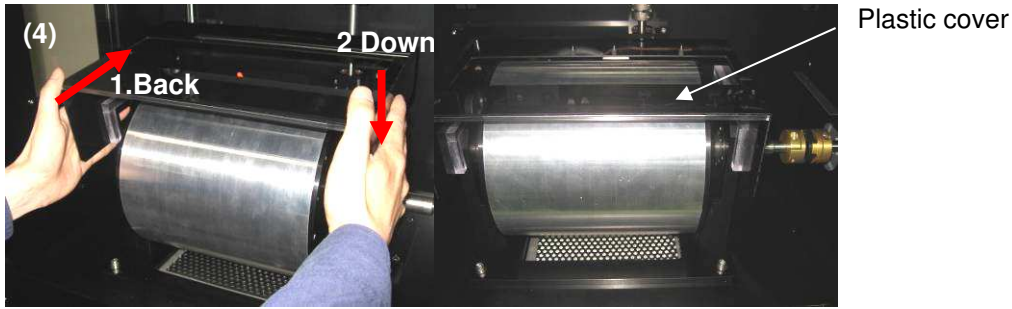


- (1) Set a coupling to the collector rotary shaft.
- (2) Press a collector base to metal blocks which identify the location of collectors at the bottom plate of the spinning chamber. Slide the base to right and engage a motor shaft and a coupling of collector shaft. Fix each coupling by screwing bolts.
- (3) Fix a collector base to the spinning chamber with bolts.
- (4) Set a plastic cover with slit.

\*A disc collector setup is the same as the drum collector.

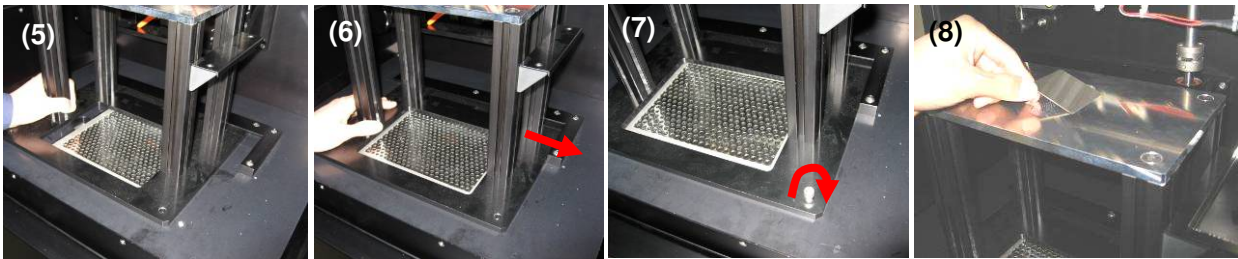






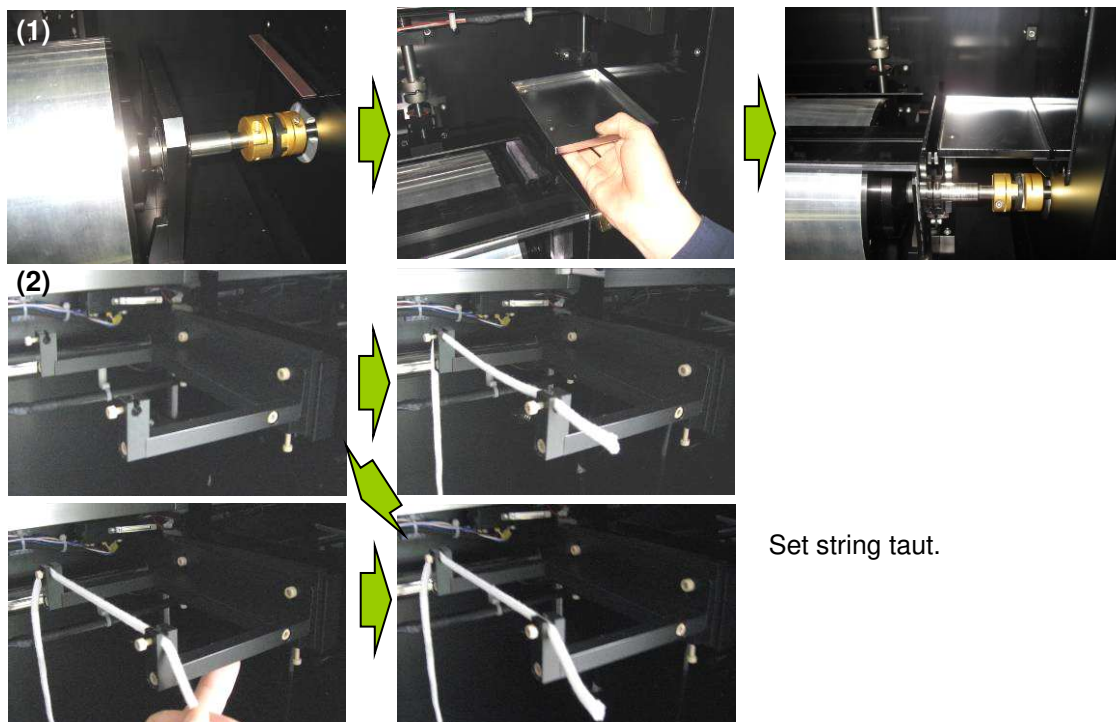
Example of a plate collector setup

- (5)-(7) Press the collector base to the metal blocks which identify the location of collectors at the bottom plate of the spinning chamber. Slide the base to right and fix it to the spinning chamber with bolts.
- (8) The plate collector has a small removal flat plate. Create a slight amount of sample on this plate at optimization of spinning conditions. The sample can be observed by an optical microscope. Put glass board on the plate and collect samples on the board. It makes observation easy.



A tray for solution and cleaning unit

- (1) Set a tray for solution.
- (2) Set a string to the cleaning unit.
- (3) Please detach the tray when you use mandrel collector.



Around the spinneret

- (1) Turn off the breaker (MAIN POWER)
- (2) Manually shift slider arm to the left end  
-> Go to (3) / (6) / (9)

## [ In case of Clip Spinneret ]

- (3) Set the spinneret to the slider and fix a high voltage cable to the spinneret.
- (4) Insert luer connectors into both ends of a tubing. (NOTE: In case of PTFE tubing, roasting its end over the fire may make connection easier. Be sure that a tubing and connectors are tightly connected and high force is not applied at the connecting point. High force at the connection causes dropping out of connector from a tubing.) Next, insert metal connector in one of luer connector, and insert another end of metal connector in a nozzle. A nozzle whose length is 15mm and tip is grinded flat could be used as a nozzle.
- (5) Outfit a clip spinneret with a set of nozzle, metal connector and a tubing. Close a cover in front of slider arm. Adjust location of the spinneret in Y axis. Fasten bolts at side of the spinneret. Please adjust fixed position when the spinning doesn't fly toward collector's center.  
-> Go to (15)

## [ In case of Co-axial Spinneret ]

- (6) Outfit a co-axial spinneret with a nozzle. Next, fix component A shown in figure and a sheath nozzle to the spinneret.
- (7) As shown in figure, make a connection between connector A and B by a tubing with luer connectors. (NOTE: Be sure that a tubing and connectors are tightly connected and high force is not applied at the connecting point. High force at the connection causes dropping out of connector from a tubing.)
- (8) Set the spinneret to the slider arm and fix a high voltage cable to the spinneret. Insert tubings with luer connectors to tube attachment for core and sheath, respectively. Luer connectors should be fixed to a tubing after the tubing is inserted inside a spinning chamber from outside NANON. Close a cover in front of slider arm. Please adjust a fixed position when the fiber doesn't fly toward collector's center.  
-> Go to (15)

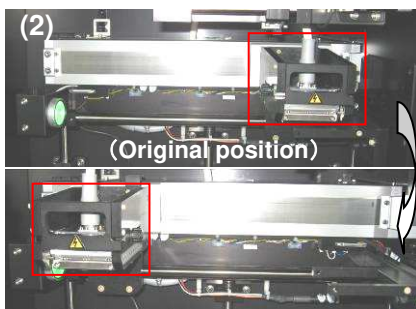
## [ In case of Ultra-tiny Co-axial Spinneret ]

- (9) Outfit a spinneret with a tubing. (tubing length: 600mm)
- (10) Set the spinneret to the slider arm and fix a high voltage cable to the spinneret.
- (11) Connect metal connector with a needle and tubing. Fix the needle to a spinneret. (tubing length: 600mm, needle length: 22mm) Core nozzle might protrude 0.5mm from tip of sheath nozzle.
- (12) Pull out tubing for core solution from a hole on the top wall of a spinning chamber. Then connect tubing with luer connector and syringe. Set the syringe on a syringe pump.
- (13) Connect tubing for sheath solution with luer connector and syringe. Put the syringe on a syringe pump.
- (14) Manually move the spinneret in right and left direction (breaker should be turned off) and check if tubings don't disturb the spinneret movement.  
-> Go to (15)

- (15) Outfit a syringe which injected spinning solution with a luer connector which is inserted to the tubing.
- (16) Manually push spinning solution in a syringe out to a nozzle.
- (17) Once spinning solution is observed at a tip of spinneret, outfit the syringe pump with a syringe.
- (18) Be sure that any items like tubings, string, etc. does not prevent movements of slider arm. Also check connection between tubing and luer connectors. Next, adjust height of a cleaning string so that the tip of nozzle touches the string.
- (19) Adjust the distance between spinneret and collector by SLIDER UP/DOWN SWITCH as shown picture (19). Please operate it with the door closed. It doesn't operate in the state that the door opens.

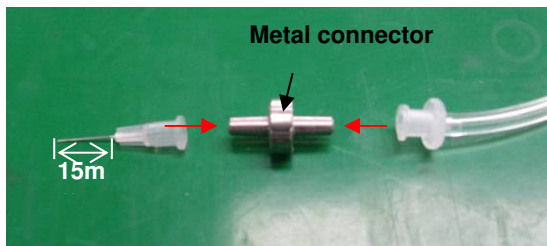
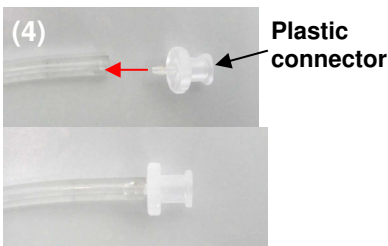
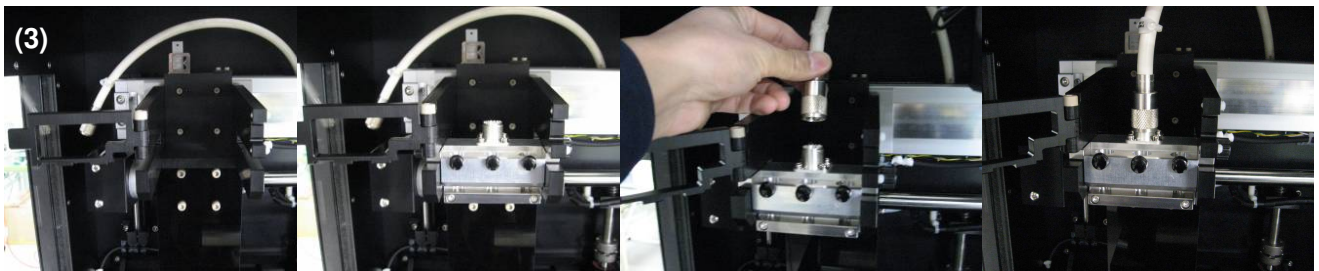
[ In case of Tubeless Spinneret]

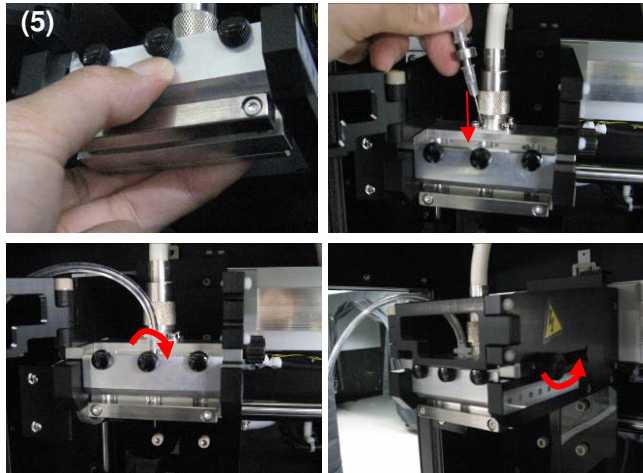
- (20) Set the spinneret to the slider arm and fix a high voltage cable to the spinneret.
- (21) The nozzle connector is connected with the syringe, and the solution is sucked up in the syringe. Attention: Please adjust the amount of the solution to less than 2ml. After the degassing, the nozzle is connected with the nozzle connector.
- (22) After the solution is pushed out to the nozzle point by hand power, the syringe is installed in tubeless spinneret.
- (23) The suppression board doesn't return to former position only by the power of the spring. Please return it by hand power.



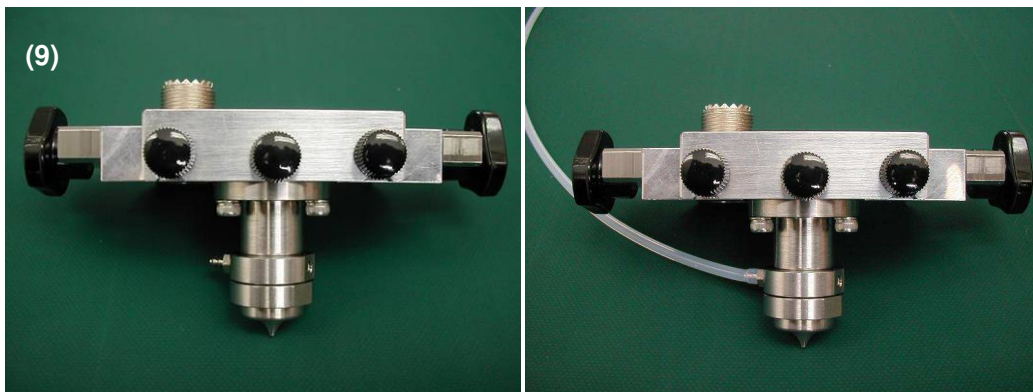
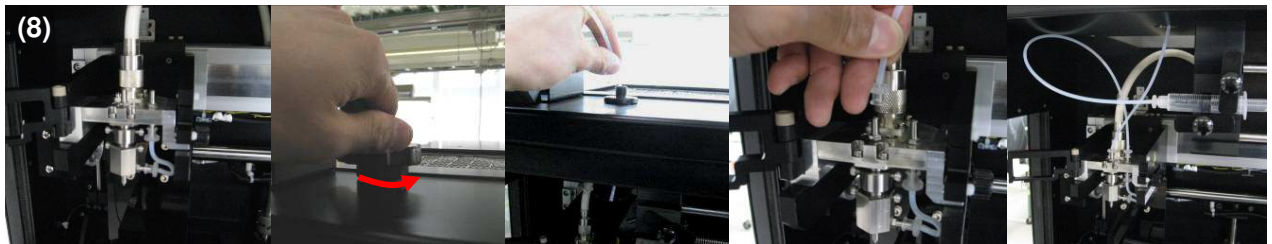
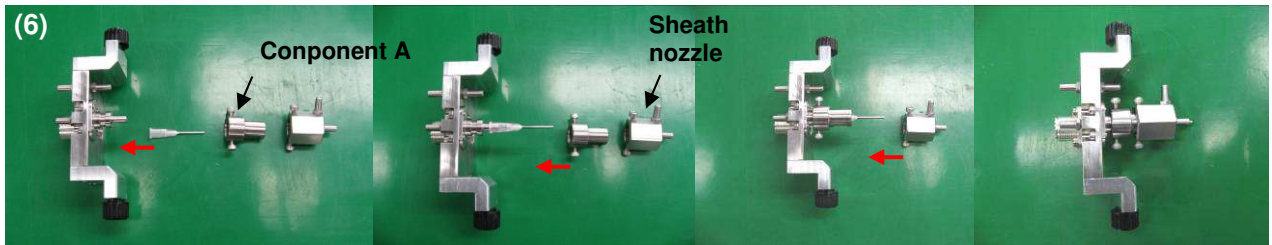
During POWER is ON, spinneret or slider arm move to a position for attaching or detaching spinneret from its original position by pressing "CL". The spinneret or slider arm move back to its original position by pressing "Start".

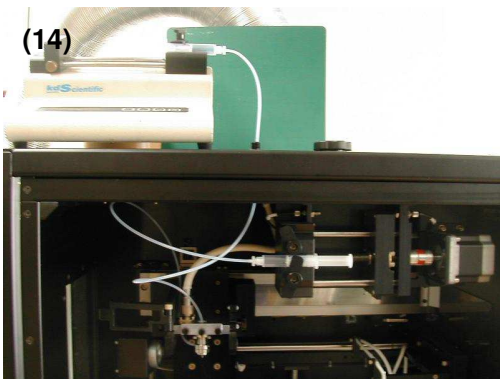
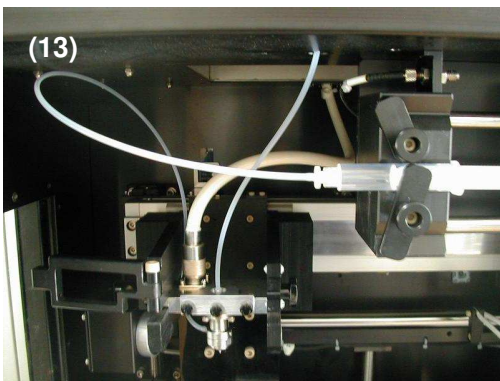
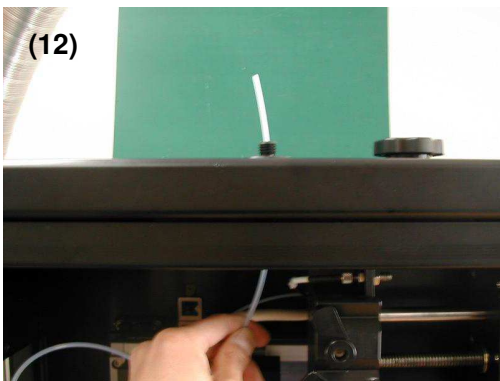
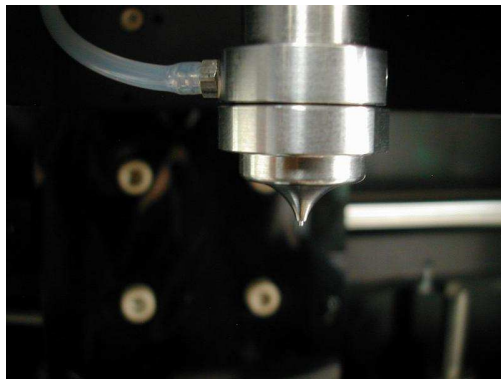
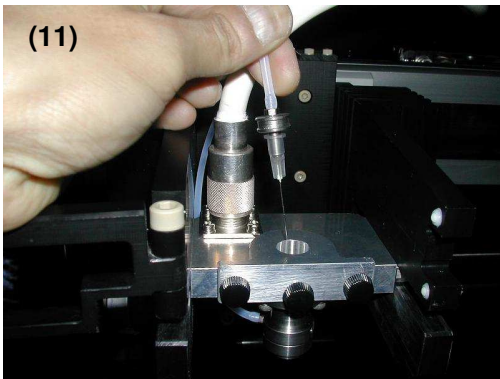
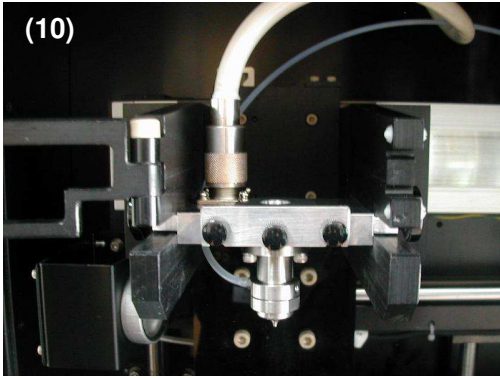
[ In case of Clip Spinneret ]

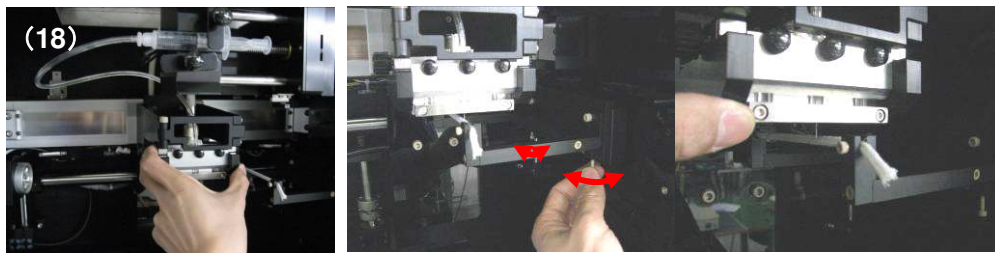
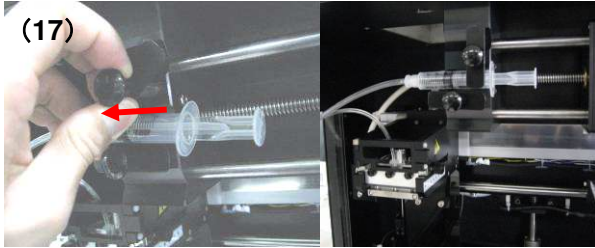
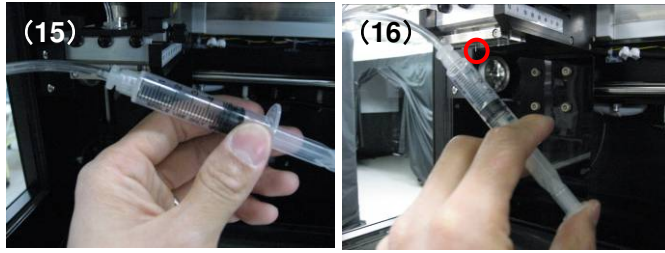




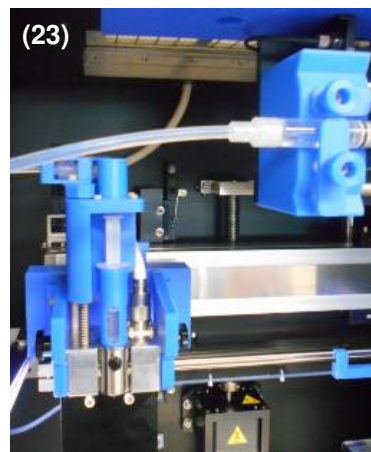
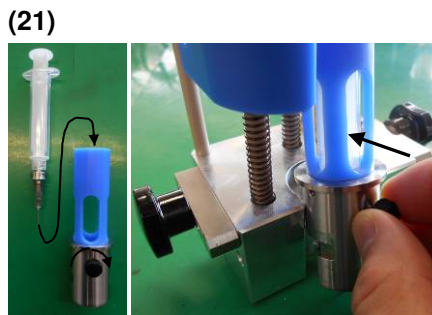
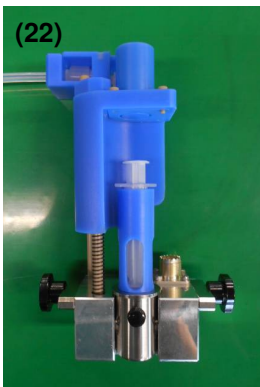
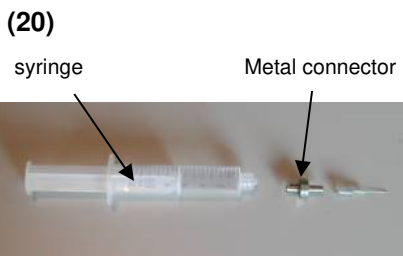
[ In case of Co-axial Spinneret ]







[ In case of tubeless Spinneret ]



### 2-2-2. Creation of fiber samples

- (1) Plug power supply cable, then PRIMARY lamp lights up.
- (2) Turn on the breaker (MAIN POWER).
- (3) After pressing "RESET", press "POWER" and setup the system. POWER ON lamp lights up.
- (4) Program each parameter, "Applied Voltage", "Solution Volume", "Feed Rate", "Syringe Diameter", "Rotation Speed", "Spinneret Width", "Spinneret Speed", "Cleaning Frequency" and "Cleaning Interval". (Refer to 2-2-1 about program procedures.)
- (5) Press "LIGHT" and turn ON the light for confirming initial jet.
- (6) Press "START" once. Spinning is standby at this stage.
- (7) Move the pusher block of syringe pump to make contact with the syringe plunger with right / left arrow keys.
- (8) Press "START" again after confirming constant amount of solution is supplied from a nozzle tip. Then, a spinning chamber starts creating fiber samples. In case that spinning solution is accumulated at the tip of nozzle, it can be cleaned by pressing "CL".
- (9) Spinning automatically stops when the set target volume is reached.
- (10) Open the door of the spinning chamber when fifteen minutes, at least, has past after spinning. Remove fiber samples. The fun works automatically after spinning.

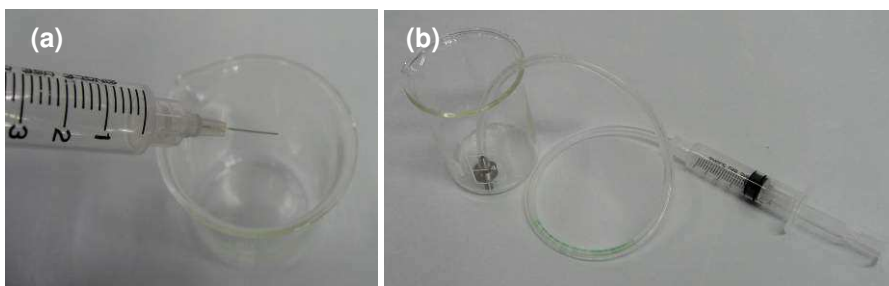
(In case of use of Drum collector.)

- (11) Use a penknife when fiber samples are peeled from the drum collector. Cut the fiber samples following the chase which is running in a longitudinal.



## 2-2-3. Care after creating fiber samples

- (1) Close the spinning chamber and press “CL” and move the slider to detachable position of spinneret. (\*The spinneret attachment can be slid by hand without using “CL” by turning off the breaker.)
- (2) In case of clip spinneret, remove a set of syringe, tubing, metal connector and nozzle. In case of co-axial spinneret, remove a set of syringe, tubing, spinneret and nozzle.
- (3) Remove a needle and push all the solution out from syringe and tubing.
- (4) Wash inside syringe / tubing / metal connector / nozzle / spinneret with solvent which dissolves spinning material.
- (5) In case of co-axial spinneret, deassembly it into each pieces. Put metal connector and metallic parts of spinneret in the bottle with solvents. Wash them in an ultrasonic bath.
- (6) Exchange solvent with water in the bottle and wash them in an ultrasonic bath again.
- (7) Dry all the items enough until it is used next time. After solvent is completely evaporated, inside spinneret / metal connector may be washed by tiny brush with water.
- (8) Clean the inner wall of the spinning chamber, surface of a collector, a tray for solution and a string for cleaning.



**Figure2-2. Example of washing a nozzle and spinneret:**

**(a) Washing a nozzle**

**(b) Washing a set of syringe / tubing / metal connector**



### 2-2-4. Procedure of the filter exchange

Change cleaning filters (Activated Charcoal Filter, Neutral (HEPA or ULPA) filter) which are set at the ventilator as following procedures when counter for filters are 0 on the display. Change the pre-filter when dirt is checked with eyes.

#### Activated Charcoal/ Neutral /HEPA/ULPA filter

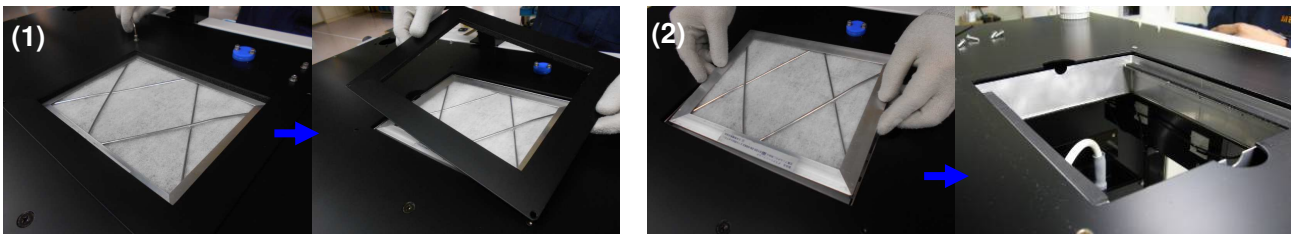
- (1) Take off the cover for filters. Put fingers on the flame of the activated charcoal filter with the black cover and take off the filter.
- (2) Put fingers on inside of the flat plate which is fixed to the side of Neutral/HEPA/ULPA filter and pull up the filter.
- (3) Outfit filter fitting space with new Neutral (HEPA or ULPA) filter, and Activated Charcoal filter, in that order.
- (4) Outfit the filter cover.



\*Change the pre-filter when dirt is checked with eyes.

#### Pre-filter

- (1) Loosen bolts and take off the filter cover.
- (2) Put fingers on the frame of filter, and take off the filter.
- (3) Outfit a new filter and fix the filter cover with bolts.



2-2-5. Indications at errors and counter measure

Indications of contents and counter measure at errors when the equipment is operated by mistake are as follows.

Table3. Indications at errors and counter measure

Errors	Contents of indications on the panel	
	At detecting errors	Counter measures
Open the door of spinning chamber during spinning.	Emergency Stop Door is Opened.	Press STOP Button
Errors at rotating the drum.	Emergency Stop Error is Detected. Drum Error	Turn Power Off
Errors about slider operation	Emergency Stop Error is Detected.	Turn Power Off
Errors at FAN.	Emergency Error is Detected. FAN Error	Turn Power Off
OVER CURRENT (soft limit)	Emergency Error is Detected. Over Current	Turn Power Off
OVER CURRENT (hard limit)	Emergency Error is Detected. HVPS: Over Current	Turn Power Off
Door open at start up.	Emergency Error is Detected. Initial: Door open	Turn Power Off
SYRINGE PUMP Home position detection error.	Emergency Error is Detected. Pump: Home Pos Err.	Turn Power Off
SLIDER Home position detection error.	Emergency Error is Detected. Slider: Home Pos Err.	Turn Power Off

**Chapter3: Maintenance**

We recommend periodical maintenance to keep the device clean and in good condition.

**3-1. Cleaning**

## 3-1-1. Outside

- (1) Clean with a soft brush after POWER OFF.
- (2) Prepare washing included detergent a little. Wipe outside after dipping and squeezing a piece of soft clothes. Wipe a piece of dry clothes after that.

**CAUTION**

Clean not to leak moisture inside or electrical circuit is shorted and it may cause malfunction, fire and/or electric shock.

**CAUTION**

Do not use hard brush and/or detergent.  
The coated surface may be damaged or printed letters may come off.

## 3-1-2. Inside

- Clean with an air gun (blower) or a soft brush.
- Clean inside at least once a year to avoid fire and /or malfunction.  
We recommend to clean before the rainy season.

**CAUTION**

Refrain from using any solvent or detergent of cleaning as the parts may possibly be damaged in some cases.

**3-1-3. Lubrication**

- All the mechanical parts such as switches or relays in this equipment require no lubrication.
- Refrain from lubricating each contact or from using any contact activator. Replace any parts which go out of order.

**Chapter4:Troubleshootings**

Most of circuits of this equipment are mounted on printed circuit boards. Parts with high reliability is used, however, it may cause the problem. Trouble shooting method is as follow. Please operate trouble shooting after understanding the circuits enough. Please consult to our engineers for more details.

4-1. Trouble shooting method

Symptom	Cause of the problem	Counter-measure
“POWER” switch in the FRONT PANEL does not light.	Isn't the AC power plug inserted or incomplete connection?	Insert the AC power plug.
	Doesn't “RESET” light up?	Press “RESET” and turn ON the “POWER”.
	Doesn't the breaker trip?	Turn ON the breaker.
	Is not the test button of the breaker pushed?	Push the button of the leakage indicator of the breaker.
A collector does not rotate.	Isn't the coupling disengaged from the shaft?	Screw bolts of the coupling again.
Loud vibration noise is heard when the collector is rotating.	Doesn't loosen bolts for the collector?	Fix the collector on the bottom plate of the spinning chamber with bolts properly.
Jets are not generated although voltage is applied.	Aren't cable for voltage and the nozzle fixed to the spinneret?	Confirm the connection between the spinneret, the cable and the nozzle again.
	Isn't the nozzle choked up?	Clean or change the nozzle.

# **Limited Warranty Policy Revision**

---

## Limited Warranty Policy

This product is guaranteed for 12 full months after shipping from our factory in Fukuoka, Japan. When it is malfunctioned during the period, its repair will be done at our factory or a facility of our representative free of charge.

- This warranty policy is only to promise free repair service of a purchased product.
  - We will not be responsible for any damages or accidents by troubles with the product or by the use of the product.
  - This warranty policy will never limit any legal rights of a user.
  
- Price and/or warranty service of this product does not include any of the following items.
  - 1) Cost for dispatching engineers for troubleshooting including travel expense
  - 2) Freight to send repair parts
  - 3) On-site installation and adjustment fee
  - 4) Operation training fee
  - 5) Observation fee after installation of this product
  - 6) Periodical check, adjustment and/or calibration fee
  - 7) Technical training and/or consultation fee
  - 8) Spinning of samples on site or at our facility in Japan
  
- Exceptions of the warranty policy  
Following items will not be covered by the limited warranty policy.
  - 1) Malfunctions or damages by operations not described in the operation manual of this product.
  - 2) Damages or loss during transportation on a user's responsibility.
  - 3) Malfunctions or damages caused by the repair or the modification made by a user.
  - 4) Malfunctions or damages caused by disasters such as earthquake, typhoon and flood, lightening, salt damage, fluctuation of voltage, use of out-of-range powers.
  - 5) Physical damages or malfunctions caused by strike, falling or mechanical shock.
  - 6) Malfunctions or damages caused by the connection with external devices not described in the operation manual.
  - 7) Consumable parts (e.g. batteries and filters)
  
- Ownership of malfunctioned parts replaced in repair work belongs to MECC.
  
- We will not be responsible for any damages or loss of integrated software, memory data or firmware.  
*\* Periodical backup to be recommended.*
  
- Repair work may take a long time of period due to late delivery, shortage or discontinued production of parts and there may be a case we cannot accept a request for repair.

## **Limited Warranty Policy Revision**

---

### ■ Request for a repair service

Please tell the following items to our representative when repair service is needed.

- Name and contact (telephone number and e-mail address) of a user
- Product name (e.g. Electrospinning system)
- Model name (e.g. NANON-01A)
- Serial number (e.g. 27123J789)
- Symptom of the trouble (as in detail as possible)  
(e.g. No high voltage output more than 11.5kV. Programming can be made but no actual output.)
- Situation of operation when the trouble happened (as in detail as possible)  
(e.g. The trouble was found when starting the system in the morning. It worked normally yesterday.)

### **CAUTION**

This product is designed to be operated by a personnel who has knowledges and technique safely to handle electronic equipment, attachments, consumable parts and chemicals for spinning.

We will not be responsible for any damages or accidents by an unauthorized personnel's access or use of the product.

## **MECC CO., LTD.**

### **HEAD OFFICE**

196-1, Fukudo, Ogori-shi, Fukuoka 838-0137

JAPAN

Phone:+ 81- 942-72-7266 Fax: +81- 942-73-3545

e-mail:askmecc@mecc.co.jp

Web site <http://www.mecc.co.jp>