

Thermo-mate

BF200

BF400

BF500

BF600

Operation Manual

Thank you for purchasing the Thermo-mate.

In order to use this instrument correctly, be sure to carefully read both this Operation Manual and the product Warranty. After reading, always keep the manual and warranty on hand so they can be used with the instrument.

Caution: Before operating this instrument, carefully read and understand the important warnings in this Operation Manual.

Yamato Scientific Co., Ltd.

In this operation manual, the following symbols are used to indicate the degree and type of danger.

DANGER!

Indicates possible injury to the operator.

Failure to heed this warning could result in serious bodily injury.

CAUTION!

Indicates possible damage to the instrument.

The product could be damaged if the warning is not heeded and if corrective measures are not taken.

The information in the operation and maintenance sections should be read and fully understood in order to obtain maximum performance from the instrument.

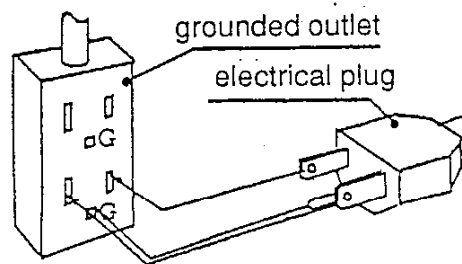
Pay careful attention to the following during installation:

DANGER!

(1) Be sure to ground the instrument.

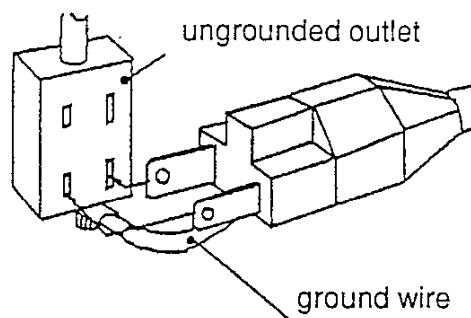
To prevent electrical shock, be sure to ground the instrument.

It is recommended that a grounded outlet be used.



Insert the electrical plug into the grounded outlet.

When using an ungrounded outlet.



Attach a ground adaptor (optional accessory) to the power plug. Confirm the polarity on the outlet side before connecting the plug. Also connect the ground adaptor wire directly to the earth terminal on the electrical outlet.

If there is no ground terminal:

In this case, use a 3P-2P adaptor with ground wire and follow local engineering practices. Consult the dealer from where the instrument was purchased or a Yamato distributor.

(2) Use the power supply that matches your model.

Supply type:

BF200	AC100V	11A
BF400	AC100V	11A
BF500	AC100V	11A
BF600	AC100V	13A

(3) Be careful where you install the instrument.

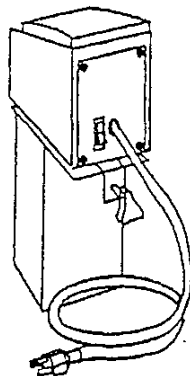
In particular, do not locate the instrument where it could be exposed to any of the following:

- Explosive or corrosive gases
- Ambient temperatures in excess of 35°C.
- High humidity.
- Direct sunlight.

CAUTION!

(1) Do not attempt to modify the instrument.

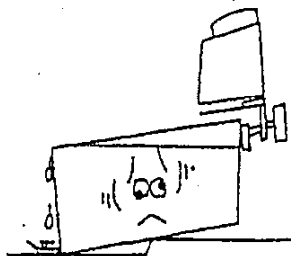
Unauthorized modification can cause malfunctions. Do not attempt to modify the instrument.



~~modification~~

(2) Install the instrument on a level surface.

To ensure that the tank remains level, position the instrument on an experiment stand, table, or any place that is stable and level.



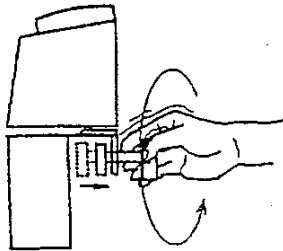
Pay careful attention to the following during installation:

CAUTION!

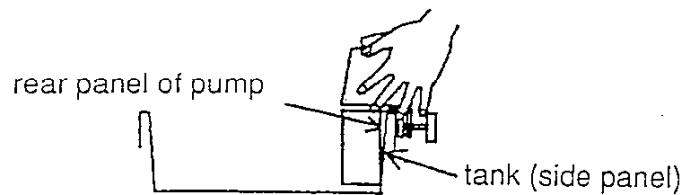
(3) Do not overtighten the adjustment knob.

Over-tightening the adjustment knob can cause the tank to deform.

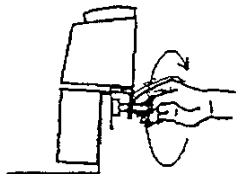
a. Turn the adjustment knob counterclockwise as far as possible.



b. Attach the BF body to the tank.



c. Turn the adjustment knob clockwise until the pump cover and tank are tightly connected. Do not attempt to turn the knob any further.

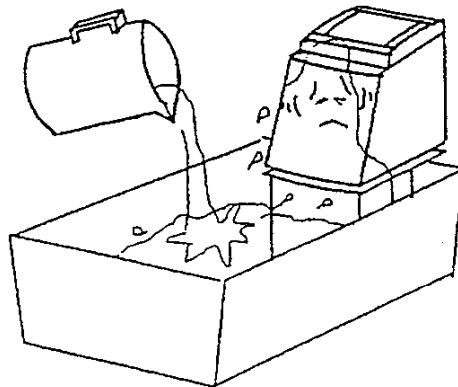


Pay careful attention to the following during operation:

DANGER!

(1) Do not allow the instrument to get wet.

Be absolutely certain not to get electrical parts wet, as this can cause short circuits and electrical shock.



(2) Do not use well water.

Use only distilled or filtered water. Use of well water or any low quality water will cause minerals to deposit in the pump and heater, reducing instrument performance, possibly resulting in a malfunction.

Recommended	Acceptable	Unacceptable
Distilled water Purified water	Tap water	Well water

(3) When using alcohol

Be sure to use ethyl alcohol only

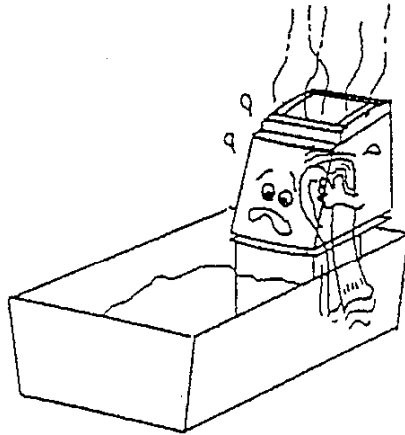
Use a cooling coil or cooler to ensure operation below 20°C.

Pay careful attention to the following during operation:

CAUTION!

(1) When using silicon oil

Silicon oil can be used only in model BF600. Do not use silicon oil in any other model, otherwise the stirrer motor can overheat due to the higher viscosity of the oil.



Use silicon oil with viscosity up to 50 cst. When using high viscosity oil, preheat the oil to lower the viscosity before use in the BF600.

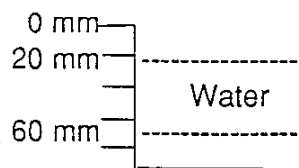
(2) Use a stainless tank when operating the instrument at over 80°C.

The maximum operating temperature for the standard tank is 80 degrees (minimum temperature: 5°C). When operating outside this range, use the optional stainless tank accessory.

(3) Confirm the water level

Please refer to the diagram below in which water level is shown.

(Water level in the tank is shown relative to the top of the tank.)



When the water level is above the 20 mm mark (water can overflow during stirring) or below the 60 mm mark, the water level sensor acts to stop both stirring and heating.

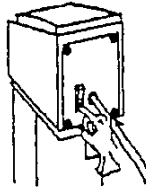
When using silicon oil in the BF600, an increase in temperature will cause an increase in the volume of the oil, so be careful that it does not overflow.

Reference: $25^{\circ}\text{C}=10.0$ liters
 $180^{\circ}\text{C}=11.5$ liters

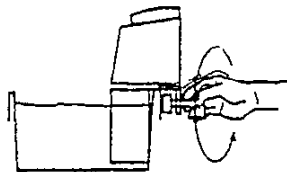
(4) When draining

Do not drain the tank by tilting on its side with the BF unit attached. Doing so without removing the BF unit from the tank can cause damage or malfunctions.

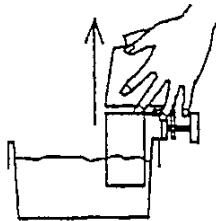
- a. Turn off the power switch on the rear panel of the BF unit.



- b. Remove the power cord from the socket.
- c. Turn the adjustment knob counter clockwise.



- d. Remove the BF unit.

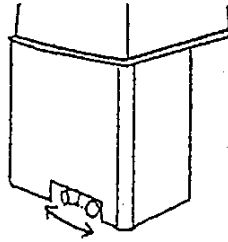


- e. Drain the water from the tank.
- f. Re-attach the BF unit to the tank.
(See page 4: "(3) Do not overtighten the adjustment knob.")

(5) The angle of the pump purge can be changed.

- When using the models BF400 / 500

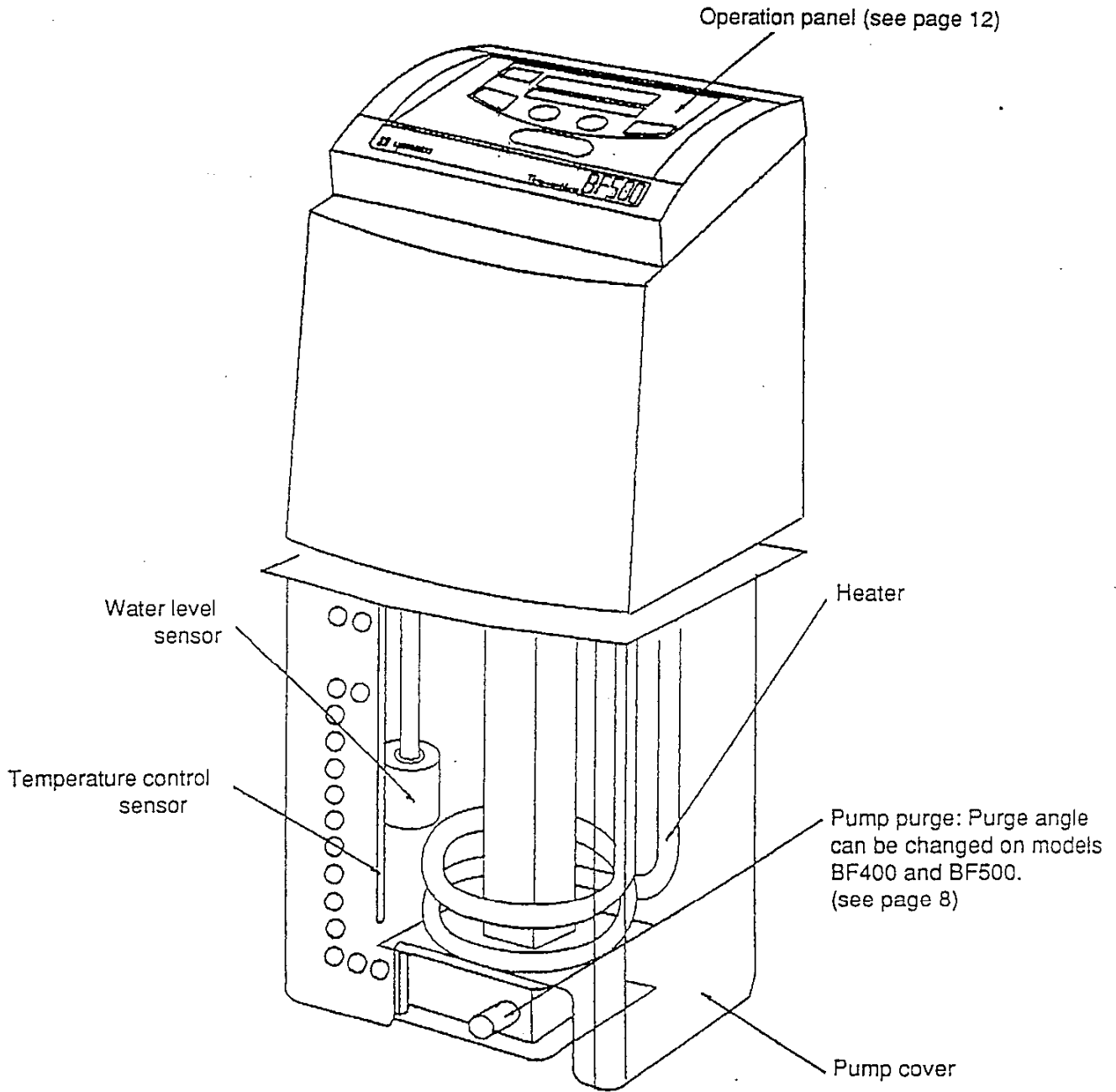
If there is a sample in the pump purge and the water circulation becomes bad, water will splash out of the purge; therefore change the angle of the purge to suit the installation location.



Part names and functions

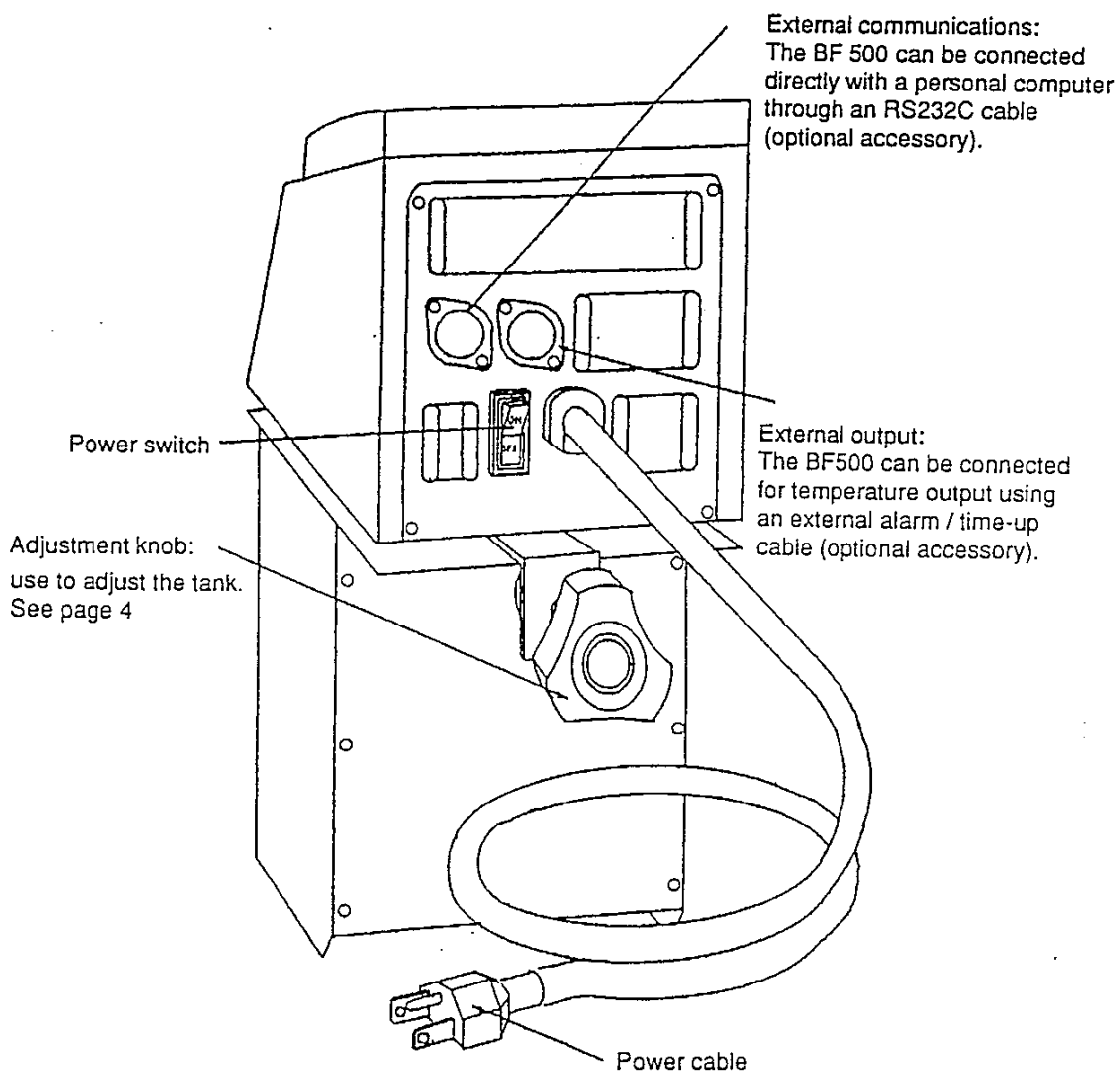
(Main body)

BF500



Part names and functions

(Main body)



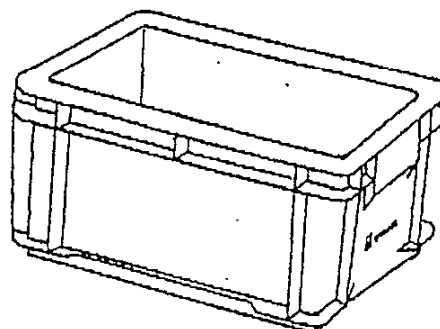
Part names and functions

(Accessory equipment)

Tank BY 100 Product No. 221824 (made of polypropylene)

Printed materials:

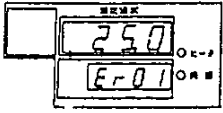
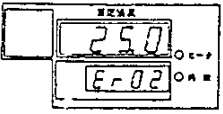

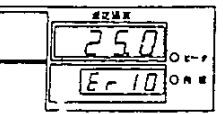
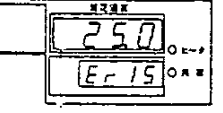
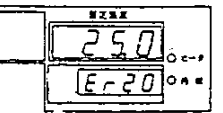
- Operation manual..... 1
- Warranty..... 1



Troubleshooting (for use with models BF400/500/600)

(Note: the BF600 does not have a decimal temperature indicator)

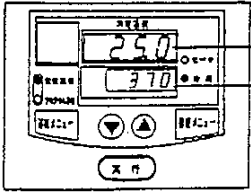
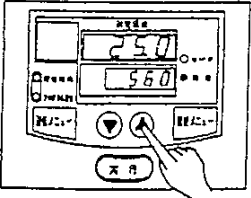
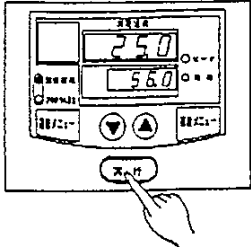
These units have a built in self-diagnostic function. In the event of a malfunction or breakdown, an error code will appear on the operation panel while a warning buzzer sounds. When an abnormality occurs, immediately cease operation and check the error code.

Abnormality sign and error code/Causes	Corrective measures
 <p>Something is wrong with the temperature sensor.</p> <ul style="list-style-type: none"> Abnormal sign flashes "ER 01" flashes 	<p>When this error code appears, turn the power off at the rear of the instrument.</p>
 <p>Something is wrong with the triac rectifier circuit.</p> <ul style="list-style-type: none"> Abnormal sign flashes "Er 02" flashes 	<ul style="list-style-type: none"> When an abnormality occurs, it may be necessary to replace parts and re-inspect the instrument. Contact the retailer from where the unit was purchased, or a Yamato retail outlet or service center. Be sure to let the agent know what error code was produced.
 <p>Something is wrong with the heater.</p> <ul style="list-style-type: none"> Abnormal sign flashes "Er 03" flashes 	
 <p>Something is wrong with the main relay.</p> <ul style="list-style-type: none"> Abnormal sign flashes "Er 10" flashes 	
 <p>Something is wrong with the electrical circuit.</p> <ul style="list-style-type: none"> Abnormal sign flashes "Er 15" flashes 	
 <p>Something is wrong with the water level sensor.</p> <ul style="list-style-type: none"> Abnormal sign flashes "Er 20" flashes 	<ul style="list-style-type: none"> The instrument is operating with a minimum of water. Add water. If adding water up to the recommended level does not cause the error message to cease, contact the retailer from where the unit was purchased, or a Yamato retail outlet or service center.

How to setup for fixed operation (models BF400/500/600)

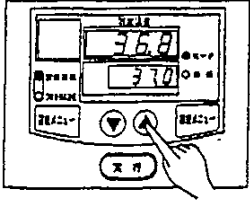
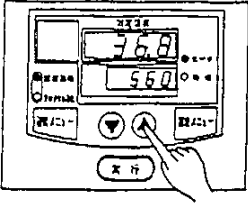
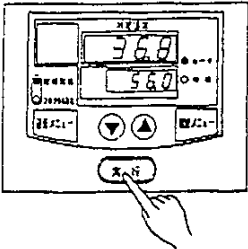
(Note: the BF600 does not have a decimal temperature indicator)

After preparations have been made for operation, proceed as follows:

	Displayed after Operation	Explanation
(1)	<p>Turn the power switch at the rear of the instrument to "ON."</p>  <p>Current temperature Previous setting</p>	<ul style="list-style-type: none"> » After power is turned on, fixed operation is automatically selected and the main window lights up, displaying the current temperature setting. The sub-window lights up displaying the previous temperature setting. » [Waiting period] lamp lights up » [Fixed operation] lamp lights up
(2)	<p>Example: fixed operation at 56°C (previous operation temperature is 37°C).</p>  <p>Push either the [▽] key, or the [Δ] key.</p>	<ul style="list-style-type: none"> • Press either the [▽] key or the [Δ] key until the temperature displayed in the sub-window indicates the desired temperature. • Pressing the [▽] key decreases the temperature setting, pressing the [Δ] key increases the temperature setting.
(3)	<p>Press the [Enter] key</p> 	<ul style="list-style-type: none"> • After reaching the desired temperature, press the [Enter] key. » The fixed temperature in the sub-window will change from flashing to continuous illumination. Fixed operations will start at the new temperature. » [waiting period] lamp is illuminated. [Fixed Operation] lamp changes from flashing to continuous illumination. » If the temperature setting has been raised from the previous setting, the [heater] lamp will illuminate and the heater will begin to warm up.

Changing the temperature setting during operation.

(Note: the BF600 does not have a decimal temperature indicator.)

	Displayed after Operation	Explanation
(1)	<p>Example: Changing the temperature while in fixed operation from 37°C to 56°C.</p>  <p>Push either the [▽] key, or the [Δ] key.</p>	<ul style="list-style-type: none"> • Push either the [▽] key, or the [Δ] key. » When in temperature change mode, the temperature displayed in the sub-window will change to flashing.
(2)	 <p>Push either the [▽] key, or the [Δ] key.</p>	<ul style="list-style-type: none"> • Push either the [▽] key or the [Δ] key until the temperature flashing in the sub-window indicates the desired temperature.
(3)	 <p>Press the [Enter] key</p>	<ul style="list-style-type: none"> • When the desired temperature is reached, press the [Enter] key. » The temperature displayed in the sub-window will change from flashing to continuous illumination. Fixed operations will begin at the newly set temperature. <p><i>Setting fixed operations is now finished</i></p>
(4)	<p><i>When you want to end operations</i></p> <p>Turn the power switch on the rear of the instrument to the [OFF] position.</p>	<ul style="list-style-type: none"> • Turn the power switch on the rear of the instrument to the [OFF] position » All circulation is stopped and displays are ended.