

Stage Top Incubator

STX

STX series Instruction Manual

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For safe and comfortable use







About symbols and indications

These warnings enable safe and correct usage and prevent dangerous situations. Please follow them at all times.

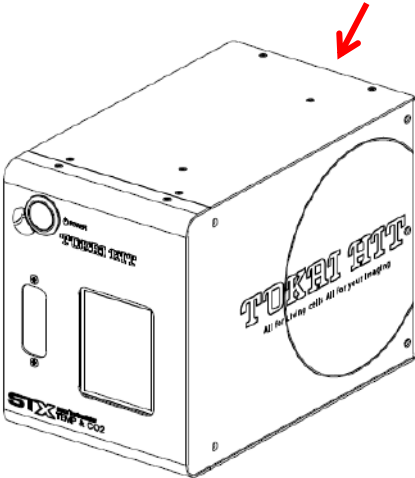
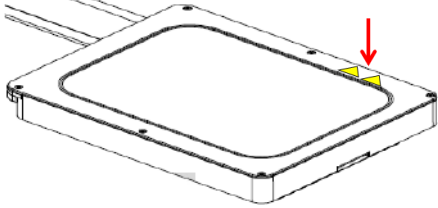

Symbol meaning

 WARNING	Indicates a hazardous which could result serious injury.
 CAUTION	Indicates a situation which could result slight injury.
CAUTION	Indicates a situation which could damage the equipment or other apparatus.
NOTE	Point of attention

Indication meaning

	Injury or damage to equipment is possible
	Must not be done
	Must be done
	High temperature possible
	Electric shock possible
	Information

Position of indication

<p>Controller (printed on rear panel)</p> 	<p>Chamber</p>  <p>Lens Heater</p> 
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To all users

- ❗ This device is to be used by researchers doing cultivation observations in a laboratory. It cannot be used at home.
- ❗ Do not take the equipment apart. This results in damage.

When shipping

- ❗ Please treat this precision instrument with care. Impacting it is forbidden.
- ⊘ Do not put any heavy things on the box.
- ⊘ Do not turn the box upside down.
- ⊘ ⚡ Do not let the unit moisten.









Regarding the environment for usage and storage

- ⚠ Do not use this equipment in the below conditions.
 - Flammable or corrosive gas or oil mist that can damage electrical insulation
 - Intense vibration or impact
 - High voltage power lines, inductive interference
 - Place where dew drops are present or with direct sunlight
 - Place with much dust







Points to pay attention when installing to a microscope

- ❗ Install the chamber in the state that the condenser is high enough. There is a risk that the condenser hits and breaks the top glass.
- ❗ Avoid stress on wires and tubes connected to the chamber.
- ❗ Connect the cylinder to the controller with supplied tube and fasten with band. Using another tube causes breakage and escape of gas. If the tube is not fastened well, there is a risk that it comes off.
- ❗ Do not bend the silicon tubes. If they are plugged, gas cannot be adequately supplied to the chamber.
- ❗ Do not use any gas other than specified. Gas leaks, dissolution of tubes and equipment, and malfunction may be occurred.
- ❗ Connect gas cylinder to the controller independently. If gas is blanching off and used with other devices, it may be the cause of trouble for both the equipment and other devices.
- ⊘ Use only the specified electricity and cables. If other cables are used, this might result in electric shocks. Using a non-specified voltage might result in equipment damage.

When using the equipment

-  Please use this equipment in a large room. If you use the equipment in a small tightly isolated room, CO₂ concentration in air might rise and adversely affect human bodies.
-  Do not handle the equipment with wet hands. It might cause damage to electric equipment.
-  In the case of glass breakage, do not touch the glass. It might result in injury and electric shock.
-  When revolving the objectives, be careful not to hit and damage both microscope and lens heater by the wire.
-  Take the following points into consideration in order to avoid focus drift during long-term microscope observations.
 - Keep the room temperature stable at 20°C-28°C.
 - Do not let air flow directly over the chamber.
-  With the exception of bath unit, wipe off media or water quickly. It can be the cause of damage.
-  Do not immerse the gas spouting nozzle into water. It may cause vibration and affect images under observation.
-  To pull out the plug from the outlet swiftly in an emergency, do not place any things near the outlet.

Storage

-  Turn off power supply while performing maintenance,
-  When opening the chamber, do not inhale air in the chamber directly. It may adversely affect human bodies.
-  Clean device with soft cloth using small amount of diluted neutral detergent. Do not use organic solvents.
-  Do not wash the equipment with water.
-  After use, make sure to remove all water completely. If some water remains, this can result in molt, breeding of bacteria and erosion.
-  Do not use volatile materials such as benzene or thinner for cleaning. Use of such materials will discolor and/or damage key device surfaces.

It is important to read this Instruction Manual before using the equipment. If it is used in manner other than specified in this manual, safety cannot be assured and it may result in damage to the equipment which will not be covered under warranty. Please follow the instructions.

Summary

This equipment is an incubation system for research which has the following characteristics.

Long term observations of cell cultures are possible right on the microscope stage through reproduction of temperature, humidity and CO₂ needed for cell culture. The temperature regulation is conducted by Top Heater of Chamber Unit, humidity with heating water in Water Bath. In order to achieve clear view during observation lid includes glass heater, even during high humidity no condensation appears.

The Lens Heater prevents heat from escaping to the objective lens under oil/water immersion.

The chamber is small and compact (stage top type) to be used on the microscope stage. It does not take much space around the microscope.

The optimal cell-culture environment is created with the controller equipped with PID control.

1 System Structure

1.1 Components

Name of components	Qty
Controller * STXG or STXF	1
Chamber	1
Lens Heater	1
Dish Attachment	Note
Fixing Lid	
Feedback Sensor	1
Extension Wire for Feedback Sensor	1
Gas Tube	2
Software STX-APP Install DVD	1
Precision Screw Driver	1
Spare coverglass for LX-D35	1
Power Cable	1
Disposable Syringe for Draining Water	1

Note : Accessories differ depending on the chamber model.

Dish Attachment

ATX-D for 35mm dish and 60mm dish

ATX-CSG for chamber slide, coverglass chamber and slide glass

ATX-W for wellplate * Included in WSKMX/IX3WX/TIZWX/DMIWX

ATX-A for ATX-D/CSG * Included in WSKMX/IX3WX/TIZWX/DMIWX

Fixing Lid

LX-D35 for 35mm dish

LX-D56 for 60mm dish

LX-CSG for chamber slide, coverglass chamber and slide glass

LX-W for wellplate * Included in WSKMX/IX3WX/TIZWX/DMIWX

2 Controller

2.1 Size and weight

Model	Dimension	Weight
STXG	W151xD263xH196 mm	3.8 kg
STXF	W151xD296xH196 mm	3.5 kg

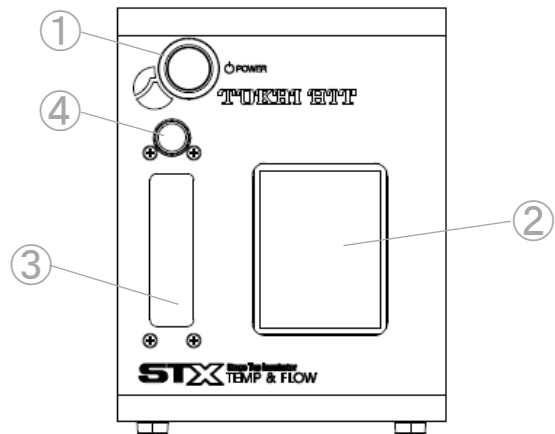
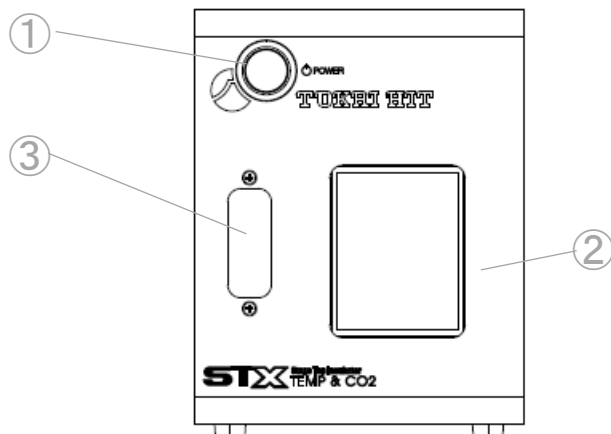
2.2 Name of parts

The image is shown for reference only.

Front panel

STXG with built-in gas mixer

STXF with analog flowmeter

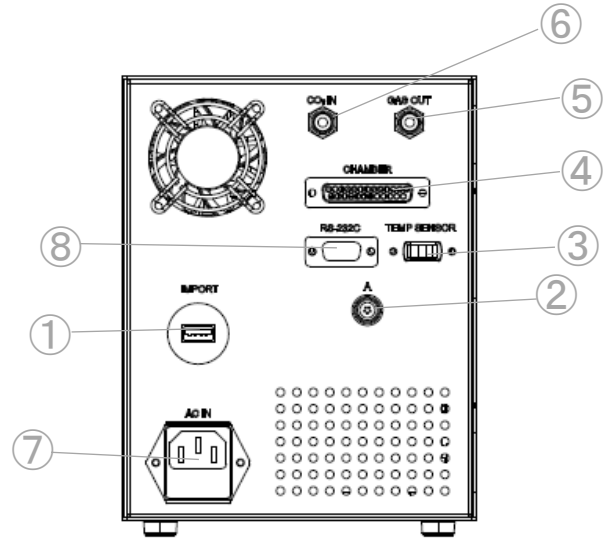
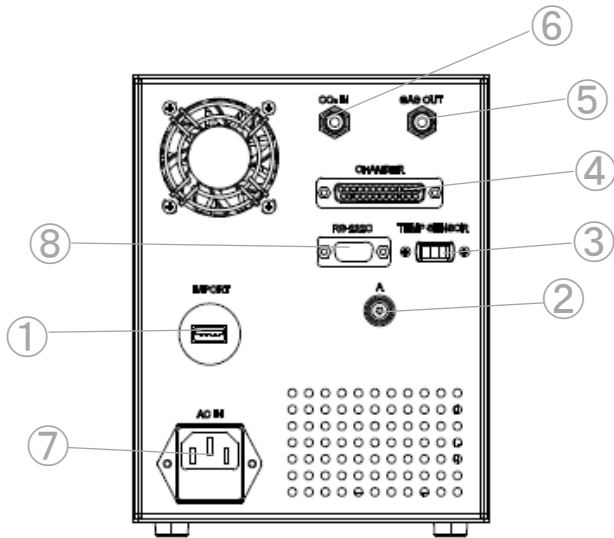


No.	Name	Role	Note
①	Main Switch	Power ON/OFF	
②	Touch Panel	Setting and indication	For the usage, see P.29-32.
③	Flowmeter	Indication of gas flow	
④	Flow Adjustment Knob	Adjustment of gas flow	Equipped to STXF

Rear Panel

STXG with built-in gas mixer

STXF with flowmeter



No.	Name	Role	Note
①	USB Connection	Connection to USB (Optional)	
②	Link Connection A	Connection to optional gas mixer	Use only if the system is used with STX optional gas mixer.
③	Sensor Connection	Connection to Extension Wire	
④	Chamber Connection	Connection to Chamber	
⑤	Mixed Gas Outlet	Gas supply to Chamber	For connection of tubes, see P.27-28.
⑥	CO2 Inlet	Intake of 100% CO ₂ (STXG) 5% CO ₂ premixed gas (STXF)	
⑦	Power Cable Connection		
⑧	RS-232C Connection	Connection to MOXA cable	For connection to PC, see P.39.

2.3 Specifications

		STXG with built-in gas mixer	STXF with analog flowmeter	
Temperature	Temperature control	PID control		
	Increments	0.1°C by digital switches		
	Setting method	Touch Panel or PC		
	Possible temp. setting range Controllable temp. setting range is from ambient +5°C	SAMPLE TEMP	30°C - 40°C	
		TOP HEATER	10°C - 65°C	
		BATH HEATER	10°C - 50°C	
		STAGE HEATER	10°C - 50°C	
		LENS HEATER	10°C - 45°C	
	Rise time	10 minutes to reach 50°C		
Accuracy	Within $\pm 0.3^\circ\text{C}$ at each heater surface (in our terms and conditions)			
Sensor	Pt100			
Humidity	Humidification control	Forced humidification by heating Bath Unit		
	Condensation prevention	Top Heater equipped with glass heater		
Gas	CO ₂ concentration range	5% - 20%	-	
	Control method	PID control	Precision needle valve	
	Accuracy	Within $\pm 0.1\%$	Within $\pm 2\%$ FS	
	Gas type	100% CO ₂	5% CO ₂ premixed gas	
	Input gas pressure	0.1MPa - 0.15MPa		
	Output gas pressure	160 ml/min	75 ml/min - 250 ml/min	
Power source	100 V ~ 240 V AC $\pm 10\%$ 50/60Hz			
Maximum power consumption	110W	90W		

Power Code

For use in areas with 100V-120V power	Use only Power Cable described below: detachable cord set, 3-conductor grounding at 125V, AC125V7A minimum, listed in UL. In case of using with extension cord, use only Power Cable with PE (Protective Earth) wire.
For use in areas with 220V-240V power	Use only 3-pole Power Cable, with plug and outlet complying with EU/EN standards in EU territory. Class 1 equipment must be connected to PE (Protective Earth) terminal. In case of using with extension cord, use only Power Cable with PE (Protective Earth) wire.

Use Conditions

Location	Indoor
Temperature	20°C - 28°C
Relative Humidity	35% - 85%
Altitude	Up to 2000m maximum
Environmental Conditions	Installation category of IEC664, Pollution degree 2

Safety Measures

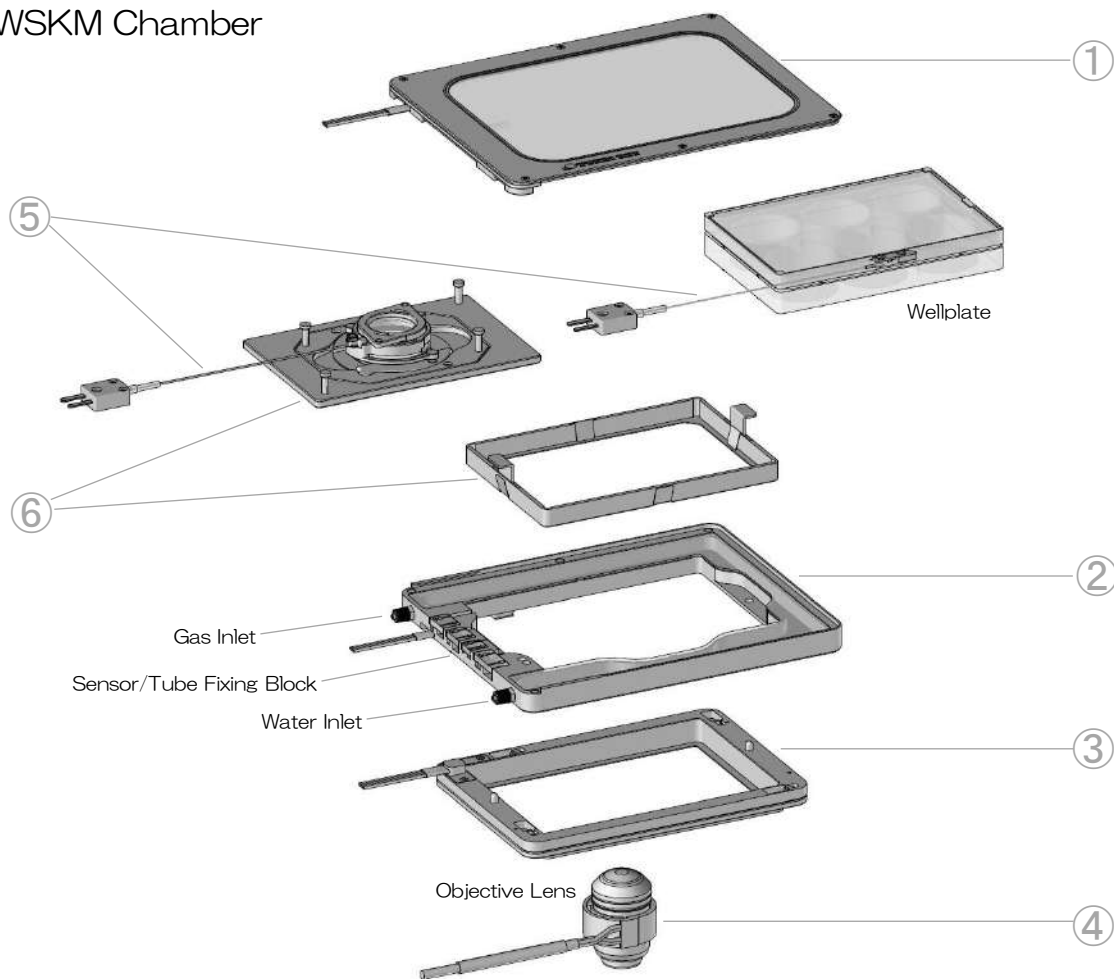
Burn Prevention Function	When the Top Heater exceeds 65°C, safety function operates and temperature rise stops.
Fuse	250 V AC 2.0A Do not use except the rated fuse.

3 Chamber

3.1 Structure

The image is shown for reference only.

WSKM Chamber



No.	Name	Role	Note
①	Top Heater	<ul style="list-style-type: none"> • Condensation prevention • Sample temperature control 	
②	Bath Unit	<ul style="list-style-type: none"> • Humidification inside of chamber by steam 	Presence/absence of Bath Heater depends on the chamber model.
③	Stage Heater	<ul style="list-style-type: none"> • Heats Dish Attachment • Prevents heat from escaping to the stage. 	
④	Lens Heater	<ul style="list-style-type: none"> • Prevents heat from escaping the objective lens. 	For use of Lens Heater, see P.23.
⑤	Feedback Sensor	<ul style="list-style-type: none"> • Measurement of sample temp. 	
⑥	Dish Attachment & Fixing Lid	<ul style="list-style-type: none"> • Fixation of vessel 	Dish Attachment and Fixing Lid differ depending on the chamber model.

3.2 Installation

WSKMX / IX3WX

Applicable vessels



Applicable stage

Flat-top XY stages with 160 x 110 mm aperture

Installable on various stages with optional adapters.

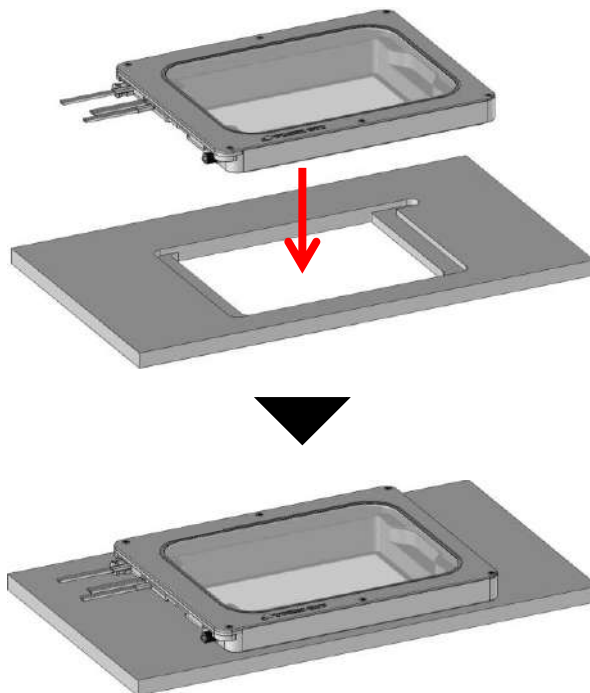
Dimension

W187 × D146 × H27 mm

Recommended water volume

32cc

Installation



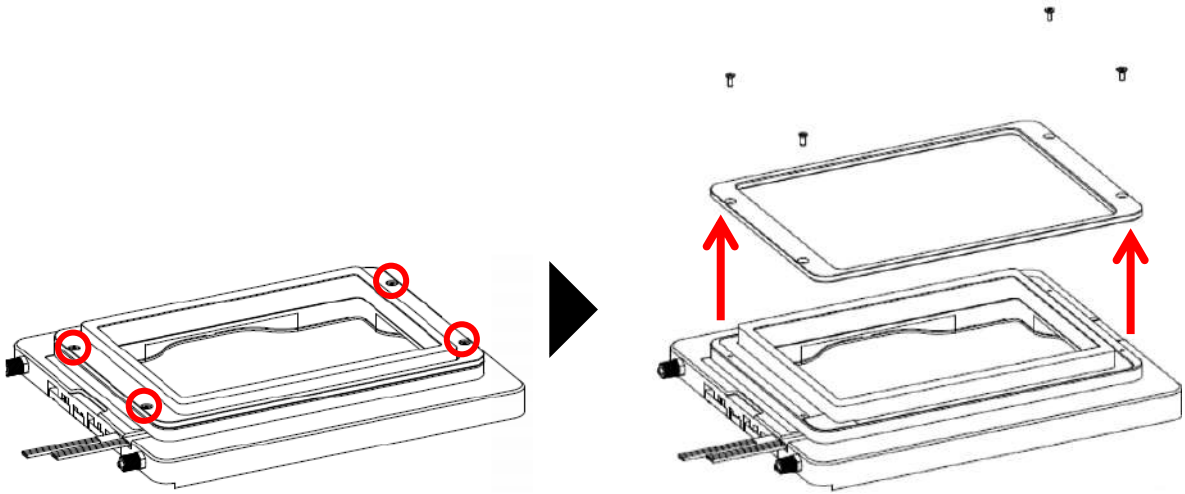
Fit the bottom part of chamber into the aperture of XY stage.

! For use on Prior Scientific H117 stage, see the next page and remove 3.0mm spacer from the bottom of chamber.

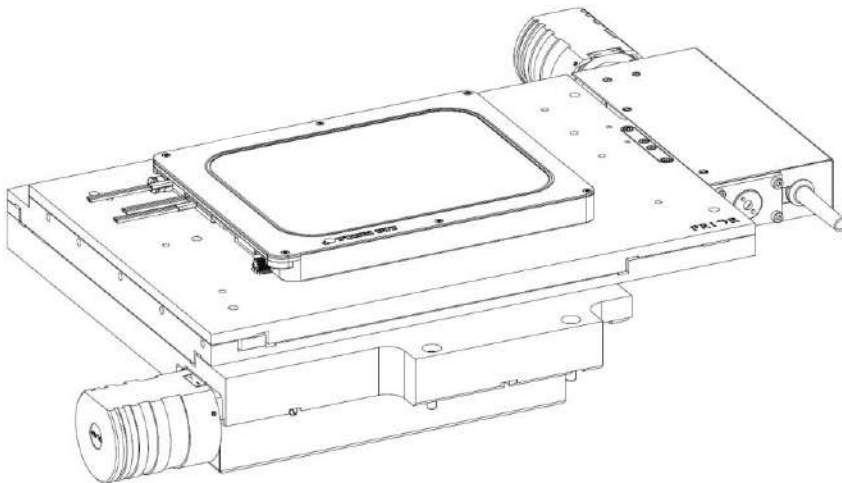
Installation of WSKMX/IW3WX on Prior Scientific H117

Before installing WSKMX/IW3WX on Prior Scientific H117 stage, remove 3.0mm Spacer from the bottom of chamber.

- ① Remove Top Heater (chamber lid).
- ② Turn the chamber upside down and remove the 4 screws with Precision Screw Driver that comes with the product.



- ③ Set the chamber without spacer on the H117 stage.



- i** Keep the removed spacer and screws in case of that the system will be used on other XY stage.

WELSX

Applicable vessels



Applicable stage

XY stage with Tokai Hit Stage Adapter or sample holder which can accommodate wellplate

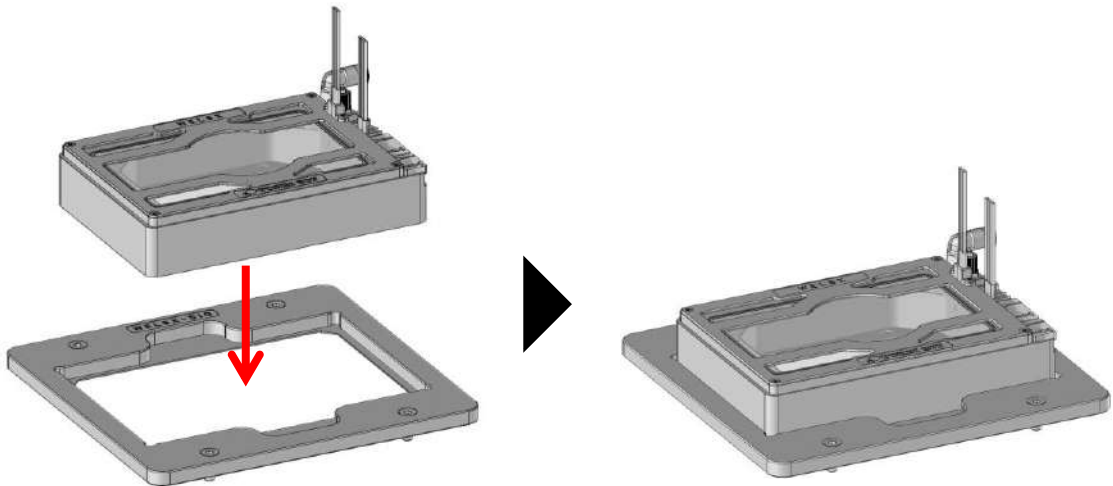
Dimension

W127.5 × D85 × H27 mm

Recommended water volume

21cc

Installation



Fit the bottom part of chamber into the aperture of Stage Adapter or sample holder.

TIZWX

Applicable vessels



Applicable stage

Nikon Ti2/Ti piezo stage

Optional Stage Adapter requires for Ti2/Ti manual/motorized stage.

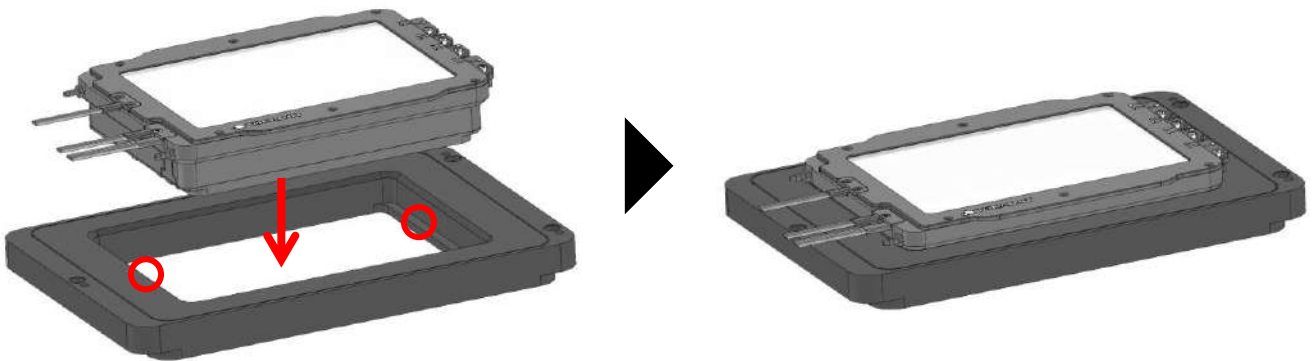
Dimension

W175.5 × D118 × H30 mm

Recommended water volume

26cc

Installation



Remove Top Heater and use two screws to fix the chamber on piezo stage or optional Stage Adapter.

TIZBX

Applicable vessels



Applicable stage

Nikon Ti2/Ti piezo stage

Optional Stage Adapter requires for Ti2/Ti manual/motorized stage.

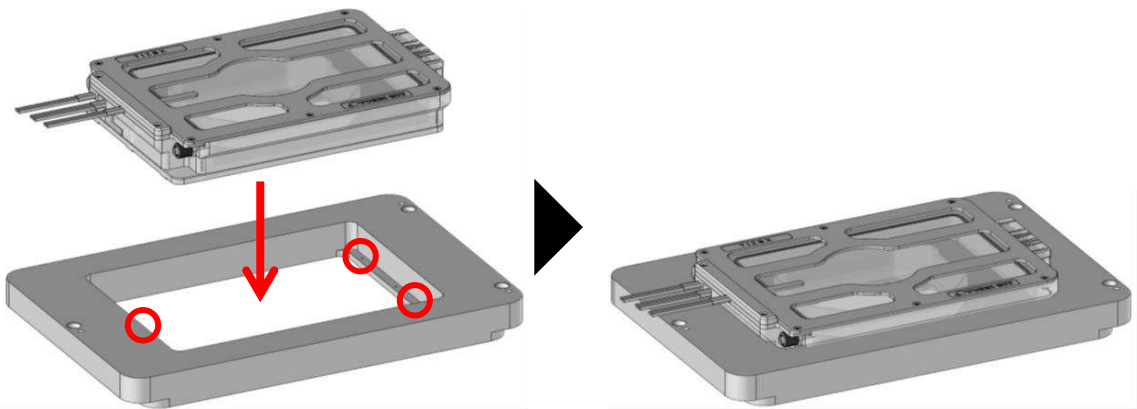
Dimension

W178 × D118 × H32 mm

Recommended water volume

61cc

Installation



Remove Top Heater and use three screws to fix the chamber on piezo stage or optional Stage Adapter.

GSi2X

Applicable vessels



Applicable stage

Leica Super Z galvo stage

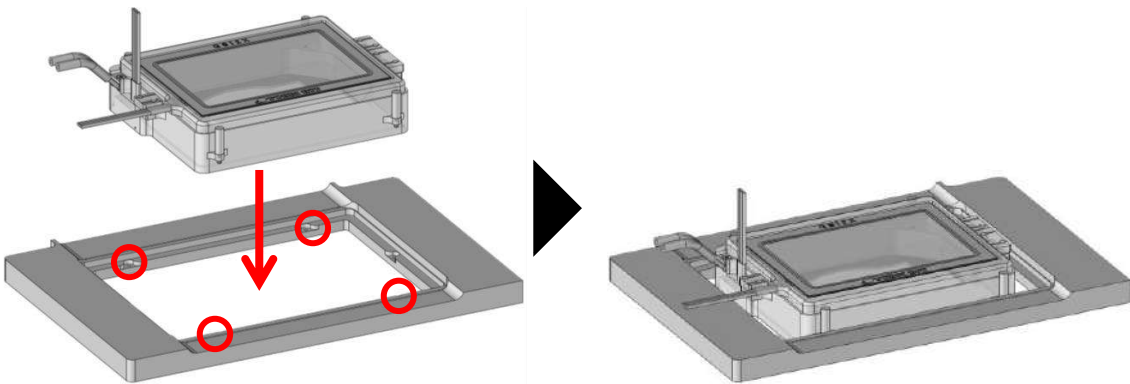
Dimension

W126 × D96 × H23 mm

Recommended water volume

18cc

Installation



Remove Top Heater and fix the chamber to stage by four screws on the side of chamber.

DMIWX

Applicable vessels



Applicable stage

Leica Scanning stage with condenser cover

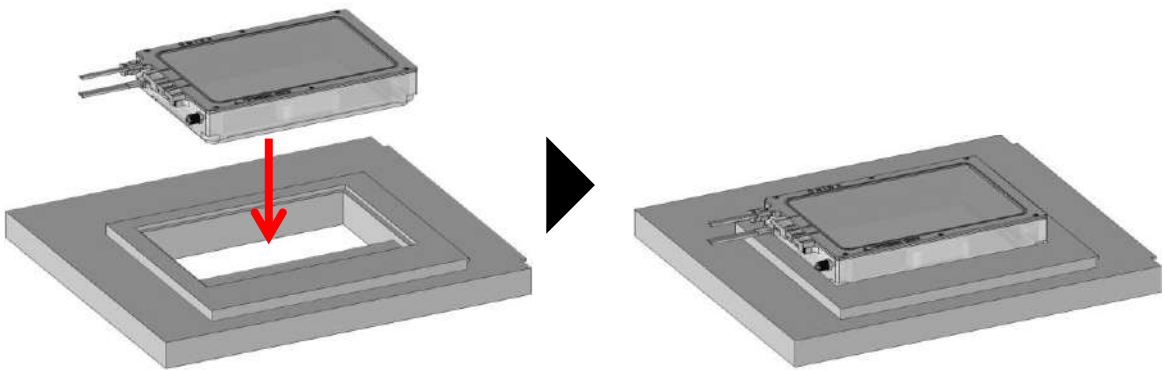
Dimension

W170 × D110 × H27.5 mm

Recommended water volume

19cc

Installation



Fit the bottom part of chamber into the aperture of XY stage.

WSBX

Applicable vessels



Applicable stage

Zeiss Piezo Insert WSB 500

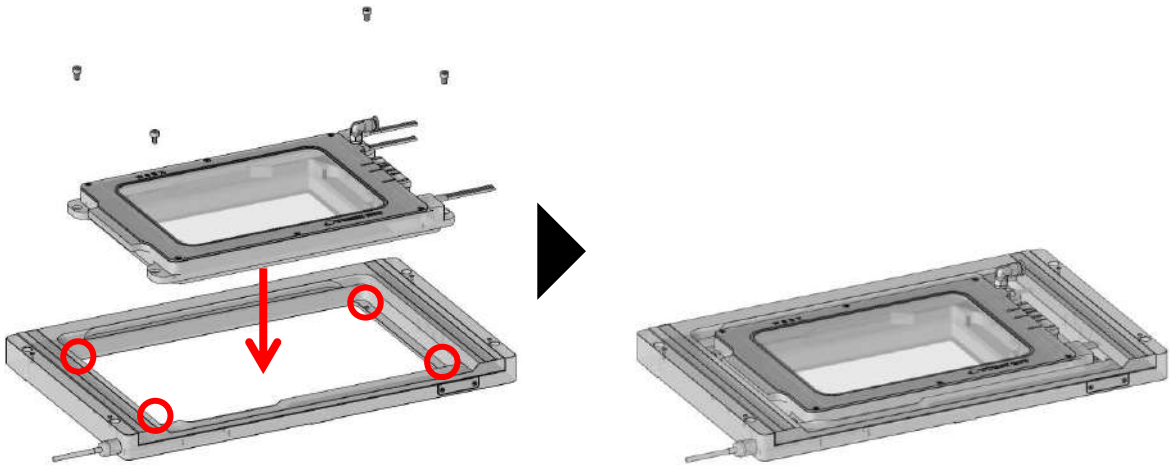
Dimension

W187 × D146 × H27mm

Recommended water volume

18cc

Installation

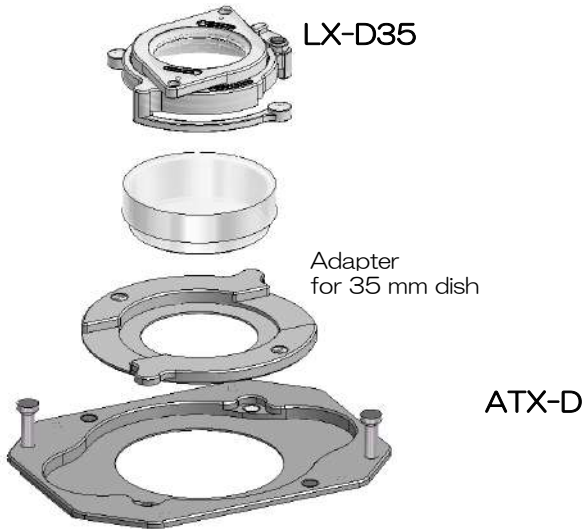


Fix the chamber to stage by four hexagon socket screws.

3.3 How to set vessel to Dish Attachment

See the figure below and set vessel.

35 mm dish



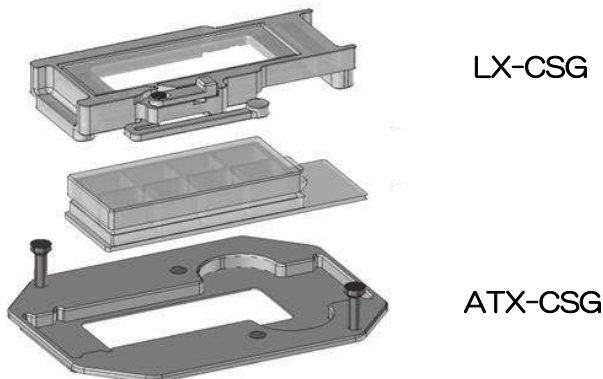
Use Adapter for 35 mm dish and fix by magnets of Fixing Lid LX-D35.

60 mm dish



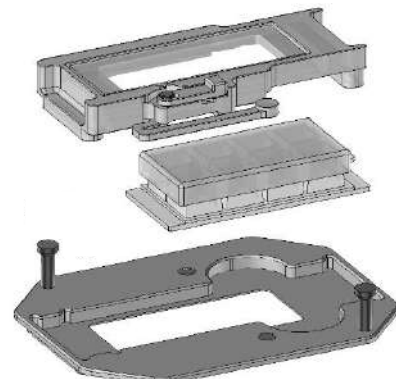
Remove Adapter for 35 mm dish and fix by magnets of Fixing Lid LX-D56.

Chamber slide and Slide glass



Place the slide on ATX-CSG and mount Fixing Lid LX-CSG.

Chambered coverglass

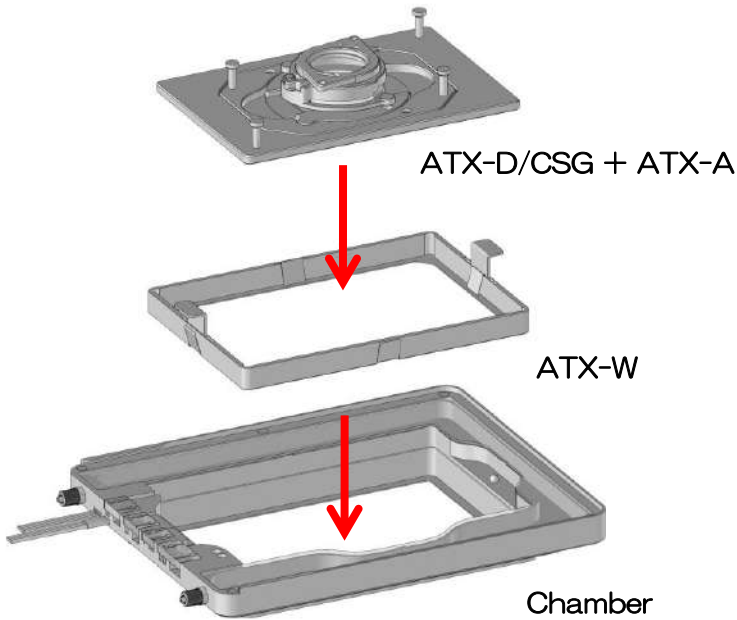


Place the chambered coverglass and mount Fixing Lid LX-CSG. Please confirm that the opening of LX-CSG is completely covered by chambered coverglass .

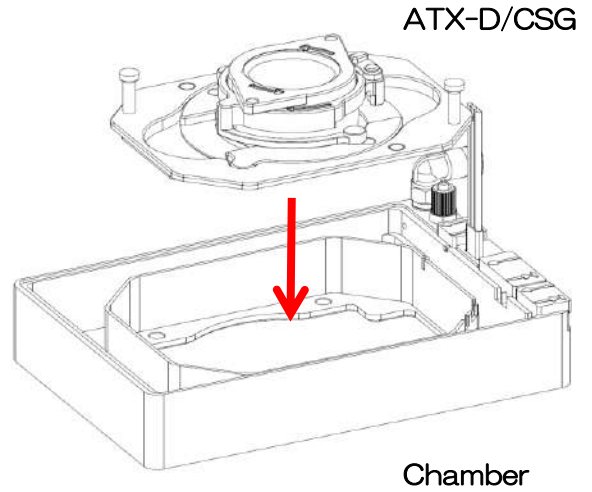
3.4 How to set Dish Attachment to Chamber

WSKMX/IX3WX/TIZWX/DMIWX/WSBX

WELSX/TIZBX/GSI2X



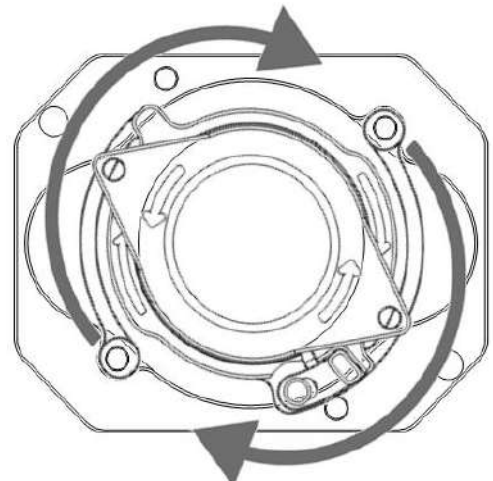
Attach ATX-D/CSG to ATX-A and install it into the chamber with Attachment for wellplate ATX-W.



Install ATX-D/CSG directly into the chamber.

3.5 How to Remove the dish fixing lids.

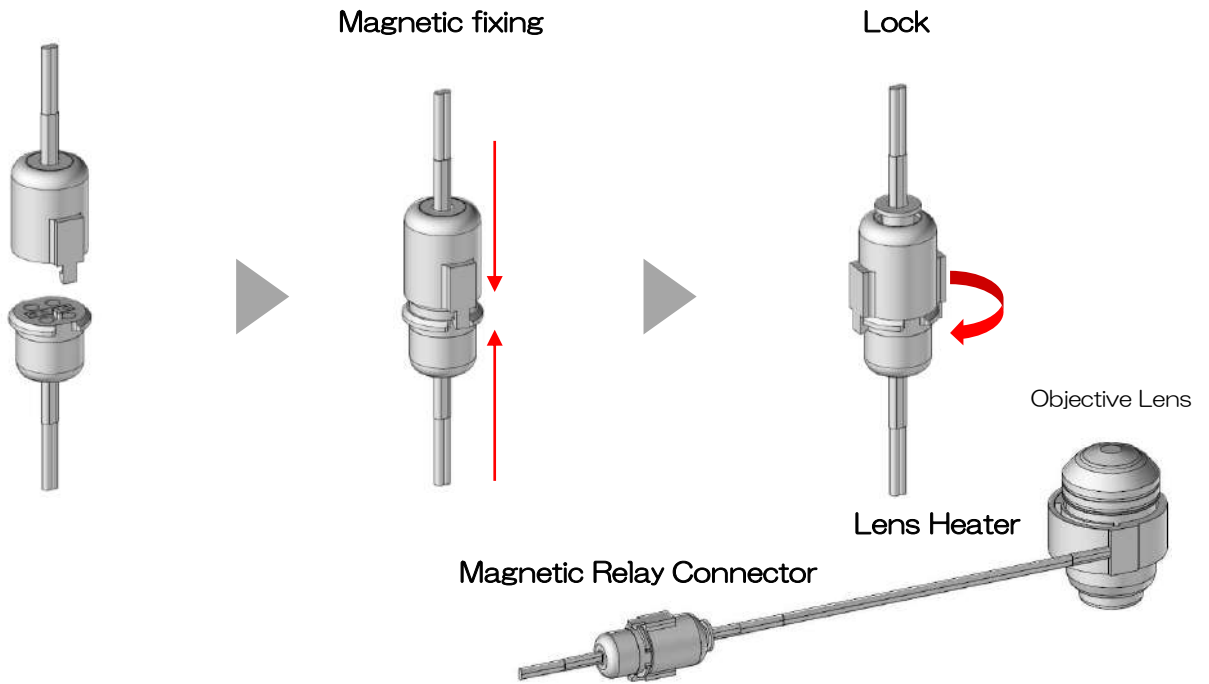
Remove the 35mm, 60mm dish fixing lids from the attachment as follows.



Turn clockwise and lift up to remove the magnetic lid from the holder.

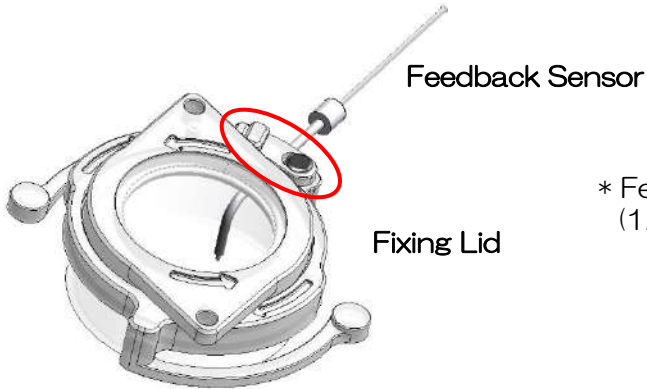
3.6 How to set Lens Heater

Wrap Lens Heater so as to be in close contact with the objective lens. Avoid uneven surface such as correction collar and diaphragm. The cable has magnetic Relay Connector to prevent the cable from getting entangled around the objective revolver.



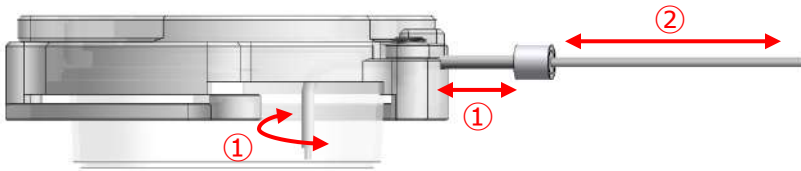
3.7 How to set Feedback Sensor

Set Feedback Sensor to Fixing Lid.



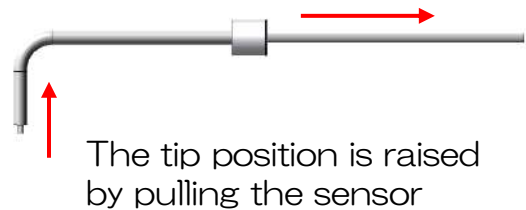
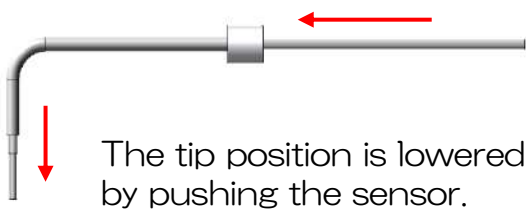
* Feedback Sensor is autoclavable.
(121°C, 2 atmospheric pressure, 20 minutes)

Set Feedback Sensor so that the tip is dipped properly into media in the vessel.

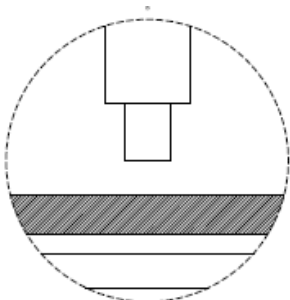


① Adjust the position and angle of the pipe.

② Adjust the height of the sensor tip.

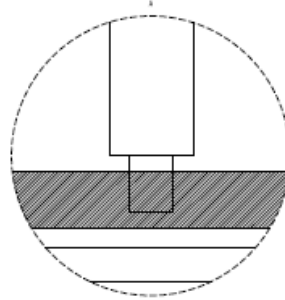


< Bad >



The sensor tip is not dipped into media.

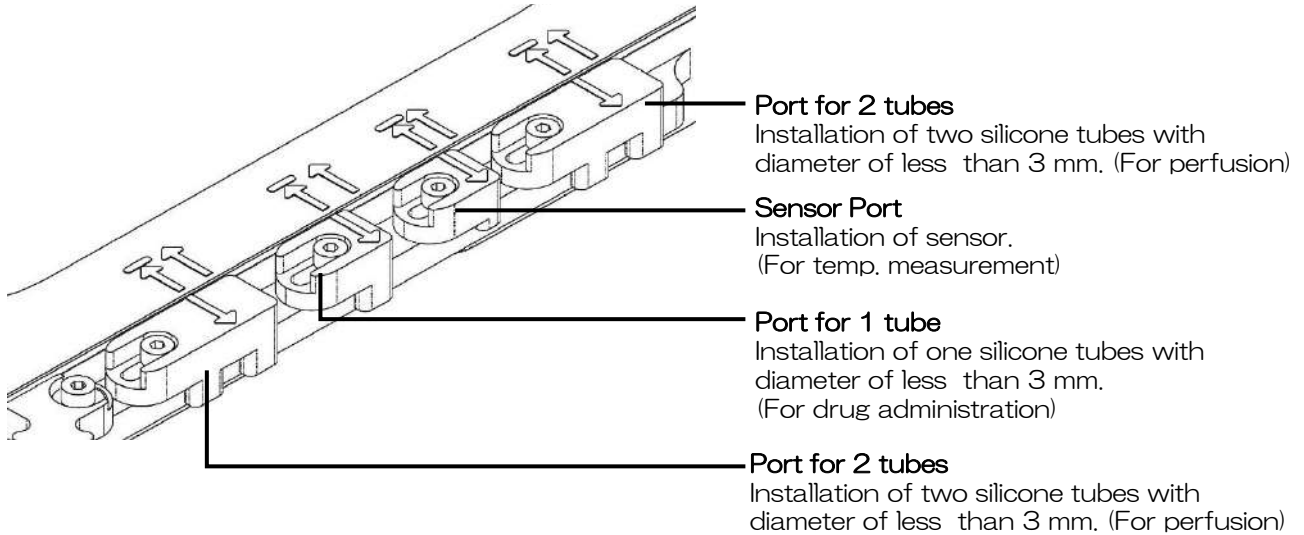
< Good >



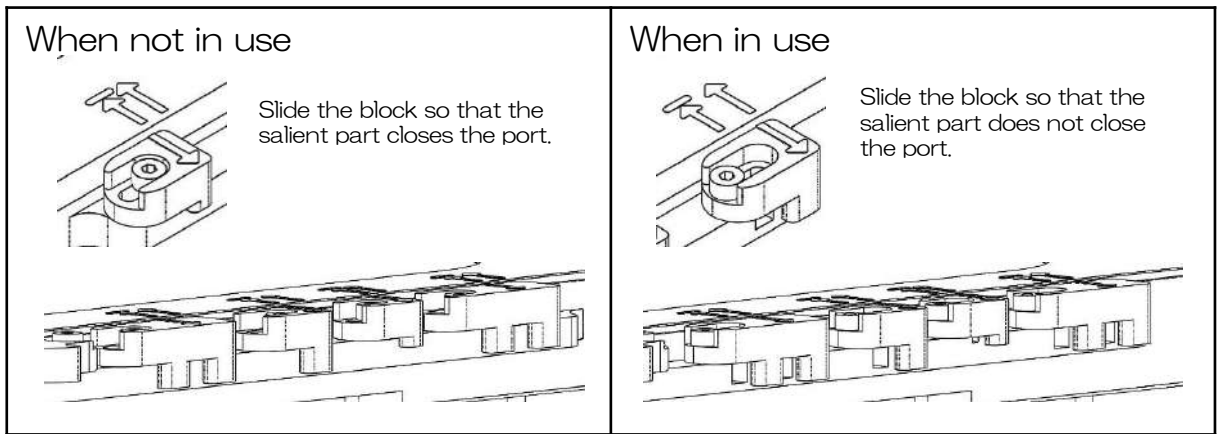
The sensor tip is dipped into media.

3.8-1 Access Ports

Attach Fixing Blocks properly according to use/non-use of Feedback Sensor and tubes



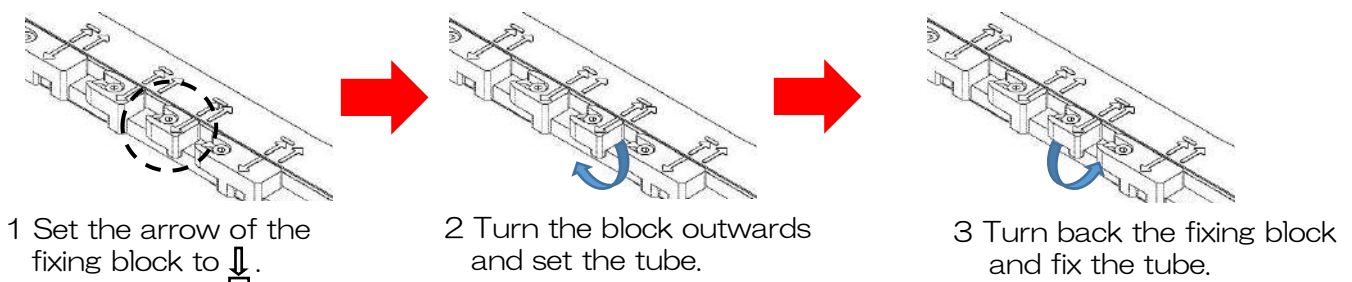
By sliding the fixing block, the access ports are opened/closed.
Please refer to the following instruction regarding the way of use.



To keep environment inside chamber, close the ports by the blocks when not in use of access ports for sensor and tubes.

How to set tubes to Access Ports

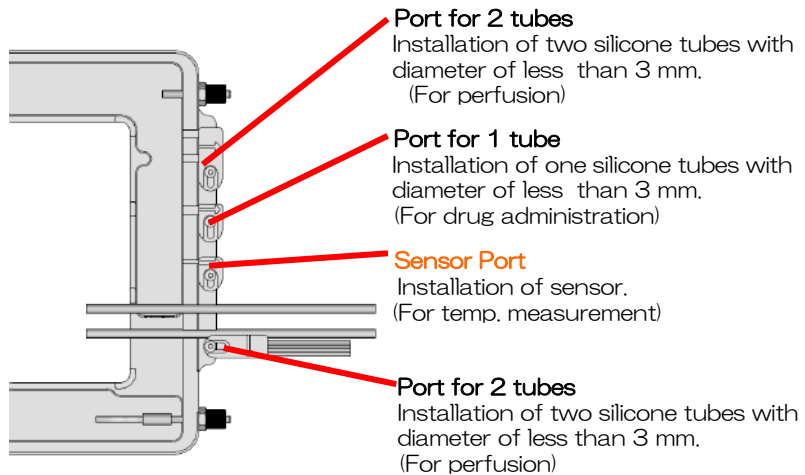
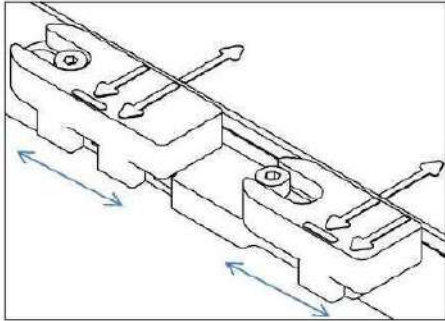
The installation of sensor / tube fixing blocks of Access Ports changes depending on whether the sensor and tubes are used or not used.



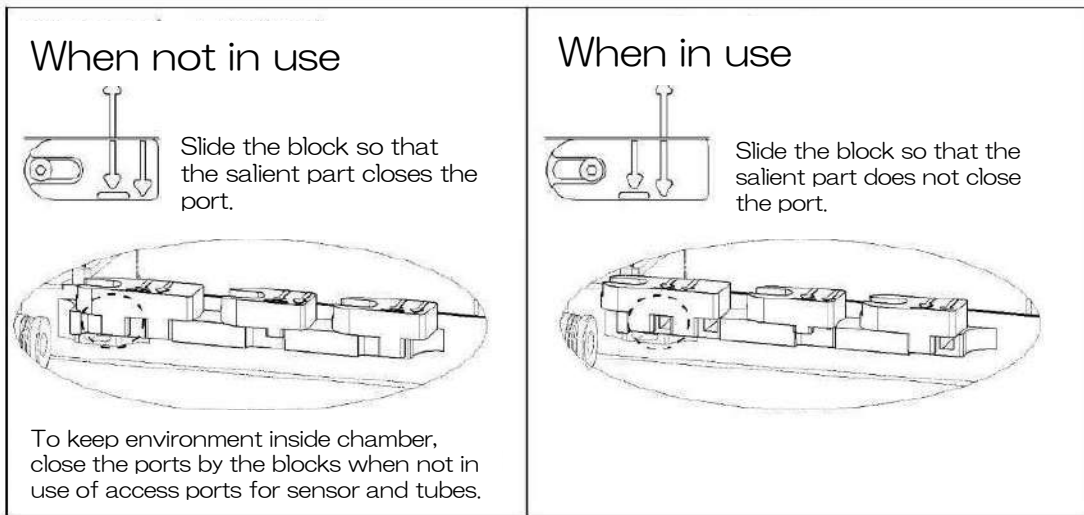
3.8-2 Access Ports

Attach Fixing Blocks properly according to use/non-use of Feedback Sensor and tubes.

Fixation method

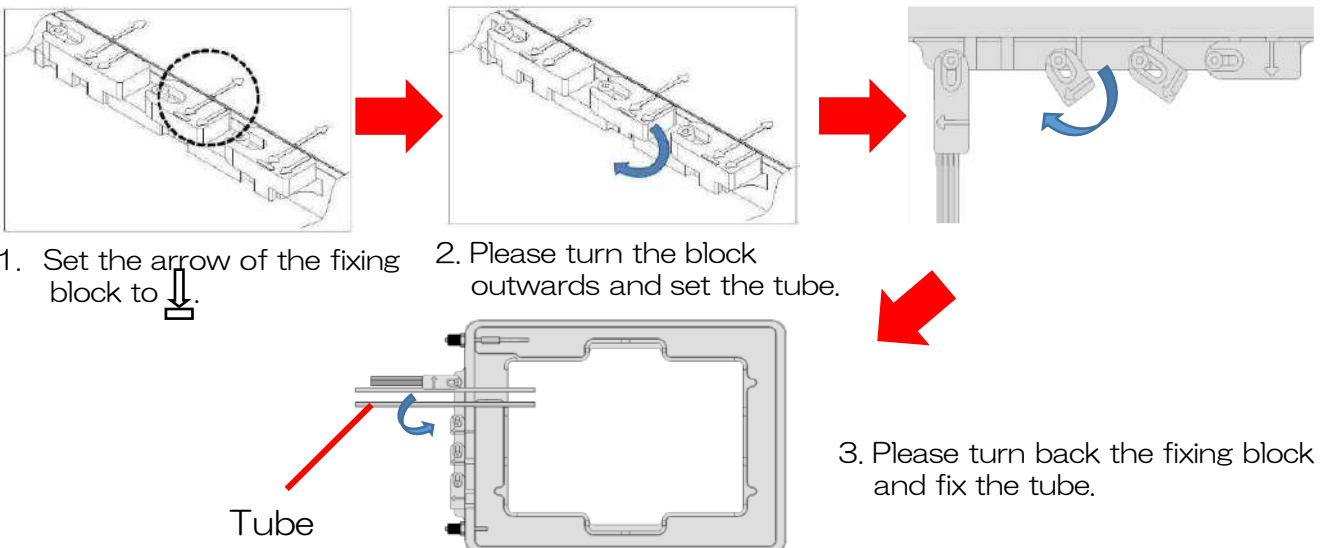


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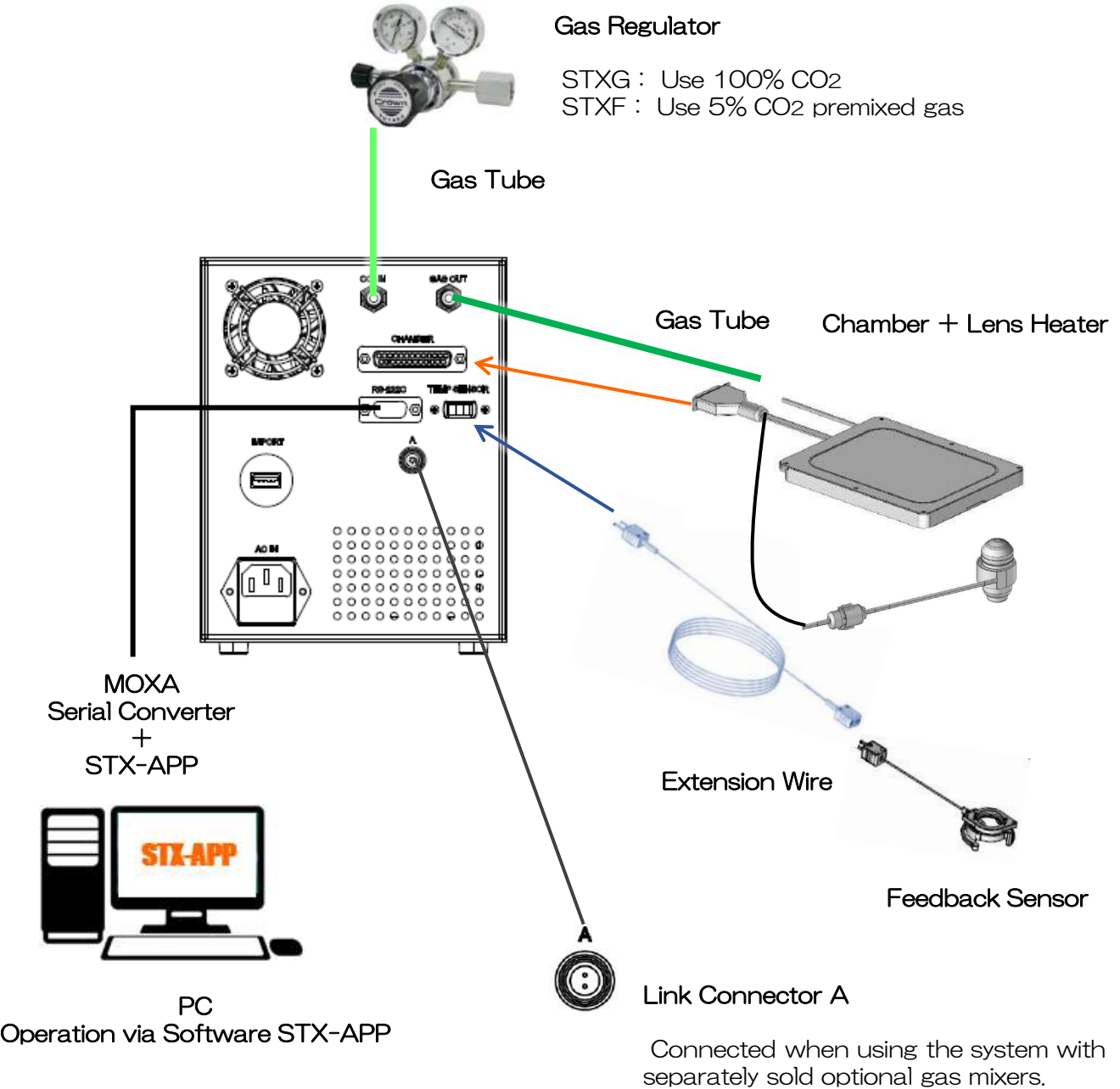
How to set tubes to Access Ports

The installation of sensor / tube fixing blocks of Access Ports changes depending on whether the sensor and tubes are used or not used.



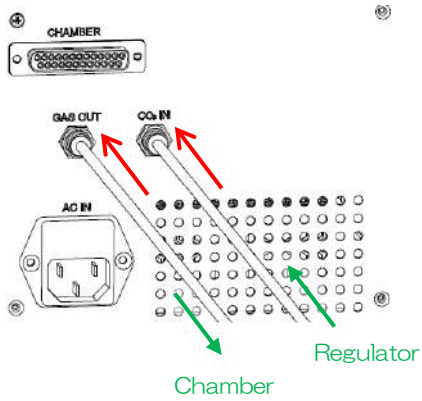
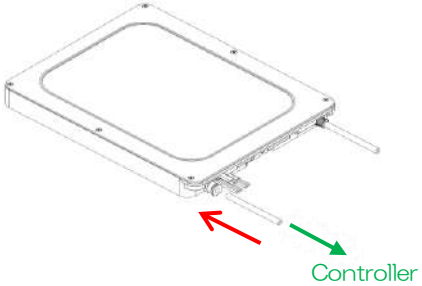
4 Connection

4.1 System Image



- ① Connect Power Cable between controller and the outlet.
- ② Set Lens Heater to the objective lens.
- ③ Install the chamber on the microscope stage.
- ④ Plug the connector of chamber cable into the socket at the rear panel of controller.

4.2 Connection of Gas Tubes

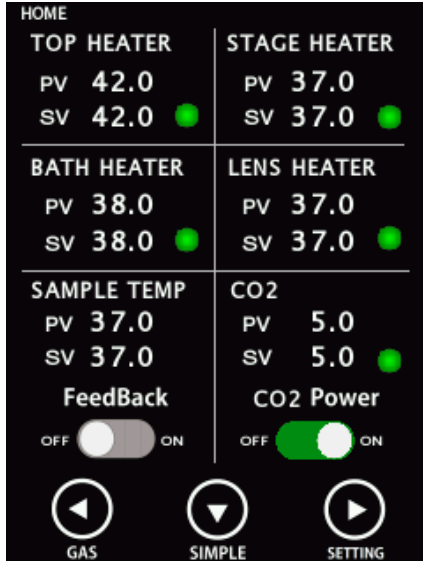
<p>Controller</p>  <p>CHAMBER</p> <p>GAS OUT CO₂ IN</p> <p>AO IN</p> <p>Regulator</p> <p>Chamber</p>	<p>STXG Connect Gas Tube between the regulator of 100% CO₂ and CO₂ IN at the rear panel of controller.</p> <p>STXF Connect Gas Tube between the regulator of 5% CO₂ premixed gas and CO₂ IN at the rear panel of controller.</p> <p>Connect another Gas Tube to GAS OUT.</p>
<p>Chamber</p>  <p>Controller</p>	<p>Connect the opposite side of Gas Tube connected to controller to the gas inlet of chamber.</p> <p>The Gas Tube is connected to the chamber in advance at the time of factory shipping.</p>

5 Operation

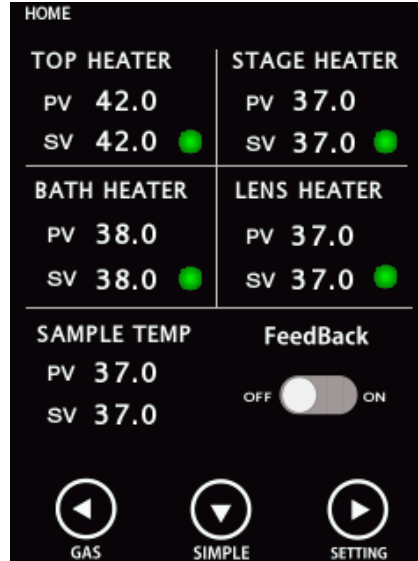
5.1 Touch Panel

HOME

STXG

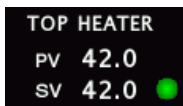


STXF



< TOP HEATER / BATH HEATER / STAGE HEATER / LENS HEATER >

Shows Process Value and Setting Value of Top Heater, Bath Heater, Stage Heater and Lens Heater. When one area is tapped in each heater area, Setting Value can be changed.



The heater is functioning normally.



When using GSI2X, the error is displayed in area of Bath Heater since the Bath Heater is not included.

< SAMPLE TEMP / FeedBack >

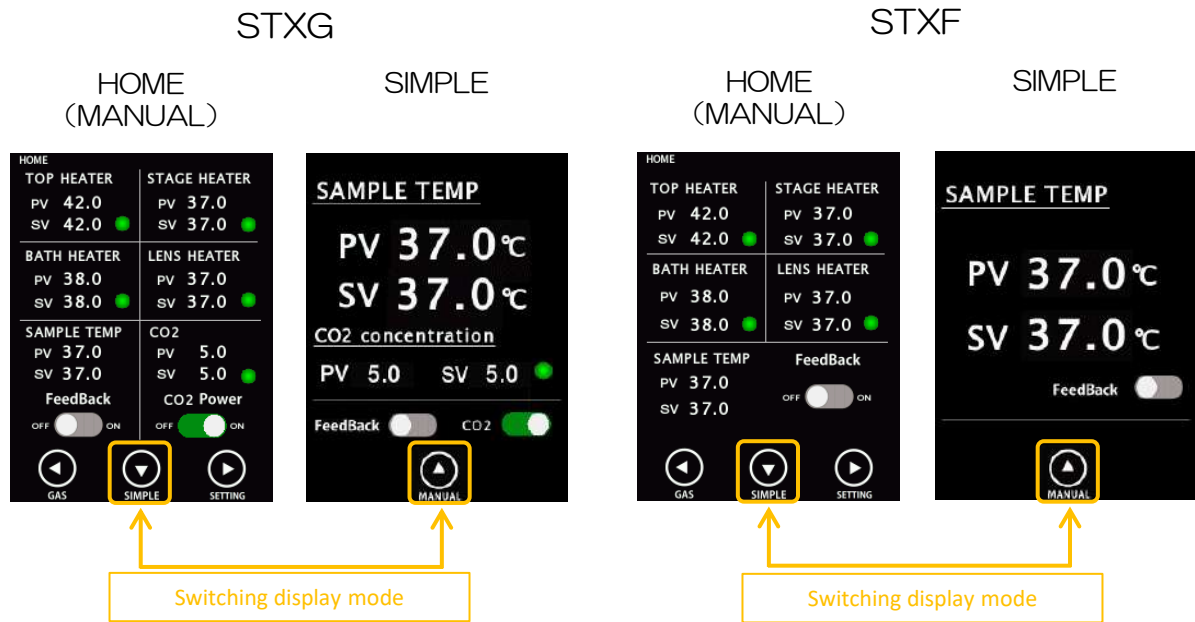
Shows the sample temperature measured by Feedback Sensor and the setting value for feedback control. When one area is tapped, Setting Value can be changed. When the FeedBack switched is turned ON, the Top Heater is regulated in feedback control.

< CO2 / CO2 Power > Only STXG

Shows Process Value and Setting Value of CO2 concentration of mixed gas supplied from controller. When the CO2 Power is turned ON, the mixed gas begins to be supplied.

SIMPLE mode

Tapping SIMPLE button, the display changes to SIMPLE mode. Hides Process Value and Setting Value of each heater and shows only Sample Temperature and CO2 concentration (STXG). Since the sample temperature can be easily checked, this is useful when operating in feedback mode.

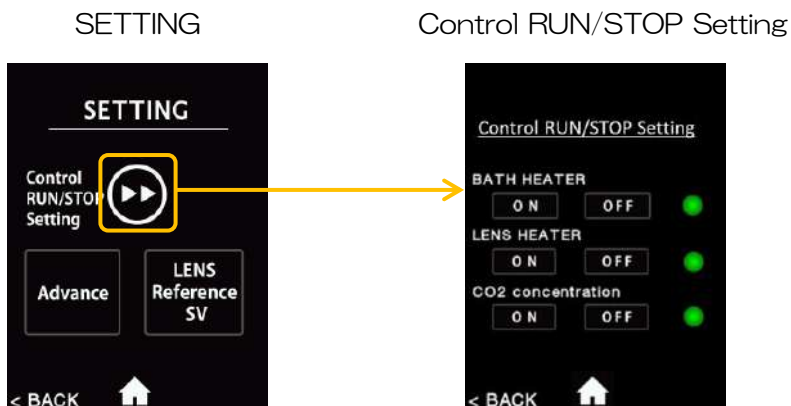


SETTING

Tapping SETTING button, the display changes to the screen for ON/OFF setting of heaters and gas supply, the reference setting value of Lens Heater and parameters.

< ON/OFF setting >

You can turn ON/OFF for Bath Heater, Lens Heater and gas supply. When using the chamber which does not have Bath Heater, the Bath Heater is set to OFF in advance.



< Reference Setting Value of Lens Heater >

You can check reference Setting Value of Lens Heater. Change the SV depending on vessel type and objective lens in use.

SETTING

Control RUN/STOP Setting

Advance

LENS Reference SV

< BACK

Lens Reference SV

Plastic Bottom Dish

Glass Bottom Dish

< BACK

For plastic bottom dish

Plastic bottom dish

Working Distance	Set Value
0.1 - 0.3	41°C
0.3 - 0.5	39°C
0.5 - 0.7	37°C
0.7 - 1.0	36°C
1.0 - 3.0	32°C
3.0 -	OFF

< BACK

For glass bottom dish

Glass bottom dish

	Working distance	Set value
Oil immersion	0.1~0.7	41°C
	0.7~0.8	39°C
	0.8~1.0	36°C
	1.0~1.5	34°C
	1.5~2.5	32°C
NOT Oil immersion	0.1~0.3	39°C
	0.3~0.7	36°C
	0.7~1.0	34°C
	1.0~3.0	32°C
	3.0~	OFF

< BACK

< Advance Setting >

You can change Input Correction values and Control Parameter values. The values calculated by calibration at Tokai Hit are inputted at the time of factory shipping. Do not change the default values for any purpose other than changing the chamber.

SETTING

Control RUN/STOP Setting

Advance

LENS Reference SV

< BACK

Advance

Input Correction

Control Parameter

Touch Calibration

< BACK

Input Correction

	Shift L1	Shift L2	Shift H1	Shift H2
Sample	0.0	0.0	60.0	0.0
Top	0.0	0.0	0.0	0.0
Bath	0.0	0.0	0.0	0.0
Stage	0.0	0.0	0.0	0.0
Lens	0.0	0.0	0.0	0.0

< BACK

Control Parameter

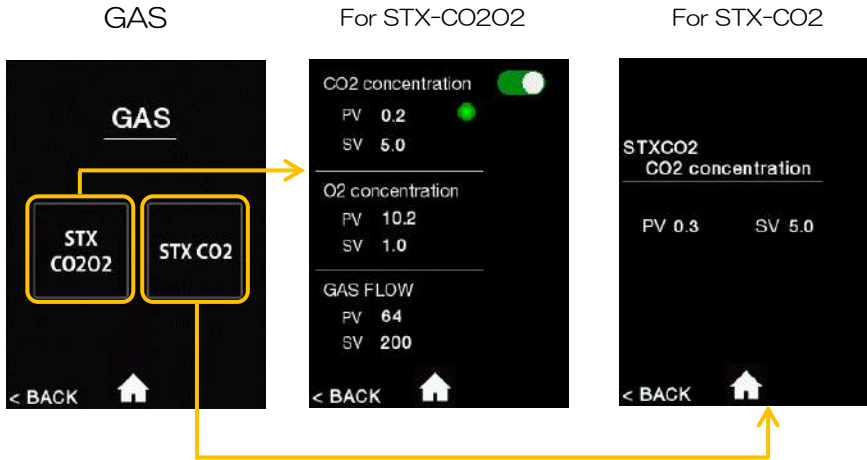
	P	I	D
Sample	5.0	0	1.0
Top	2.0	0	0.0
Bath	5.0	0	0.0
Stage	5.0	0	0.0
Lens	5.0	0	0.0

< BACK

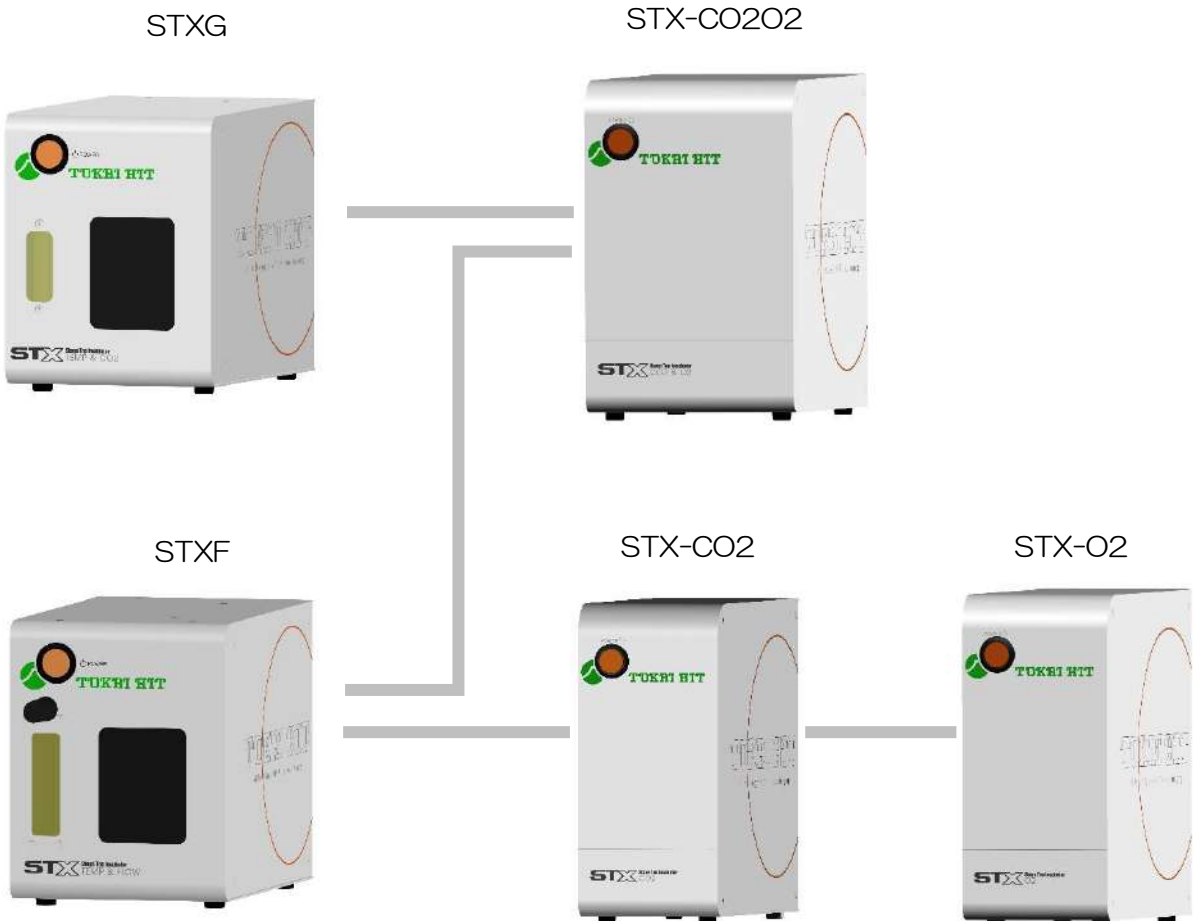
The default Input Correction values and Control Parameter values are described in the seal on the top surface of controller.

< Optional Gas Mixer >

When using the system with optional gas mixers, tap GAS button at HOME screen and set CO₂/O₂ concentration and gas flow.



System Image of optional gas mixers



5.2 Reference Setting Value

Reference Setting Value is described at the seal at front panel of controller. It is provided to heat the dish bottom temperature to 36.5°C-37.0°C under room temperature of 25°C. Temperature inside chamber may vary depending on actual use condition.

example

S/N	35mmDish	Well plate
TOP	48.0	48.5
BATH	41.0	41.0
STAGE	38.0	37.5
LENS		
SAMPLE	37.0	37.0

Shows Reference Setting Value for 35mm dish and wellplate.

For Reference Setting value of Lens Heater, see P.31.

5.3 Work-flow

Preliminary Operation

Carry out preliminary operation for about 1 hour.

Gas Supply

Start gas supply in 30 minutes before experiment.

Cultivation

A Reference Setting Value

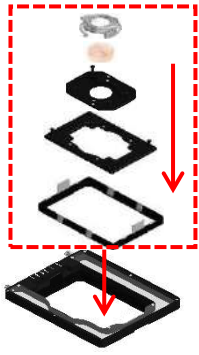


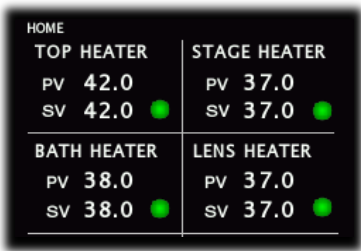
Easily start experiment by reference setting value.

B Feedback

Actual sample temperature can be checked and adjusted in real time. It is possible to maintain the sample temperature precisely even if room temperature is not stable.

5.4 Preliminary Operation

In order to stabilize the environment inside/outside the chamber, carry out preliminary operation for about 1 hour before experiment. Making the temperature of microscope and chamber before observation keeps the sample temperature stable and prevents drift of the observation image.

<p>1</p> 	<p>Remove top heater (chamber lid) and install the suitable dish attachments and the empty vessel.</p> <p style="text-align: center;"> ATX-W (Wellplate holder) ↓ ATX-A ↓ ATX-D + empty dish + LX-D35 (refer to P.22) </p>														
<p>2</p> 	<p>Pour distilled water into the water bath. The water level should be about 70% of the water bath.</p> <p>For recommended water supply volume, see the chamber details from P.13.</p>														
<p>3</p> 	<p>Mount top heater and turn Main Switch ON.</p>														
<p>4</p>  <table border="1" data-bbox="192 1653 549 1902"> <thead> <tr> <th colspan="2">HOME</th> </tr> </thead> <tbody> <tr> <td>TOP HEATER</td> <td>STAGE HEATER</td> </tr> <tr> <td>PV 42.0</td> <td>PV 37.0</td> </tr> <tr> <td>SV 42.0 ●</td> <td>SV 37.0 ●</td> </tr> <tr> <td>BATH HEATER</td> <td>LENS HEATER</td> </tr> <tr> <td>PV 38.0</td> <td>PV 37.0</td> </tr> <tr> <td>SV 38.0 ●</td> <td>SV 37.0 ●</td> </tr> </tbody> </table>	HOME		TOP HEATER	STAGE HEATER	PV 42.0	PV 37.0	SV 42.0 ●	SV 37.0 ●	BATH HEATER	LENS HEATER	PV 38.0	PV 37.0	SV 38.0 ●	SV 37.0 ●	<p>Input reference setting value at SV of each heater.</p> <p>For the reference setting value of chamber, see P.33. For the reference setting value of lens heater, see P.31.</p>
HOME															
TOP HEATER	STAGE HEATER														
PV 42.0	PV 37.0														
SV 42.0 ●	SV 37.0 ●														
BATH HEATER	LENS HEATER														
PV 38.0	PV 37.0														
SV 38.0 ●	SV 37.0 ●														

5.5 Gas Supply

1



- 1) Confirm regulator valve ② is closed.
- 2) Confirm pressure adjustment ③ is slack.
- 3) Open cylinder valve ①.
- 4) Open regulator valve ②.
- 5) Turn pressure adjustment ③ toward right to adjust secondary pressure indicated in meter B to be in a range from 0.1MPa to 0.15MPa.

STXG

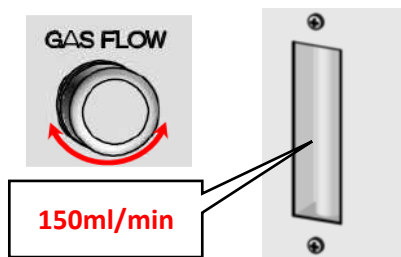
2



Set CO₂ concentration and turn CO₂ Power ON at touch panel of controller or software STX-APP.

STXF

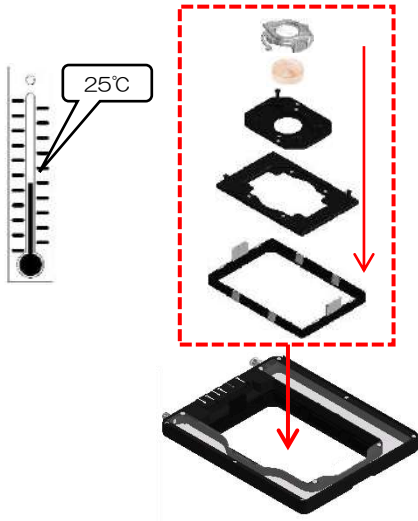
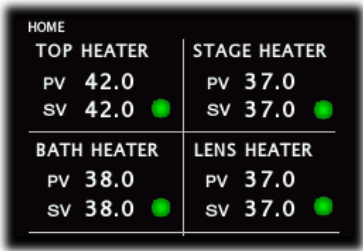
2



Turn the adjustment knob and adjust flow rate at flowmeter to 150ml/min.

5.6 Cultivation

A Reference Setting Value

<p>1</p> 	<p>Confirm room temperature is stable at around 25°C.</p> <p>Remove Dummy Plate from the chamber and install attachment with observation vessel.</p> <p>For the setting of vessel, see P.21. For the setting of attachment, see P.22.</p>
<p>2</p> 	<p>Confirm FeedBack switch is OFF.</p> <p>Input reference setting value at SV of each heater.</p> <p>For the reference setting value of chamber, see P.33. For the reference setting value of lens heater, see P.31</p>


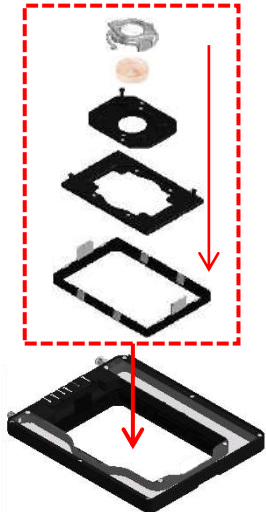
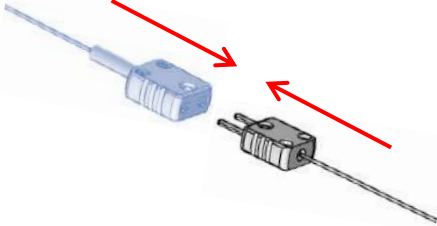

Describing position of reference setting value





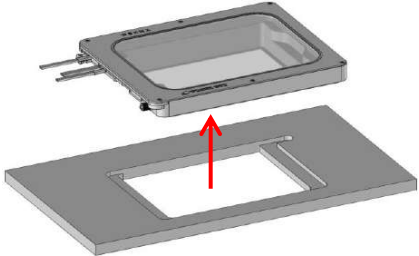
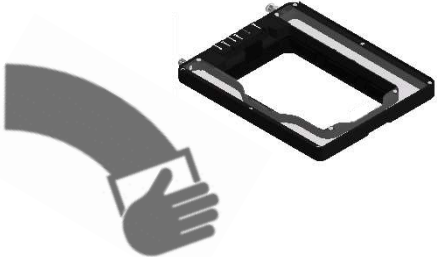
example

S/N	35mmDish	Well plate
TOP	48.0	48.5
BATH	41.0	41.0
STAGE	38.0	37.5
LENS		
SAMPLE	37.0	37.0

B Feedback

<p>1</p> 	<p>Attach Feedback Sensor to the fixing lid and place it on the observation vessel.</p> <p>For the setting of Feedback Sensor, see P.25.</p>
<p>2</p> 	<p>Remove the empty vessel from the chamber and install the observation vessel.</p> <p>Remove Fixing Block for sensor, pass Feedback Sensor through the access ports (groove) and attach the block to the chamber in the correct direction.</p> <p>For the setting of Fixing Block, see P.26.</p>
<p>4</p> 	<p>Connect the plug of Feedback Sensor to Extension Wire connected to the controller.</p>
<p>5</p> 	<p>Turn FeedBack switch ON and input the target temperature at SV of SAMPLE TEMP.</p> <p>Top Heater starts automatic control to keep the actual sample temperature stable at the target temperature.</p>

5.7 Cleaning

<p>1</p> 	<p>Shut off regulator valve ② and then ① to stop CO2 supply.</p>
<p>2</p> 	<p>Turn Main Switch OFF. Remove top heater carefully and wipe dew water at the inside surface. Remove remaining water at water bath with using syringe.</p>
<p>3</p> 	<p>Remove chamber and lens heater from the microscope.</p>
<p>4</p> 	<p>Clean the chamber with using cloth with alcohol. If water drops are left inside water bath, it may cause mold.</p>

6 Software STX-APP

6.1 STX-APP Summary

Software STX-APP enables setting of cultivation environment, regulation of device and data logging. The suitable temperature setting under use environment is possible and it includes functions such as program temperature control and picture transfer.

* Support Windows 7 or later version.

6.2 Installation

- 1 Install and set the MOXA serial converter “Uport1 130” . Refer to the next page for the installation process.
* MOXA serial converter should be installed to use STX-APP software.
- 2 Proceed installation of 【STX-APP】 according to the instructions.
* Open the file in STX-APP and choose an installer from English, Chinese or Japanese.

6.3 Initial setting of chamber

At time of its initial activation, the below window will be shown. Confirm each value is same as the reference setting value indicated in the seal at the front of controller. If it is different, input the correct value.

STX-APP Reference SV Setting
(PC)

	35mmDish	Well Plate
TOP HEATER	46.0	
BATH HEATER	41.0	
STAGE HEATER	38.0	

Confirm the Controller front panel printed for Reference Setting Value and correct the value if different.

OK

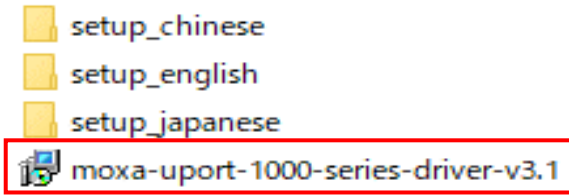
Reference Setting Value
(Controller)



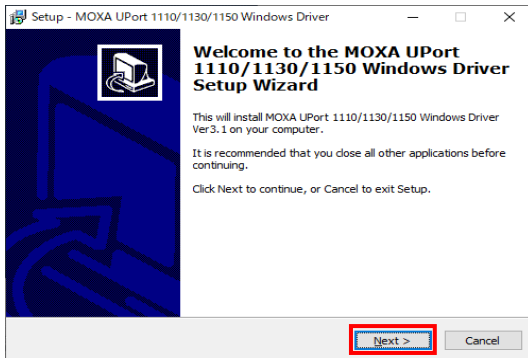
If your chamber does not support wellplate use, please input the values for 35mm dish in the “Well Plate” setting.

Serial converter “Uport1 130” installation and setting.

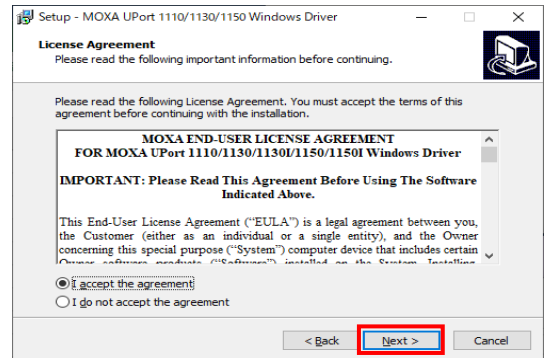
1 Click “moxa-uport-” inside STX-APP install DVD.



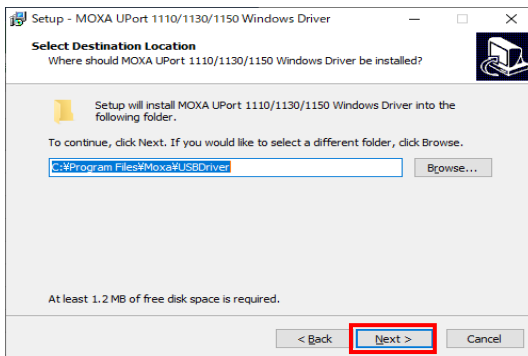
2-1 Setup screen
Click “Next”



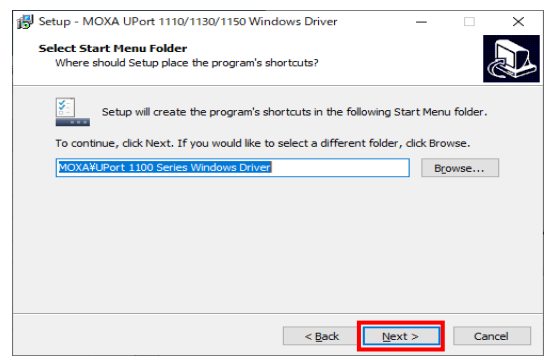
2-2 Accept the agreement and
Click “Next”



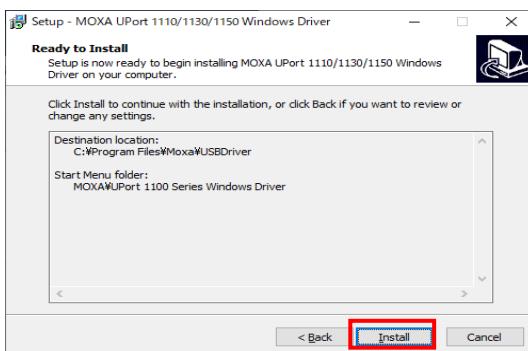
2-3 Select destination to save
the driver and Click “Next”



2-4 Select folder to save the shortcuts
and Click “Next”

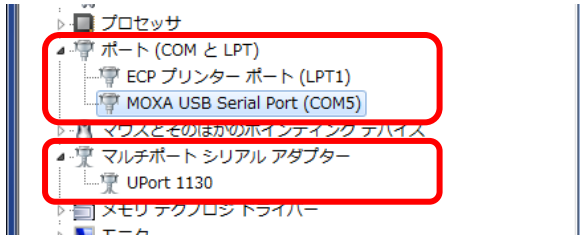


2-5 Click “Install” to start Install

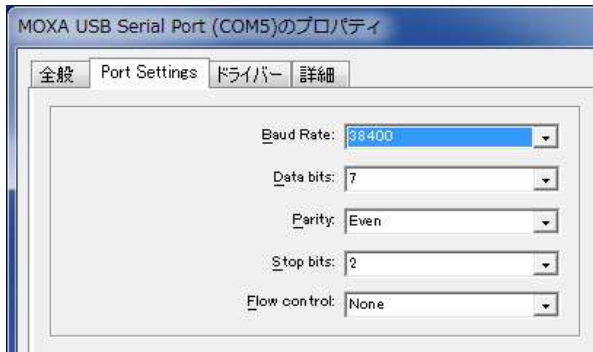


3 After the installation, connect the serial converter Uport 1130 to the computer.

4 Open device manager.



5 Right-click “MOXA USB Serial Port (COM*)” and select property.



Change the setting of Port Setting at property and click OK.

Back to device manager. Right-click “Uport 1130” and select property.



Confirm “RS-485 2W” is shown in Ports Configuration.

Setting completed.

After completing the setting of the serial converter, open the file in STX-APP and choose an installer from English, Chinese or Japanese. Proceed installation of 【STX-APP】 according to the instructions.



6.4 Introduction of incubation mode

There are 3 different incubation modes available for STX series. “Quick mode”, “Feedback mode” and “Manual mode” have different features and advantages to meet usage. Please refer to the following information.

Quick mode

Sample temperature : 37°C
Accuracy : $\pm 0.3^{\circ}\text{C}$

The system heats the sample by suitable setting according to chamber model, vessel type and room temperature range and maintains the sample temperature at 36.5°C-37.0°C under stable room temperature.

Feedback mode

Sample temperature : 30°C-40°C
Accuracy : $\pm 0.1^{\circ}\text{C}$

The system regulates Top Heater based on the actual sample temperature measured by Feedback Sensor. It minimizes temperature fluctuating caused by environmental disturbances.

During Feedback mode, the Top Heater is regulated automatically and other heaters are regulated by suitable setting according to vessel type and room temperature.

Manual mode

All heaters can be set freely.

6.5 Operation Flow

Please refer to the related page for detailed information on each screen.

Quick Mode / Manual Mode

1 - Initial Display



2 - Setting STEP1

P.46



Select chamber, vessel type, room temperature and press NEXT. Select the file from OPEN FILE to load the previous settings.

3 - Setting STEP2

P.47



Set preliminary operation time.

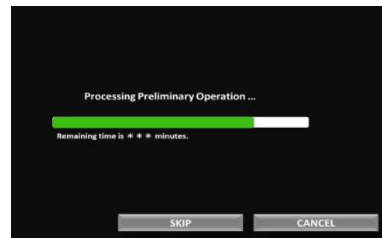
4 - Setting STEP3

P.47



Follow the instructions to prepare the system. After finishing the preparation, please press START.

5 - Preliminary Operation



Displays the remaining time for preliminary operation.

6 - HOME

P.48



Start control in Quick mode. Select the Manual tab for control in Manual mode.

Feedback

1 - Initial Display



2 - Setting STEP1

P.46



Select chamber, vessel type, room temperature and press NEXT.

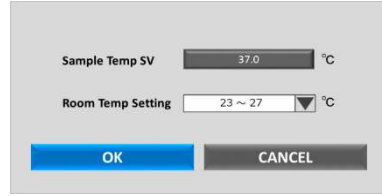
3 - Calibration

P.58



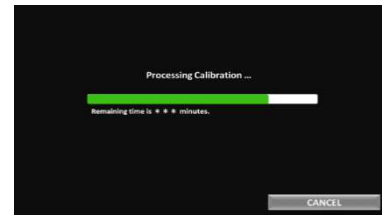
Follow the instructions to prepare the system.

4 - Sample Temperature Setting



Set sample temp. and room temp.

5 - Start calibration



If press CANCEL, the setting of the sample temperature of 37°C is automatically entered.

6 - Home

P.48



Start control in Feedback mode.

6.6 Function



HOME

P.48

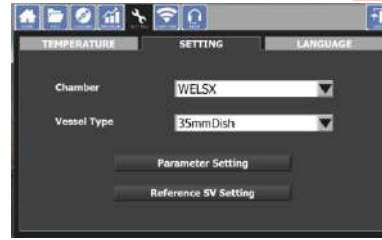


Setting and indication of heaters, gas and incubation mode



SETTING

P.57



Pre-setting of chamber, vessel type and temperature



FILE

P.54



Save of setting and load of data



CAPTURE

P.59



Picture transfer interval and registration



LOGGING

P.54



Heater select and setting of data logging cycle/time



HELP

P.60



Help and inquiry screen



PROGRAM

P.55

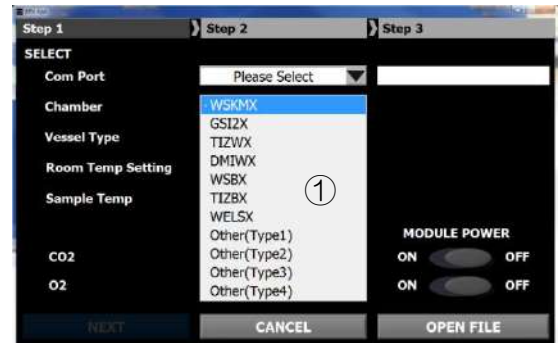
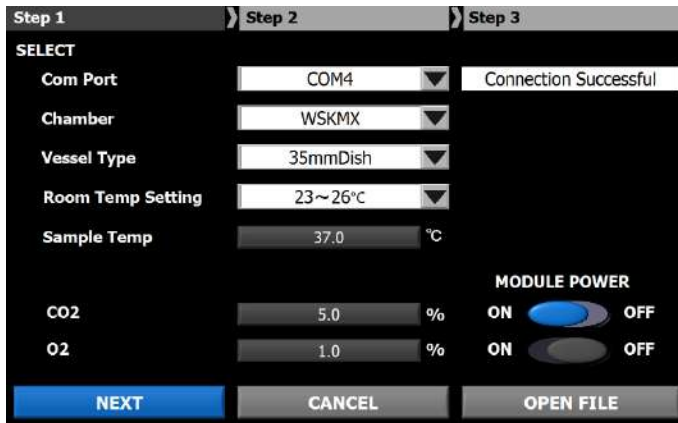


Program control setting of time, temperature and gas concentration

7 STX-APP Setting

7.1 STEP1 : Primary setting

Set Com. Port, Chamber, Vessel Type, Room Temp. Setting, Sample Temp. and Gas Concentration.



Note: Use the PC keyboard for entering numbers.

Com. Port

Select the computer port connected to the controller, which can be confirmed at the Device Manager.

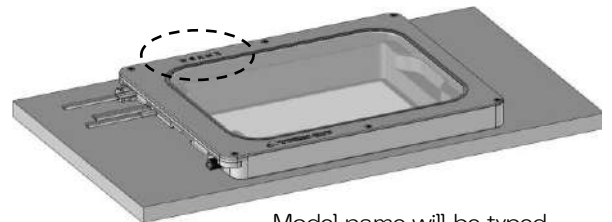
Chamber

Select the chamber model connected to the controller (refer to ①), which is described at the top surface of chamber.

What are 「Other Type1 - Type4」

When the chamber is not listed on the model selection (UK, PLAM, KRi series etc.), please select a Type 1 - 4 depending on the Type shown in the chamber.

- Other Type1: with feedback, with Bath Heater
- Other Type2: with feedback, without Bath Heater
- Other Type3: without feedback, with Bath Heater
- Other Type4: without feedback, without Bath Heater



Model name will be typed on the Top Frame or/and rear panel of the controller.

Vessel Type

Select the vessel type.

Room Temp. Setting

Select the room temperature range in use environment.

Sample Temp.

Default setting is to maintain sample temperature at 37°C. In order to maintain sample other than 37.0°C, carry out calibration of Top Heater following the instructions.

CO₂ / O₂

Clicking the number, Setting Value can be changed.

CO₂/O₂ MODULE POWER

ON/OFF of O₂ and CO₂ function.

NEXT

If there is no any error in STEP1, moves to STEP 2.

CANCEL

Turn off the application.

OPEN FILE

Loading of previous setting file

7.2 STEP2 : Preliminary operation setting

Set preliminary operation period.



Preliminary Operation Time

Set the time from 30 minutes to 24 hours.

NEXT

Move to STEP3.

BACK

Back to STEP1.

SKIP

Skip STEP2 and STEP3 and move to HOME screen.

7.3 STEP3 : Preparation for preliminary operation

Carry out the preparation following the instructions.



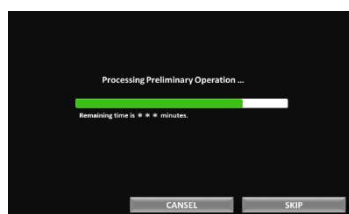
START

Start preliminary operation according to the setting STEP2. For gas supply, see P.35.

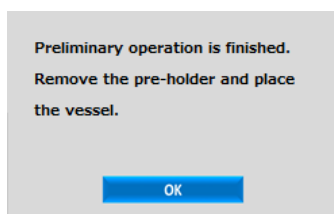
BACK

Back to STEP2.

In preliminary operation



Finish



8 STX-APP Home

8.1 Page information

Enable to change each setting, select incubation mode and move to other function pages.



- ① Status
Display current status of operation.
- ② System info.
Display current system information.
- ③ Incubation mode
Enable to change incubation mode
- ④ Gas setting
Enable to set gas concentration, flow rate and function ON/OFF.

8.2 Status



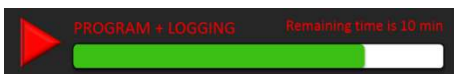
IN OPERATION
The system is ready for incubation.



LOGGING
The system is in data logging.



PROGRAM RUN
The system is in program running.



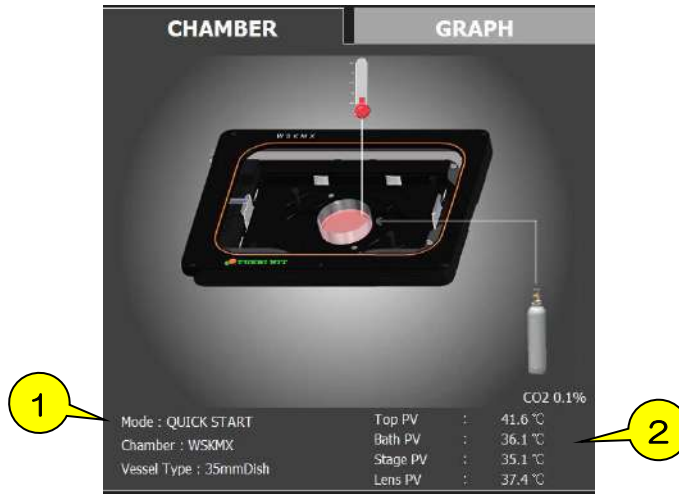
PROGRAM + LOGGING
The system is in program running and data logging.



SENSOR ERROR
Showed in the errored heater.

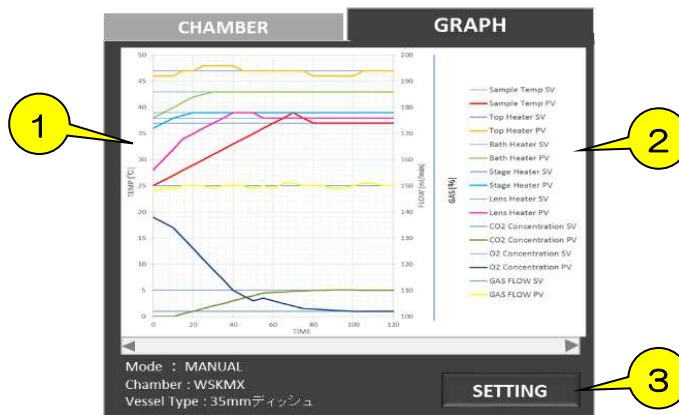
8.3 System information

CHAMBER



- ① Display incubation mode, chamber model and vessel type.
- ② Display all heaters PV.

GRAPH



- ① Waveform
Display PV and SV of all heaters, sample temperature and gas concentration.
- ② Graph label
- ③ SETTING
Graph scale and color can be changed.



GRAPH SETTING - SCALE

- ① SCALE
Graph scale and color can be changed.
- ② X-AXIS SCALE (TIME)
Elapsed-time or clock display can be selected.
- ③ X-AXIS setting
Unit of time can be selected.
- ④ Y-AXIS SCALE (TEMP)
Set maximum value and minimum value of temperature. If AUTO is selected, it performs automatic scaling.
- ⑤ Y-AXIS SCALE (GAS)
Set maximum value and minimum value of gas concentration. If AUTO is selected, it performs automatic scaling.

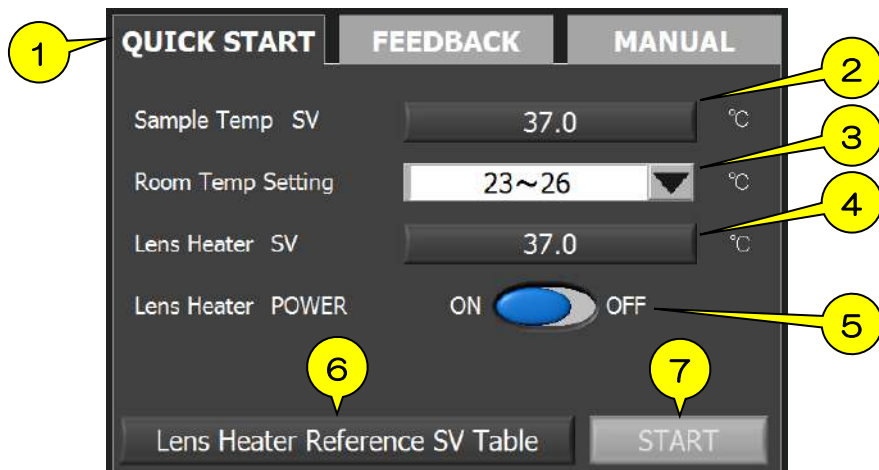


GRAPH SETTING - GRAPH

- ① SV LINE
Color designation for Setting Value.
- ② SV DISPLAY
ON/OFF for SV graph
- ③ PV LINE
Color designation for Process Value.
- ④ PV DISPLAY
ON/OFF for PV graph
- ⑤ BACKGROUND
Color designation for background
- ⑥ X-AXIS SCALE MARK LINE
Color designation for x-axis mark
- ⑦ Y-AXIS SCALE MARK LINE
Color designation for y-axis mark

8.4 Incubation mode

QUICK START



① QUICK START

The system heats the sample by suitable setting according to chamber model, vessel type and room temperature range and maintains the sample temperature at 36.5°C-37.0°C under stable room temperature.

② Sample Temp SV

In order to maintain sample other than 37°C, click this button and carry out calibration.

③ Room Temp Setting

Select room temperature from the pull-down.

④ Lens Heater SV

Reference setting value of Lens Heater can be checked.

⑤ Lens Heater POWER

Lens Heater can be turned on and off. When using the long operation distance objective lens with working distance of 3.0 mm or more, turn off.

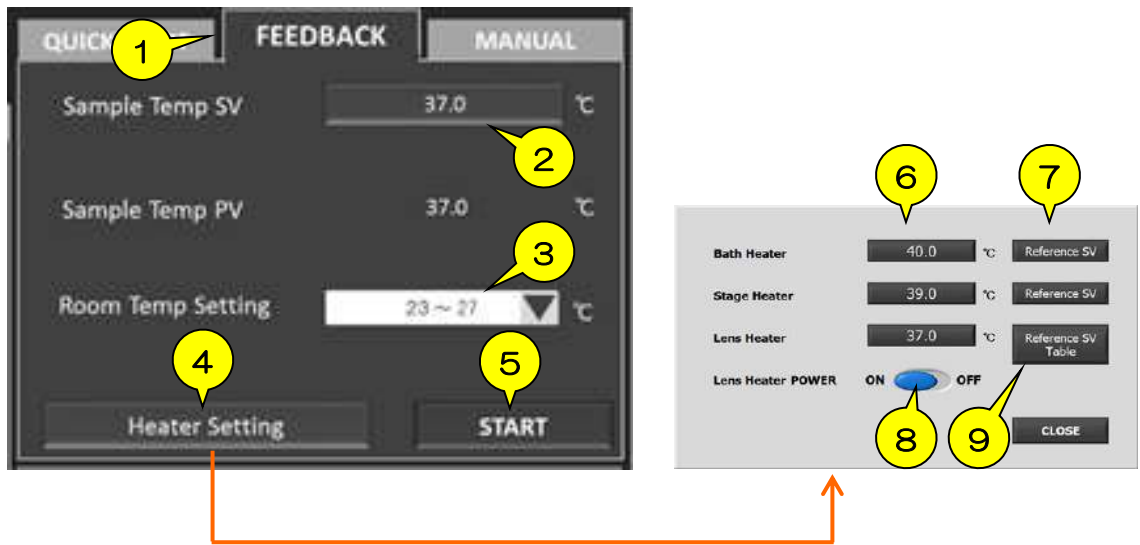
⑥ Lens Heater Reference SV Table

Display reference setting value of Lens Heater depending on vessel type and working distance of objective lens.

⑦ START

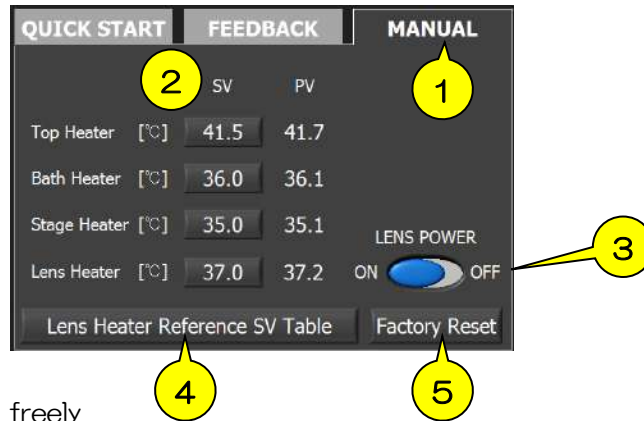
Click this button to change the incubation mode.

FEEDBACK



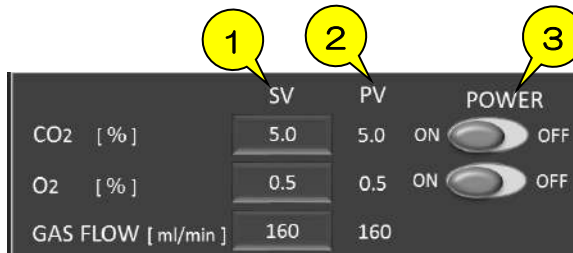
- ① FEEDBACK
The system regulates Top Heater based on the actual sample temperature measured by Feedback Sensor. It minimizes temperature fluctuating caused by environmental disturbances.
- ② Sample Temp SV
Set your target sample temperature.
- ③ Room Temp Setting
Select room temperature from the pull-down.
- ④ Heater Setting
Setting Value for heaters can be set.
- ⑤ START
Click this button to change the incubation mode to Feedback mode.
- ⑥ Setting Value for Bath Heater, Stage Heater and Lens Heater can be changed.
- ⑦ Reference SV
Setting Value will be returned to the default setting (reference setting value).
- ⑧ Lens Heater POWER
Lens Heater can be turned on and off. When using the long operation distance objective lens with working distance of 3.0 mm or more, turn off.
- ⑨ Lens Heater Reference SV Table
Display reference setting value of Lens Heater depending on vessel type and working distance of objective lens.

MANUAL



- ① MANUAL
All heaters can be set freely.
- ② Heater SV
Setting Value of all heaters can be changed.
- ③ Lens Heater POWER
Lens Heater can be turned on and off. When using the long operation distance objective lens with working distance of 3.0 mm or more, turn off.
- ④ Lens Heater Reference SV Table
Display reference setting value of Lens Heater depending on vessel type and working distance of objective lens.
- ⑤ Factory Reset
Setting Value will be returned to the default setting (reference setting value).

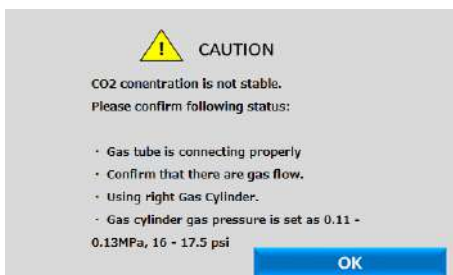
8.5 Gas setting



- ① SV
Setting Value of CO2 concentration, O2 concentration and gas flow rate
- ② PV
Process Value of CO2 concentration, O2 concentration and gas flow rate
- ③ POWER
ON/OFF of CO2 function and O2 function

Important :

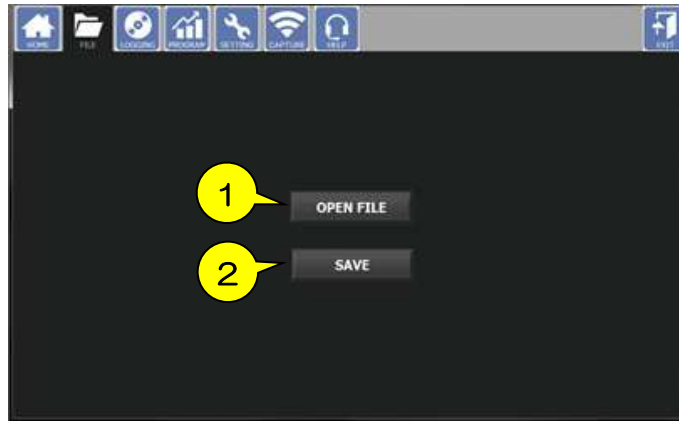
The below window will be shown when Process Value of gas concentration is not within $\pm 2\%$. Confirm the status and follow the instructions in the trouble-shooting.



If the trouble cannot be solved, please contact Tokai Hit.

9 STX-APP Function

9.1 FILE



① OPEN FILE

Loading of saved setting file

② SAVE

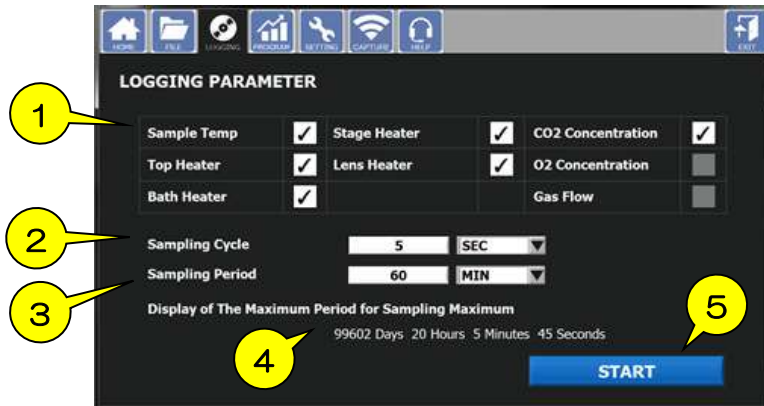
Saving of setting file

*The desktop is the default save destination

Data to be saved :

Heaters Setting Value, CO₂/O₂ Setting value, Program Control setting, Logging setting, Correction value of Feedback Sensor, Calibration setting, Chamber model, Vessel type, Room temperature setting

9.2 LOGGING



① LOGGING PARAMETER

Set the check boxes which are to be recorded. If heater/gas function is OFF, it will be unselectable.

② Sample Cycle

Input sampling cycle and unit. The minimum setting is 5 sec.

③ Sample Period

Input sampling period and unit. The minimum setting is 1 hour.

④ Display of the Maximum Period for Sampling Maximum

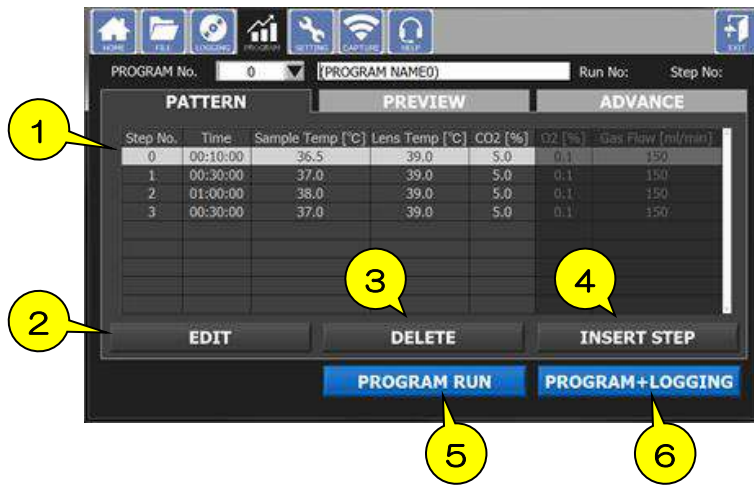
Display the maximum sampling period based on inputted cycle.

⑤ START

Click to start logging.

9.3 PROGRAM

PATTERN



① PATTERN

Program setting table for time, sample temp. CO2/O2 concentration and gas flow

② EDIT

Select the step from the pattern table and click this button to edit the program.

③ DELETE

Select the step from the pattern table and click this button to delete the program.

④ INSERT STEP

Inserts the additional step below the step.

⑤ PROGRAM RUN

Returns HOME and starts program control.



If STOP is clicked, the system stops program control and returns to setting screen.

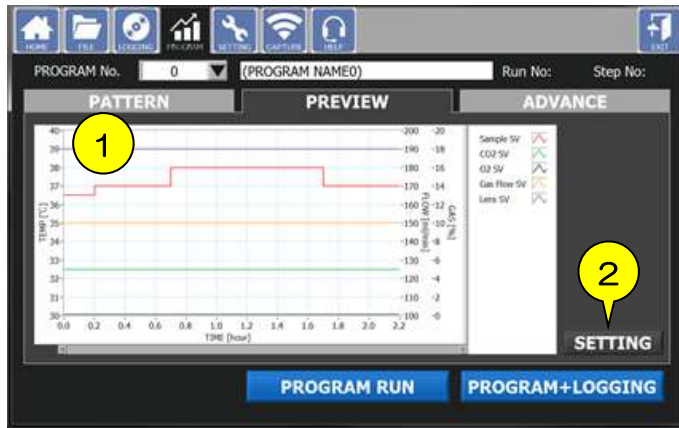
⑥ PROGRAM + LOGGING

Returns HOME and starts program control and logging.

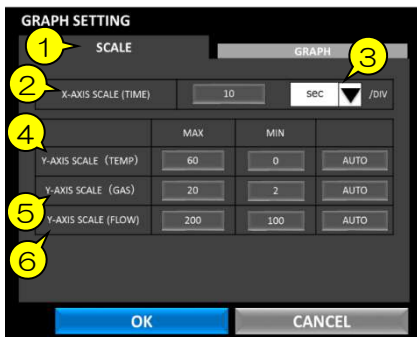


If STOP is clicked, the system saves recorded data and returns HOME.

PREVIEW

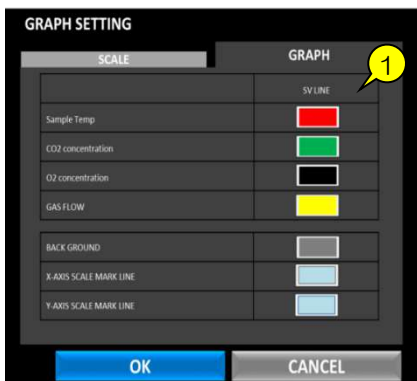


- ① Preview graph
Display preview image of program control setting.
- ② SETTING
Graph scale and color can be changed.



GRAPH SETTING - SCALE

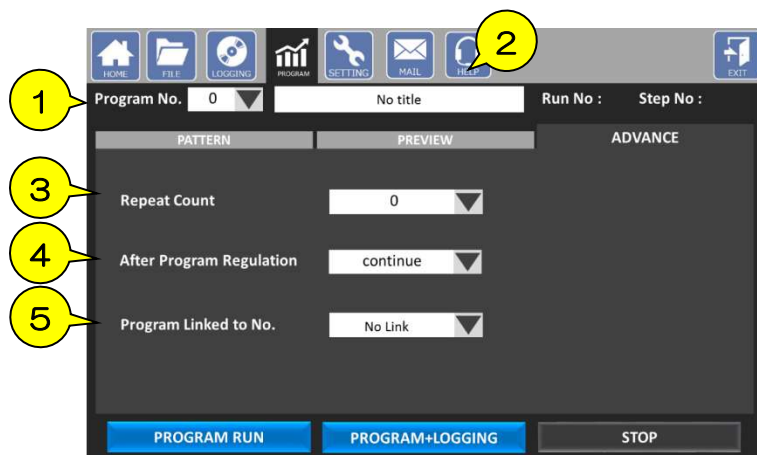
- ① SCALE
Graph scale and color can be changed.
- ② X-AXIS SCALE (TIME)
Elapsed-time or clock display can be selected.
- ③ X-AXIS setting
Unit of time can be selected.
- ④ Y-AXIS SCALE (TEMP)
Set maximum value and minimum value of temperature. If AUTO is selected, it performs automatic scaling.
- ⑤ Y-AXIS SCALE (GAS)
Set maximum value and minimum value of gas concentration. If AUTO is selected, it performs automatic scaling.
- ⑥ Y-AXIS SCALE (FLOW)
Set maximum value and minimum value of gas flow. If AUTO is selected, it performs automatic scaling.



GRAPH SETTING - GRAPH

- ① SV LINE
Color designation for Setting Value.

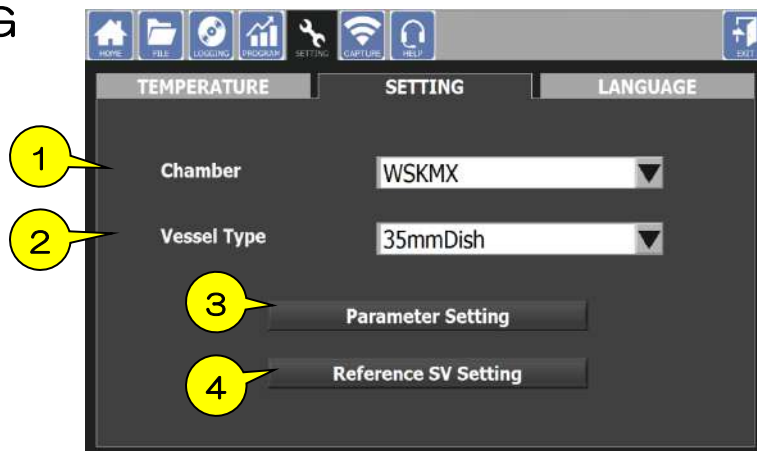
ADVANCE



- ① Program No.
Program number can be specified. The default number is 0.
- ② Program Name
Input program name.
- ③ Repeat Count
Number of times of repeating can be selected from the pull-down.
- ④ After Program Regulation
Set the action after the program control finishes.
Select from Continue, Reset and Link.
- ⑤ Program Linked to No.
When selecting “Link” at ④, the linked program will start.
e.g. Program No.1 → Program No.3 → Program No.1

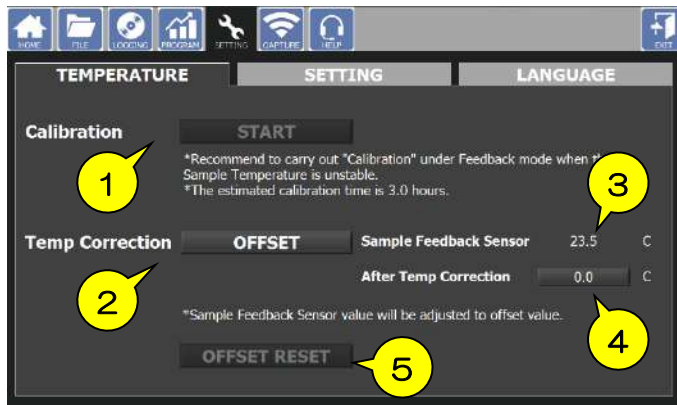
9.4 SETTING

SETTING



- ① Chamber
Chamber model can be selected. It is indicated at the top surface of chamber.
If the chamber needs to be changed to other chamber during experiment, use this setting.
- ② Vessel Type
Vessel type can be selected. If the vessel needs to be changed to other vessel during experiment, use this setting.
- ③ Parameter Setting
Correction values and control parameter values are inputted. Do not change the default values for any purpose other than changing the chamber.
- ④ Reference SV Setting
Reference setting values are inputted.

TEMPERATURE



① Calibration

Carry out calibration following the instructions.

During the calibration, it will automatically achieve suitable parameters for Top Heater according to the actual use environment. It is recommended to run calibration at time of its initial activation or moving the system to different use environment.

Prepare vessel with media/water in the same amount as that required in actual experiment. Use Fixing Lid and set Feedback Sensor so that its tip is dipped properly into media/water in the vessel.

② Temp Correction

Offsets the value measured by Feedback Sensor.

③ Sample Feedback Sensor

Shows the current value measured by Feedback Sensor.

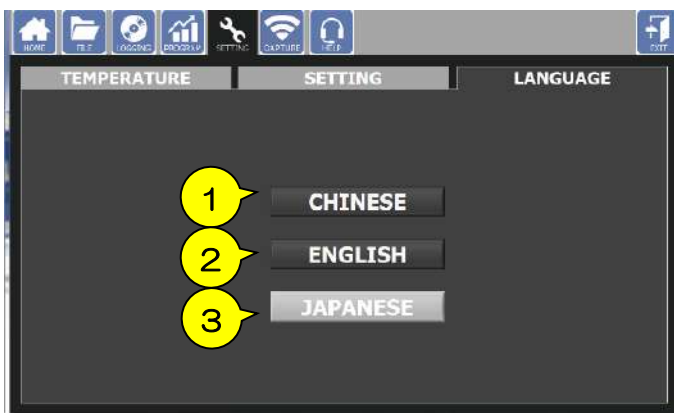
④ After Temp Correction

Shows the value after offsetting.

⑤ FACTORY RESET

The offset value returned to the default setting.

LANGUAGE



① CHINESE

Changes language to Chinese.

② ENGLISH

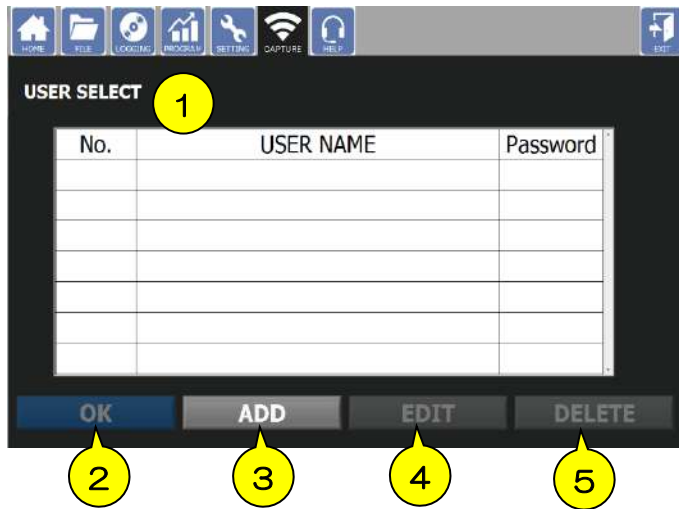
Changes language to English.

② JAPANESE

Changes language to Japanese.

9.5 CAPTURE

SETTING

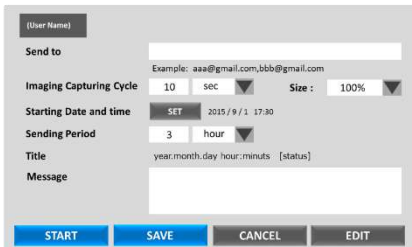


① USER SELECT

Shows the registered users list. If password is set in registration, ✓ mark appears.

② OK

Select user and click this button to move to message window.



Message window

Send to : Mailing account to which capture images will be sent

Size : Capture image size can be changed.

Imaging Capturing Cycle : Cycle of image acquisition

Sending Date and time : Starting time of image sending

Sending Period : Period of image sending

Message : Mail body

START : Starts image sending.

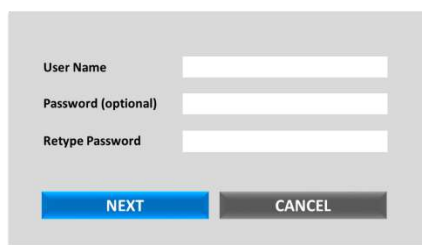
SAVE : Saves set contents and returns to USER SELECT.

CANCEL : Returns to USER SELECT.

EDIT : Moves to mailing account setting screen.

③ ADD

New user registration window appears. In order to send image, set the mailer. Input the SMTP server to be used.

A screenshot of a 'New user registration window'. It features three input fields: 'User Name', 'Password (optional)', and 'Retype Password'. Below the fields are two buttons: a blue 'NEXT' button and a grey 'CANCEL' button.

New user registration window

User Name : Input display name.

Password : Entering password is optional.

NEXT : Moves to mailing account setting.

CANCEL : Returns to CAPTURE.

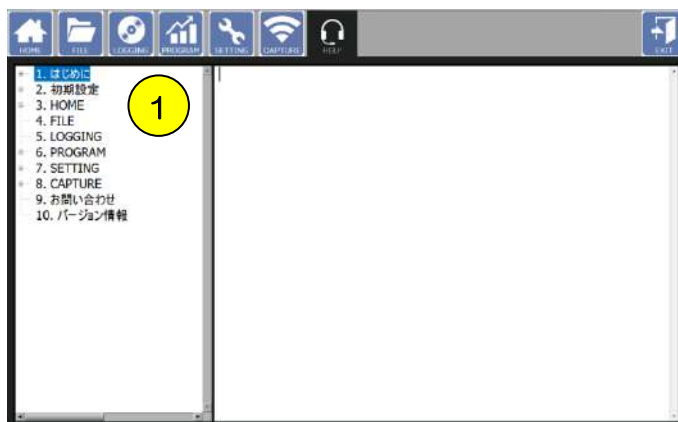
④ EDIT

Registered account can be edited. If a password has been set, input the password.

⑤ DELETE

Deletes registered account.

9.6 HELP

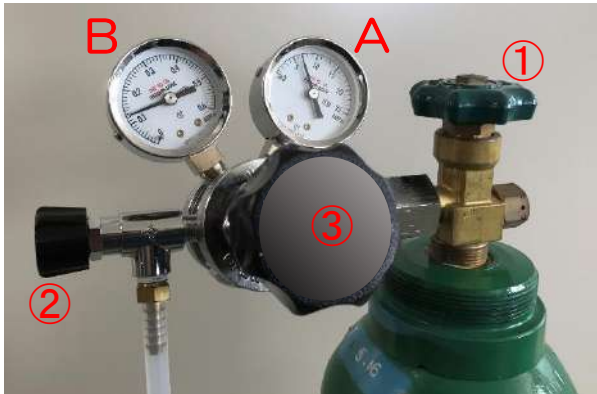


- ① Displays each function description. Select the subject and confirm the contents on the right side. Details will be displayed in the language set in the language setting (P.58) when clicking the contents.

10 Note and Trouble-shooting

Check List for Gas Supply

Please confirm the following when Process Value of gas concentration is not stable at Setting Value or gas flow rate does not increase.



A : Primary pressure meter
Remaining amount of gas

B : Secondary pressure meter
Delivery gas pressure

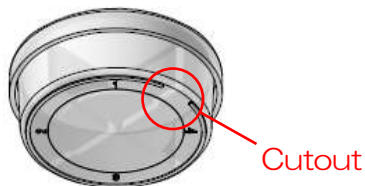
- 1 Confirm the secondary pressure indicated in meter B to be in a range from 0.1MPa to 0.15MPa.
- 2 Confirm the remaining gas amount.
- 3 Confirm both cylinder valve ① and regulator valve ② are opened.
- 4 Connect gas tubes without buckling it.
- 5 Confirm gas is supplied to the controller from the regulator.
Ensure that gas is delivered to the controller-side of tube.
- 6 < STXG > Confirm there is no abnormal noises resulting from gas leakage.

If the trouble cannot be solved, please contact Tokai Hit.

Vessel to be used

35 mm petri dish

The petri dishes of Iwaki, Nunc or Greiner have a cutout at the bottom and there is a possibility that the incubation environment cannot be kept stable or dew condensation is generated on the lens heater due to leakage. In a case of that, please use the exclusive spacer sold separately.



Spacer for Iwaki
35DI-BS



Spacer for Nunc or Greiner
35DGN-BS

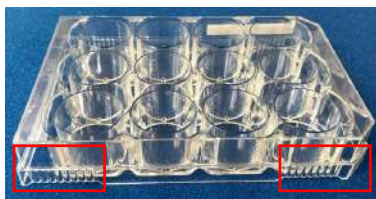
Chamber slide / Chambered coverglass

General slides with 75 x 25 mm can be used on the standard attachment.

The lid of Lab-Tek II has a structure of handle. To use this type of vessel, please set Fixing Lid on the vessel without lid or cut off the handle in advance.

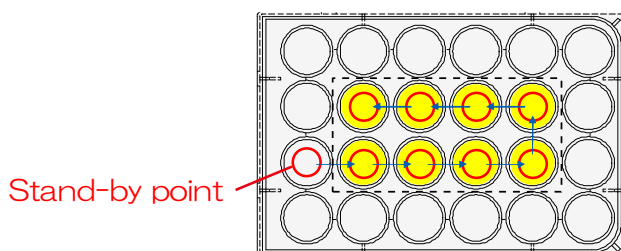
Wellplate for WSKMX, IX3WX, TIZWX or DMIWX chamber

Multi wellplates with 127 x 85 mm can be used in the chamber. Please avoid the wellplate which has cutouts at the side or bottom.



Note for multi points time-lapse :

When using the objective lens with short working distance, sample heat escapes to the lens. In order to minimize temperature gap between wells, please set the stand-by position to a well without sample.



Trouble-shooting

Status	Guidance
“XXX Heater SENSOR ERROR” on the status information	Confirm if the chamber unit cable are properly connected. If the display has not change then there may be a potential for sensor disconnection. Please contact dealer or Tokai Hit.
PV does not keep stable at SV after preliminary operation.	Confirm the plug coming from chamber is connected to controller properly. The PV reaches to the SV within 30 minutes after power on. Please avoid direct impact from air conditioner to stabilize the heaters.
PV becomes higher than SV and stay it high.	First, please run the system without feedback control. If the trouble cannot be solved, there is a possibility of the heating cable disconnection. Please contact dealer or Tokai Hit.
Media evaporates fast.	Evaporation rate depends on use environment, but approximate rate is 0.5-1.0ml per an hour. If water does not remain in water bath, please refill water through water inlet tube. Possibly the Top Heater is not placed correctly.
Water in water bath evaporates too fast.	Possibly the Top Heater is not placed correctly. Ensure the Top Heater is set on chamber properly.
Dew condensation is generated at the bottom glass of Top Heater.	Decrease the Bath Heater SV by 1.0-2.0 or increase the Top Heater SV by 1.0-2.0 as needed.
Dew condensation is generated at the objective lens.	There may be cut-out at the bottom of dish, which causes leakage of humidity. Please use the dish without cut-out or use the exclusive spacer sold separately.
<p>< Feedback mode ></p> <ul style="list-style-type: none"> - The sample temperature does not reach to the target value. - PV is not stable. - Top Heater PV reaches to 65.0 and does not stable for 30 minutes or more. 	<p>Confirm if the Feedback Sensor is connected to the controller via Extension Wire.</p> <p>Confirm if the sensor tip is dipped properly into media in the vessel.</p>

Tokai Hit Customer Support

Please contact our support team with following information.

1. Description of inquiry or problem
 - Inquiry of regarding usage,
 - Details of malfunction or defect
 - Request of additional accessories and optional products

2. Serial Number
 - Six digit number at chamber cable and controller

Email : solution@tokaihit.com

Web : www.tokaihit.com