

Thermo Plate[®]

Microscope-Stage Automatic Thermo control System



TPI series Instruction Manual

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1 For safe and comfortable use

For Research use only. This device is to be used by researchers doing cultivation observations in a laboratory. It cannot be used at home. Be sure to read this instruction manual carefully before using, and please use the device correctly. Also, please keep this instruction manual.

For your safety

If the device is used in manner other than specified in instruction manual, safety cannot be assured and may result in damage to device which will not be covered under warranty. Please follow the instructions.

About symbols:

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

We will not be responsible in the unlikely event of death, serious injury or property damage by using deviating from the original purpose and not following the displayed symbols.

Symbol meanings	
	Injury or damage to equipment is possible
	Must not be done
	Must be done
	Electric shock is possible

When shipping

- Please treat this precision instrument with care. Impacting it is forbidden.
- Do not put any heavy things on the box.
- Please store and transport under specified storage conditions.
- Do not turn the box upside down.
- Do not let the unit moisture.

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
Dusty place
Outside the designated use environment and storage environment

Points to pay attention when installing to a microscope

- Use only the specified electricity and cables. If other cables are used, it might result in electric shocks. Using a non-specified voltage might result in equipment damage.
- Please install this device by the method recommended by Tokai Hit.
- Do not place this device near a heat source or a combustible material around this device. Abnormal temperature control or fire may be caused.
- Please do not give a strong shock to the glass part. Glass may break.
- In case of glass breakage, do not touch the glass. It might result in injury and electric shock. Be aware of the glass fragments may scatter.
- Please do not touch the glass as much as possible. It may cause a malfunction or abnormal heating.
- Do not place heavy objects on this device or add strong force. It may cause a malfunction.
- The heating range of the plate is only the heater part. Please keep in mind that other part part will not be warmed.
- When rotating the revolver, turn the aiming handle and retract the objective lens. The objective lens may contact with this device, possibly damaging the lens or device. It may cause abnormal heating.
- When transmitting lights such as laser to the glass heater, please adjust the amount of light.

2. Components and names

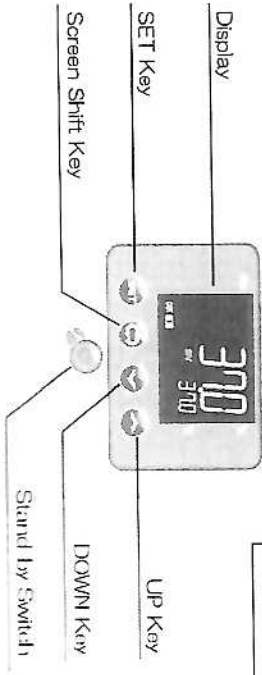
Components	Qty	Image	Description
Controller	1		Controller that regulates the Heating Plate
Heating Plate * Orange line: Strengthen glass No line: standard glass	1		Designed to install on microscope stage to maintain specimen temp.
External Temp. Sensor (Length : 300mm)	1		Temp. sensor to be used for checking the temperature of the heating plate (p.14) or Shift Calibration (p.20)
Extension Wire for Sensor (Length : 1500mm)	1		For extending the length of the External Temp. Sensor
AC Adapter (Length : 1800mm)	1		Supplies power to the control * Must use in original pairs
Power Cable (Length : 1800mm)	1		
TEM (Temp. logging software) Installation CD	1		Installs Tokai Hit original data logging software. The data will be saved as CSV format
USB Cable (Length : 2000mm)	1		Cable connected between the controller and the PC when using the above software
Mounting Hook	1		Use it for standing the controller

Depending on the heating plate type, fixing screws, hexagonal wrenches, etc. may be included in the package.

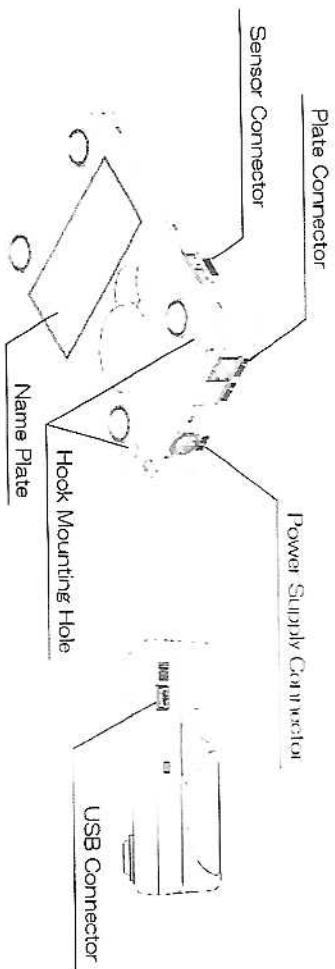
- ⊘ ⚠ Do not handle the device with wet hands. It might cause damage to electric equipment.
 - ⊘ ⚠ Do not touch the electrical contacts such as the connector for the plate cable.
 - ⓘ Please observe the below in order to avoid focus drift during microscope observations.

Keep the room temperature at 25°C ± 2°C.
Do not let air flow directly over the device.
 - ⊘ ⚠ In an emergency pull out the plug from the outlet. Do not place any things near the outlet.
 - ⓘ Please be careful not to catch the power cord, various cables, etc. on the human body such as limbs.
 - ⊘ ⚠ To avoid the risk of electric shock, connect this device to a commercial power supply equipped with a protective installation.
 - ⊘ ⚠ Do not modify the equipment or disassemble each part. It may cause a malfunction.
- Blackout**
- ⓘ Please use the uninterruptible power supply if you want to operate the equipment without interruption even during blackout.
- Connected PC**
- ⓘ Please be sure to use a PC that conforms to the EMC standard of information and communication equipment.
- Maintenance**
- ⓘ ⚠ Turn off power supply while performing maintenance.
 - ⊘ Do not use volatile materials such as benzene or thinner for cleaning. Use of such materials will discolor and/or damage key device surfaces. Clean device with soft cloth using small amount of diluted neutral detergent and wipe gently with a dry cloth in the end. Do not use organic solvents. Also, please do not scrape strongly during cleaning.
 - ⊘ Avoid cleaning with hard or sharp objects.
 - ⊘ Do not wash the device with water.
 - ⓘ Please keep at our specified storage condition. It may cause a malfunction.

Controller



Dimension of Controller
(Excluding protrusions) :
W85XD135XH30 mm



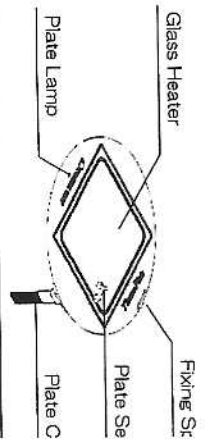
Name Plate (Sample)
For details, please refer to the actual name plate attached on the product.



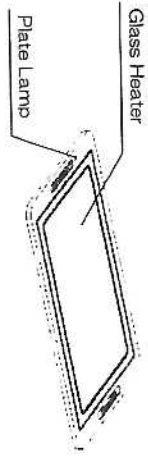
Glass Heater

* Plate Lamp is attached to some major models.

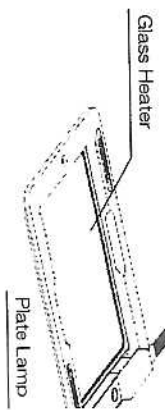
- Inverted** TPI-11ORX Plate Dimension : ϕ 110mm
 - Inverted** TPI-108RX Plate Dimension : ϕ 108mm
 - TPI-115RX Plate Dimension : ϕ 115mm
 - TPI-UR12X* Plate Dimension : ϕ 110mm
- * Exclusively designed for Integra 3
(not compatible to use with Integra T1)



- Inverted** TPI-SQFTX / SQFTLX Plate Dimension : 160X110mm



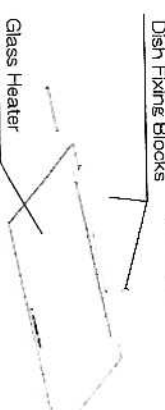
- Inverted** TPI-SGX Plate Dimension : 160X110



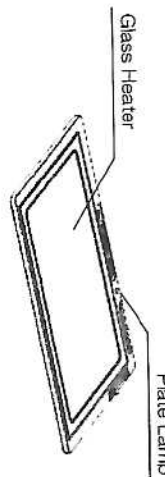
- Inverted** TPI-SQMX Plate Dimension : 165X105mm



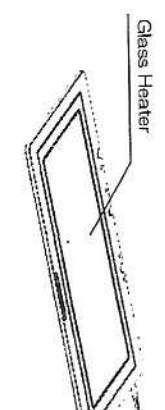
- Inverted** TPI-CKX53X Plate Dimension : 190X110



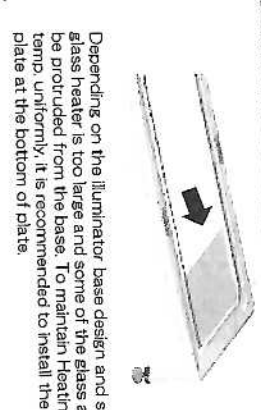
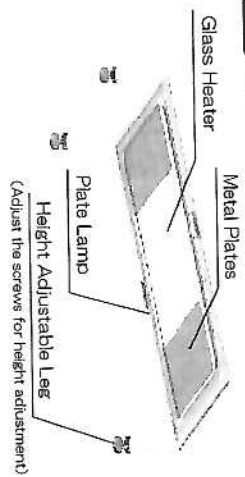
- Inverted** TPI-TCSX Plate Dimension : 127.5X85.5mm



- Inverted** TPI-TS2X Plate Dimension : 238X110



- Stereo** TPI-UNIX Plate Dimension : 435X220mm. Leg Adjustable Range : 75~100mm



Depending on the illuminator base design and size, the glass heater is too large and some of the glass heater protrudes from the base. To maintain heating temperature uniformly, it is recommended to install the plate at the bottom of plate.

Glass Heater

* Plate Lamp is attached to some major models.

Stereo TPI-SZX2X

Plate Dimension : 222X226mm

Spot Facing for Mounting Screw

(Please use the attached screws)



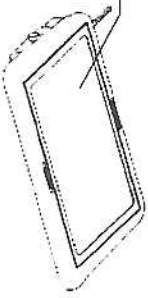
Glass Heater

* Incl : Fixing Screws (M4X6) X4, Hexagonal Wrench

Stereo TPI-SZ2

Plate Dimension : 278X175mm

Glass Heater

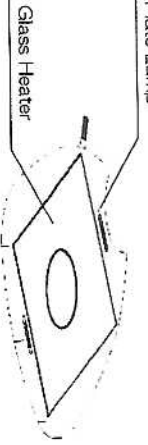


* Incl : Fixing Screws (M4X20) X2, (M4X15) X4, Hexagonal Wrench, Slider

Stereo TPI-SMZSLX

Plate Dimension : 254X263mm

Plate Lamp



Glass Heater

Stereo TPI-STKX

Plate Dimension : 155X204mm

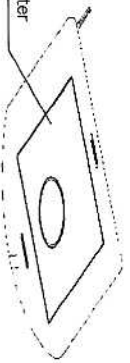
Glass Heater



Stereo TPI-TB300X

Plate Dimension : 280X266mm

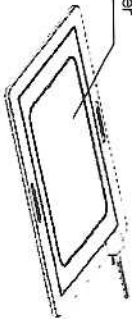
Glass Heater



Unright TPI-TLBaseX

Plate Dimension : 219.5X169.5mm

Glass Heater



Stereo TPI-SMZ25X

Plate Dimension : 251X238mm

Spot Facing for Mounting Screw

(Please use the attached screws)

Glass Heater

* Incl : Fixing Screws (M4X6) X2, Hexagonal Wrench

Stereo TPI-STMX

Plate Dimension : 272X227mm

Glass Heater



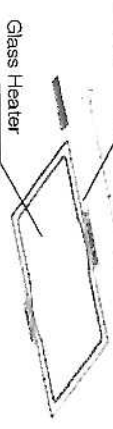
Stereo TPI-SX

Plate Dimension : 142X115mm

Plate Lamp

Mounting Plate

(Please use by peeling off double-sided tape)



Glass Heater

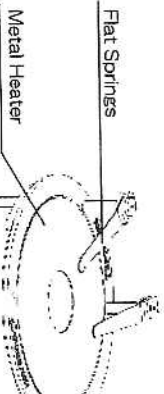
Metal Heater (with a hole)

Inverted

TPI-110RH26 Plate Dimension : ϕ 110mm

TPI-108RH26 Plate Dimension : ϕ 108mm

Flat Springs



Metal Heater

Plate Cable

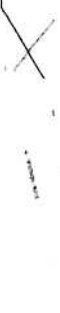
Inverted

TPI-SQH26FT

Plate Dimension : 160X110mm

Flat Springs

Metal Heater



Inverted TPI-SQH26

Plate Dimension : 160X

Flat Springs

Metal Heater

Inverted

TPI-TCSH26

Plate Dimension : 127.5X85.5mm

Flat Springs

Metal Heater

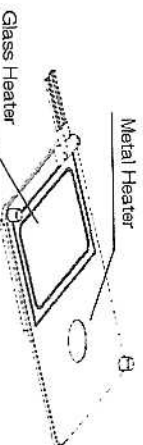


2 In 1 Heater

Inverted

TPID-12X Plate Dimension : 160X110mm

Metal Heater



Glass Heater

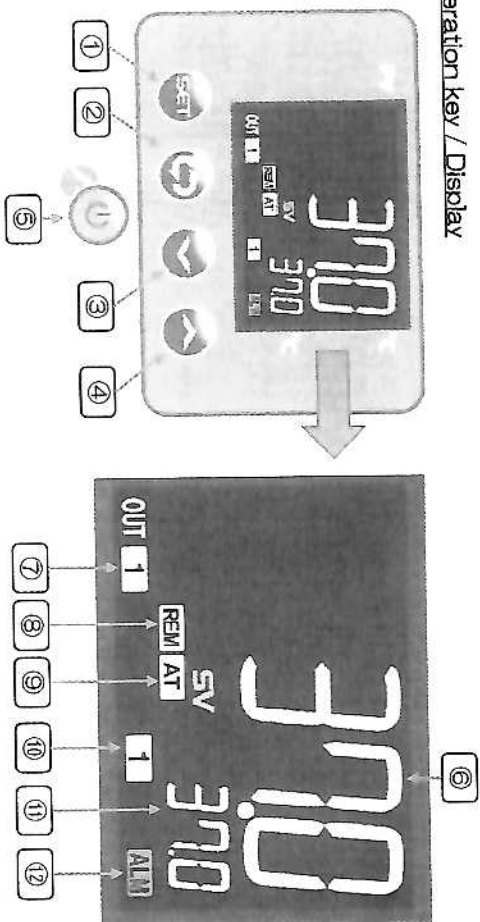
* 2 channel controller is included

Some models are not listed in this manual.
For details, please contact Tokai Hit.

* Flat Springs are included to the Metal Heater as standard
* The hole diameter at the center of Metal Heater is 26mm as a standard though the hole diameter between 26 mm can be specified.
EX) TPI-110RH00, TPI-SQH00FT
⇒ Hole diameter is 10mm
Model : TPI-110RH10, TPI-SG

3 Display and parameter

Operation key / Display



1	SET Key	1) SET enter button 2) Starts PID Calibration by pressing and holding the button For details, refer to 6. PID Calibration (p.19).
2	Screen Shift Key	1) Shift the screen 2) Starts Shift Calibration by pressing and holding the button For details, refer to 7. Shift Calibration (p.20).
3	DOWN Key	Decreases the Setting Value (SV). By holding the key, the value will be dropping continually.
4	UP Key	Increases the Setting Value (SV). By holding the key, the value will be increasing continually.
5	Stand-by Switch	ON/OFF switch of the controller. Temp. control starts from the moment pressed the Stand-by Switch, Please follow the procedures in this manual and use it correctly.
6	Plate Temp. (Process Value)	The process value is displayed on the temp. display screen. On setting mode, character strings of contents are displayed.
7	OUT Lamp	Lights up when the controller is outputting to the plate.
8	REM Lamp	Lights up when using the optional TEM-i (Temp. Management Software) and running automatic operation at the set temp. program pattern.
9	AT Lamp	Lights up during PID calibration or Shift calibration. For details, refer to 6. PID Calibration (p.19) and 7. Shift Calibration (p.20).
10	CH Lamp	Displays current CH (Channel) e.g. Lights up [1] : Heating Plate channel No light: External Temp. Sensor channel
11	Plate Temp. (Setting Value)	The setting value is displayed on the temp. display screen. On setting mode, setting value for each contents are displayed.
12	ALM Lamp	Lights up when an error occurs. Refer to 11. Troubleshooting (p.25).

Plate Lamp condition

* Plate Lamp is attached to some major models.

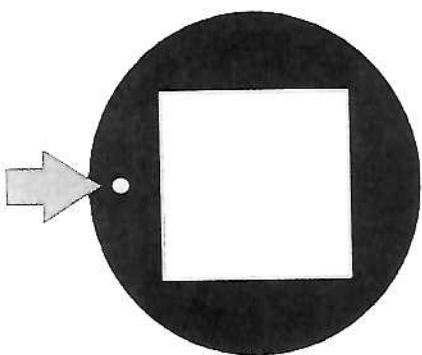


Plate Lamp

Lights up	Plate temp. process value (PV) = Plate temp. setting value (SV) condition lasts longer than 5 seconds. Turns off when the plate temp. process value (PV) is outside the $\pm 0.3^{\circ}\text{C}$ range of the plate temp. setting value (SV) for seconds or longer.
Blinks per 1.0 sec	Shift calibration or PID Calibration is running.
Blinks per 0.2 sec	An error occurred.
Lights off	Temperature is rising or proceeding with the operation.

4. Preparation for use

Installation

- Place the heating plate on the microscope stage.
* For inverted microscopes, pay attention not to entangle the plate cable with objective lens.

- Connect the heating plate to the plate connector of the controller.



Since it is a low type connect please insert! deeply.

* When removing, please pull the cable while pressing the convex part shown in the left figure

- Connect the AC adapter to the power connector of the controller and connect the power cord.



Since it is a low type connect please insert! deeply.

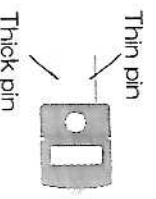
- When using TEM (Temperature logging software), connect the USB cable which is included in the package to the controller.

- Wipe off the heating plate if needed.

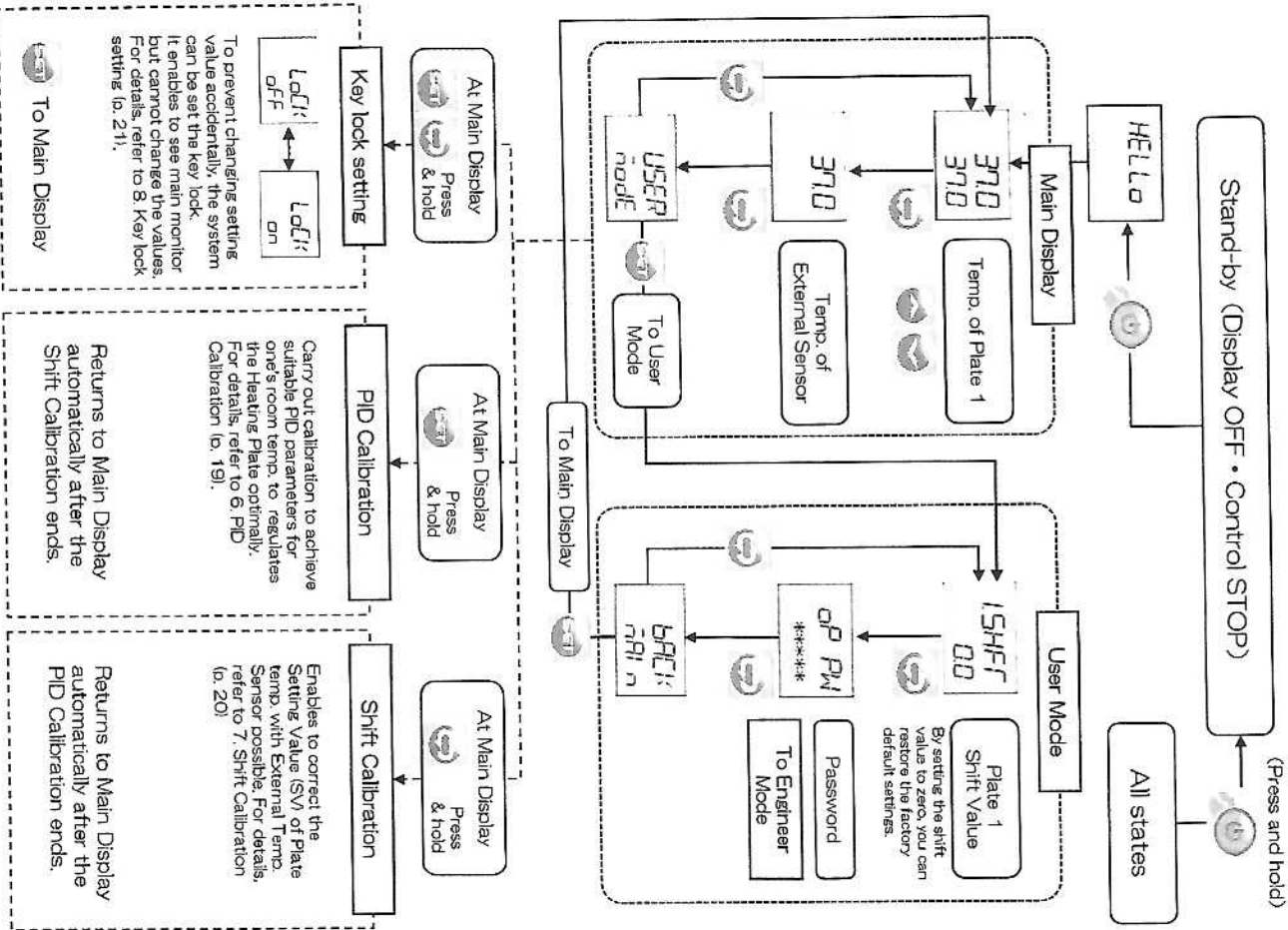
- Connect the External Temp. Sensor to the Extension Wire and connect Extension Wire to the sensor connector of the controller.



* Please note that the connector of the Sensor and Extension Wire are composed of thick and thin pins to secure the insert direction.



Parameter



To prevent changing setting value accidentally, the system can be set the key lock. It enables to see main monitor but cannot change the values. For details, refer to 8. Key lock setting (p. 211).

Carry out calibration to achieve suitable PID parameters for one's room temp. to regulate the Heating Plate optimally. For details, refer to 6. PID Calibration (p. 19).

Enables to correct the Setting Value (SV) of Plate temp. with External Temp. Sensor possible. For details, refer to 7. Shift Calibration (p. 20)

For measuring temperature

Attach the External Temp. Sensor to the glass part on the Heating Plate. Please carry out the following procedure.

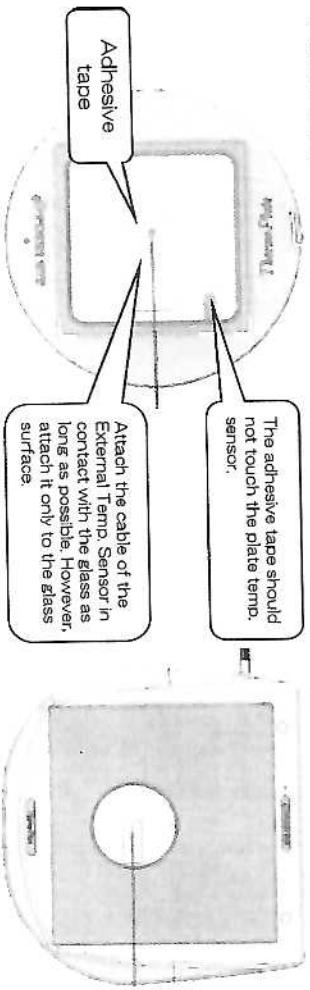


Image of sensor tip shape

In order to improve the temp. acquisition properly by pasting on the glass. The shape of sensor tip is recommended as shown in the left.

i Please attach the flat surface sensor tip to center of glass plate with adhesive tape for accurate temp. measurement. Remove the remaining air between the tape and the glass to make sure the tip is in closed contact with the glass.



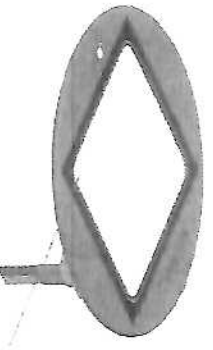
The flat surface of the External Temp. Sensor tip is not in close contact with the glass.

NG



The flat surface of the External Temp. Sensor tip is in close contact with the glass.

NG



External Temp. Sensor is not attached on the center of plate properly.

NG



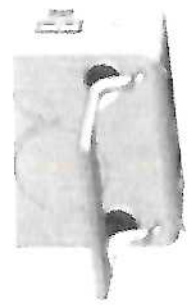
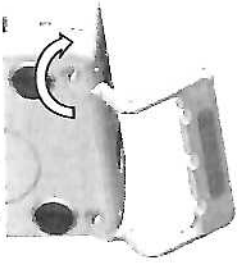
External Temp. Sensor is attached over the plate sensor.

NG

How to use the Mounting Hook

The controller can be used putting on the flat surface or used in the following way with the attached Mounting Hook.

◎ To put on the flat surface



Attach the Mounting Hook as shown above.

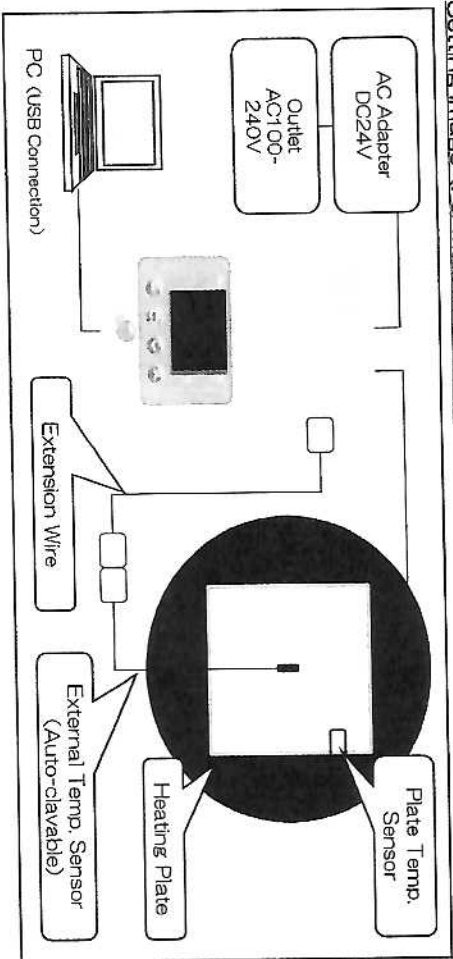


Please use it on a flat surface.

⊘ Do not apply excessive load on the Mounting Hook, it may damage the system. (e.g. prohibited to pull the wall-hanged controller, push the controller from above while controller is placed on the table.)

5. How to use

Setting Image (For measuring temp.)



For accurate temp. control

- ❗ Before using, be sure to confirm that the serial number stated in the product name plate on the back of the controller: OOOOOO 6 digits matches the cable on the Heating Plate (near the connector).
- ⊘ Please do not combine the controller and Heating Plate with different serial number. There is a possibility that temp. may not be controlled correctly.
- ⊘ Please do not let air flow directly over the Heating Plate surface. An error may occur in the Heating Plate surface temp..
- ⚠ Please use a thermometer which conform to international or national weighing standards and check that the temp. indicated by the attached External Temp. Sensor is correct. Please ensure this confirmation at least once a year. Be sure to use this thermometer which has a small and thin tip shape. A large thermometer may cause abnormal heat heating or malfunction of the Heating Plate.
- ❗ Be sure to check that the temp. at the central part of the Heating plate is near the setting value with the attached External Temp. Sensor before placing the dish on the Heating Plate. If there is a phenomenon such as temperature difference between the Heating Plate temp and the External Temp. Sensor, refer to 6. Procedure for PID Calibration (p.19) or 7. Shift Calibration (p.20) and carry out the temp. correction.
- ❗ Be careful not to spill the specimen or the medium in the dish when placing the dish on the Heating Plate.

5. How to use

- ① Please turn on the Stand-by Switch to begin the preliminary operation. The preliminary operation is necessary at least for about 30 minutes to 1 hour.

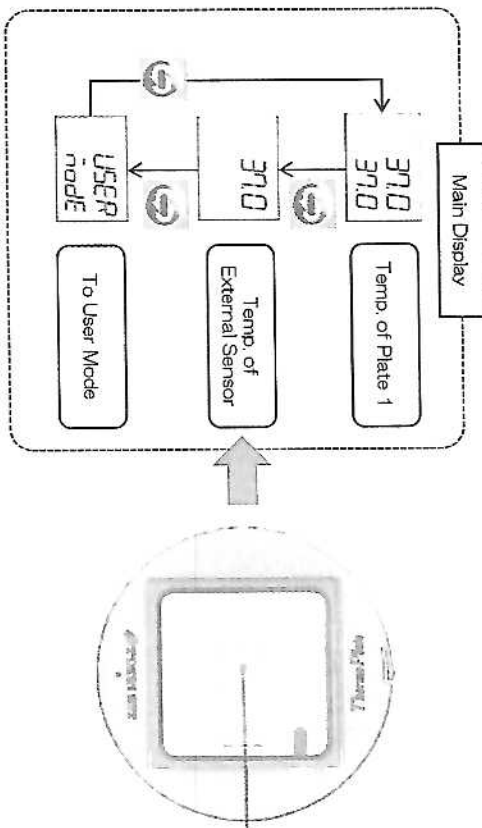
- ⊘ Heating starts when press the Stand-by Switch. Do not touch the heating part beyond necessity while heating. It may cause burns.

- ② Use the UP or DOWN Key to input the setting temp. of Heating Plate. Refer to 3. Display and parameter (p.10) for the operation.

The Heating Plate temp. will be reaching stable temperature in about minutes after inputting the temp. setting value.
 * Temp. stabilization time varies depending on the plate model.

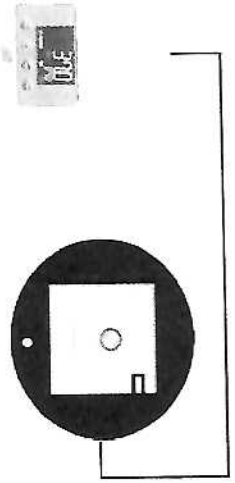
- ③ Before placing the dish on the Heating Plate, please run temp. check (p.1) as necessary. Measure the Heating Plate temp. with the attached External Temp. Sensor and confirm if it matches the setting temp..

- ⚠ As a result of checking the temp., if the Heating Plate temp. does not stabilize in your usage environment, please correct the temp.. For temp. correction, refer to 6. PID Calibration (p.19) or 7. Shift Calibration (p.20)



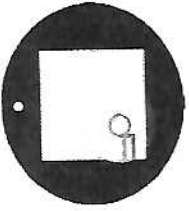
6. PID Calibration

- ④ Set a dish on the Heating Plate and start observation.

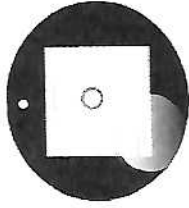


Examples of dish INCORRECT installation

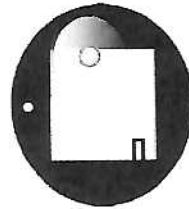
NG



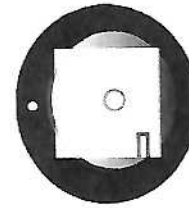
NG



NG



NG



Dish is on the Sensor

There is an object on the Sensor

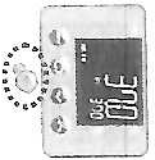
Dish protrudes beyond the heating surface

It may cause sensor false detection, which may affect temperature control.

The sample may not be heated properly.

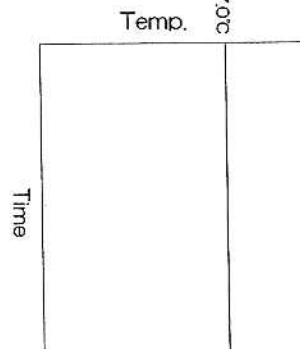
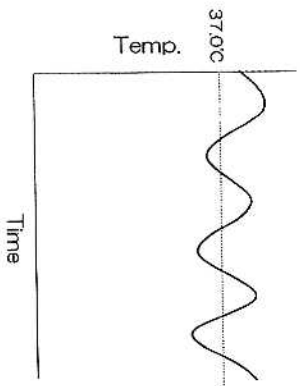
- * When installing a dish on the Heating Plate, please be careful not to spill the specimen and the medium.

- ⑤ When finishing, turn off the controller by pressing and hold the Stand-by Switch. Disconnect the plug of Power Cord from power socket after controller is to be turned off completely.

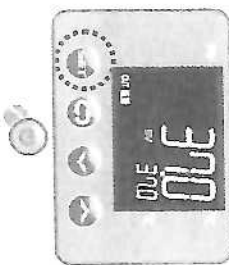
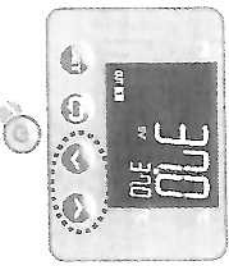


- ⑥ If the glass part of the Heating Plate gets dirty, please clean it.

This system adopts PID control for stable temp. control and the controller is calibrated under the environment of room temperature $25 \pm 2^\circ\text{C}$ before shipping. If the temp. of the Heating Plate is not stable in your usage environment, the controller can provide the optimum parameters based on your environment by carry out PID calibration so that the Heating Plate temp. becomes stable.



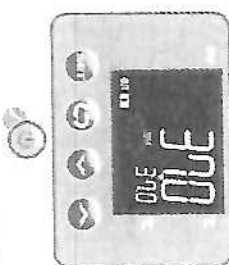
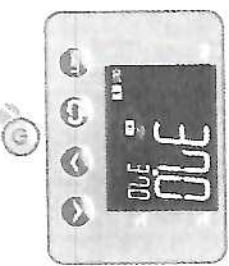
- ① Display the heating plate temperature from the main screen and set the temp. by using the UP/DOWN key, and press and hold the SET key.



Set the temp.

Press and hold the SET key

- ② PID calibration starts when the AT Lamp blinks and it ends when the AT Lamp lights off.

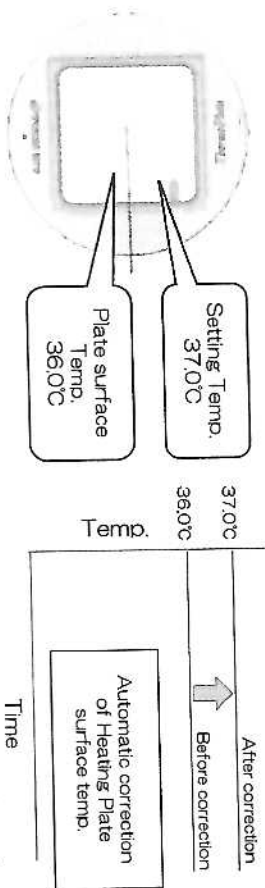


AT Lamp blinks

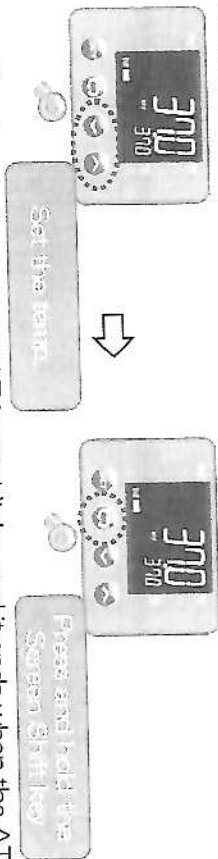
AT Lamp lights OFF

7. Shift Calibration

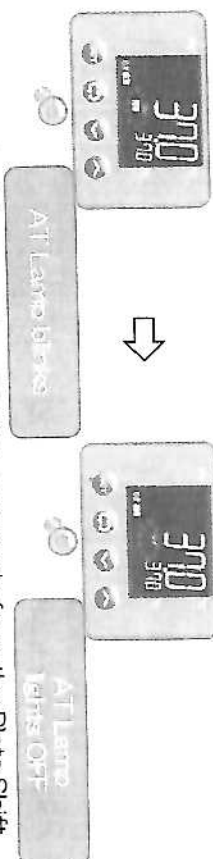
The Shift Calibration is for correcting the equality in the temp. between the surface temp. on the heating plate and measured temp. of external temp. sensor.
 * Since the External Temp. Sensor is not included in the Economy Type, this operation can not be carried out.



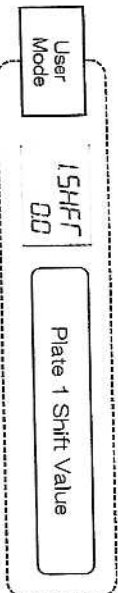
① Display the heating plate temperature from the main screen and set the temp. used with the UP/DOWN key, and press and then, hold the Screen Shift key.



② Shift calibration starts when the AT Lamp blinks, and it ends when the AT Lamp lights off.



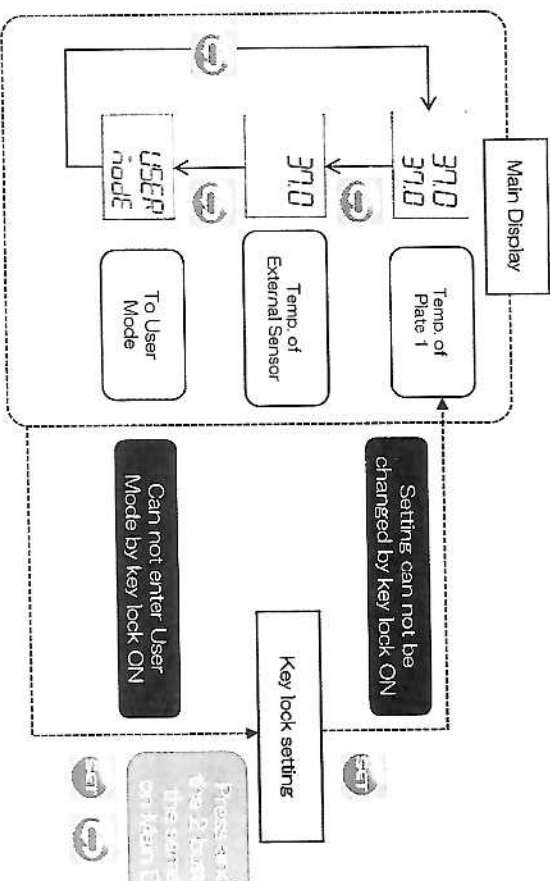
You can visually check how much correction was made from the Plate Shift Value in the User Mode. You can also manually do the Shift Calibration by directly inputting the correction value to this Shift Value.



⊘ Please check the stability of the Heating Plate temp. before carry out Shift Calibration. The operating environment is stable within the range of $25 \pm 2^\circ\text{C}$, and the air blowing should not be hit the surface of the Heating Plate. It may cause the sensor temp. false detection and the Shift Calibration program may not be finished.
 Shift calibration takes at least 30 minutes or more.

8 Key lock setting

To prevent changing the setting value accidentally, the system can be set the key lock. It enables to see main monitor but unable to change the values.



① Press and hold the SET Key and Screen Shift Key together on the Main Display.



② Following key lock display will be shown on the display. Use UP / Down Key to Lock ON or OFF settings.



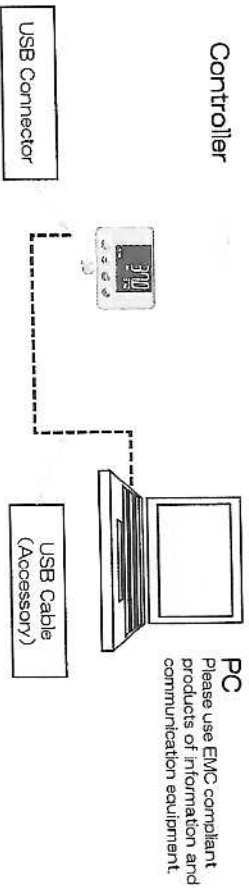
③ When the setting is completed, press SET key to return to the Main Display.

9. TEM - Installation

TEM (Temperature Logging Software) connects the controller and the PC by USB and graphically displays the measured values. In addition, since the measured data can be saved as CSV data, it can be used for quality control.

- ① Operating environment
 - 1) OS : Windows 7 (32bit/64bit) Windows 8.1 (32bit/64bit)
: Windows 10 (32bit/64bit)
 - 2) Firmware : .NET Framework 4.0 or higher
 - 3) USB : 2.0 / 1.1
 - 4) Display : 1024X768 or more recommended
 - 5) Required Input / output device : USB, Keyboard, Pointing Device. (Recommended)
 - 6) Required memory: 100 MB or more (Recommended)
 - 7) Required disk space: 100 MB or more (Recommended)

Device connection image



Controller

PC

Please use EMC compliant products of information and communication equipment.

② Installation

- TEM(EN) → setup
- TEM(JP) → setup
- TEM(SC) → setup
- Double-click the "setup" file in the folder of the language you want to install (English ⇒ EN, Japanese ⇒ JP, Chinese (Simplified Chinese) ⇒ SC) and install according to the procedure.
* For PCs that do not have ".NET Framework" installed, installation will start automatically.

③ Driver Installation

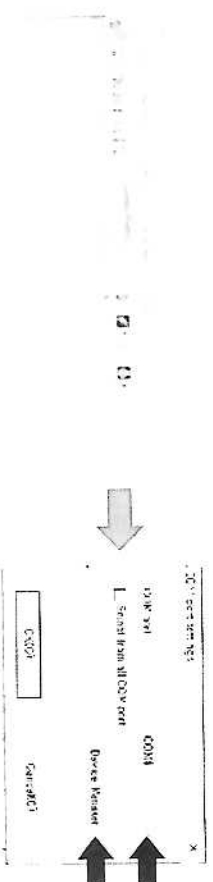
- ③ TOKAI HIT Thermplate TEM
- The icon on the left appears in the device manager, and double-click it and push the "Update Driver" button from the property. Select the "Driver" folder on the installation CD and follow the instructions to install the driver.



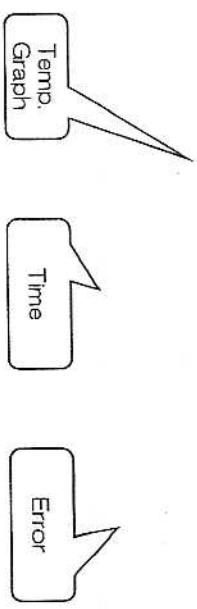
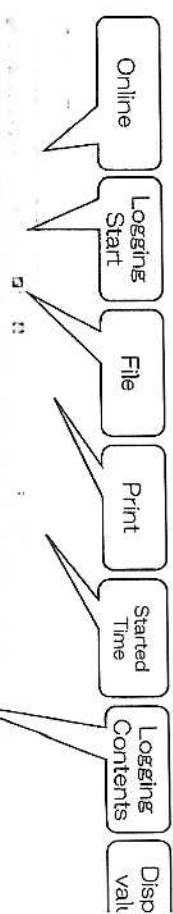
Driver

10. TEM - How to operate

- ① Start the TEM (Temp. Logging Software).
- ② Select "Port setting" from "Setting" on the screen, select the communication port to which the device is connected, and click "OK".
* The communication port can be checked from "Device Manager".



- ③ When connecting successfully, the following image will be displayed.

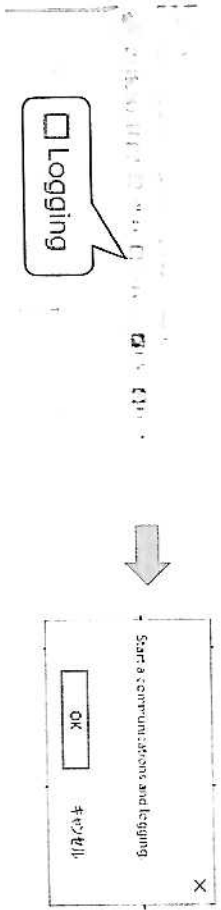


⇨ Lights red when an error occurs

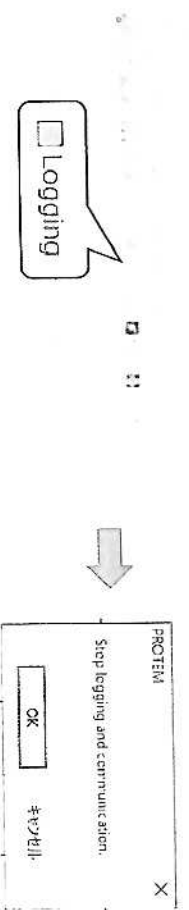
11. Trouble shooting

Logging method

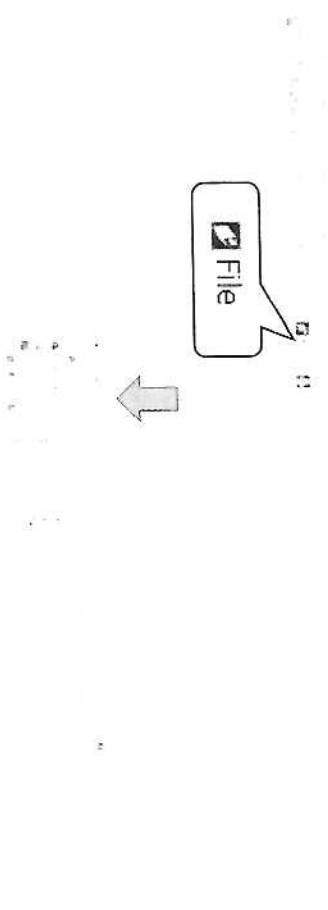
- ③ Select "logging" button on the toolbar, you will get a dialog saying "Start logging". Click "OK" to start logging.



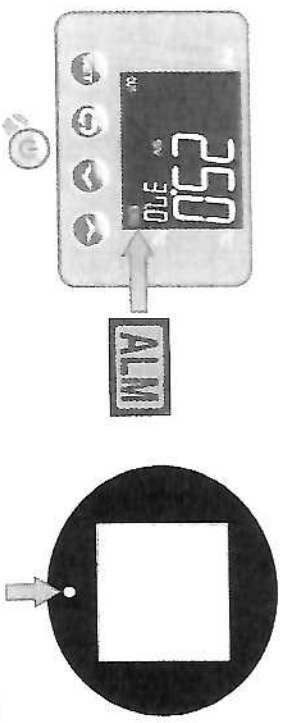
- ⑤ If you want to stop logging, select the "logging" button on the toolbar and bring up the dialog "Stop logging" and then, Click "OK" to stop logging.



- ⑥ To check the logged data, click the "File" button on the toolbar to display a list of saved files.



The following alarm indication may appear on the display or Plate Lamp. If device does not operate normally, please stop using it immediately and check the alarm.



ALM Lamp lights on display

Plate Lamp is blinking (0.2 sec. period)

* Specific plate equip with Plate Lamp (not all of plate has this lamp). When the plate does not have lamp, please check the monitor of controller for alarm check.

Error Contents	Condition	Alarm output	Restoration Method
Abnormal heating detection	The Heating Plate sensor does not detect temp. elevation when controller OUT Lamp is ON.	Temp. control : STOP	Immediately turn off the controller and check if there abnormally on the Heating Plate. If abnormally is found, DO NOT use the plate and contact Tokai Hit. In case of false detector will recover by turning on the power again.
	The Heating Plate sensor detect temp. elevation when controller "OUT Lamp" is OFF.	Temp. control : STOP	
Controller Internal circuit fault	Detect a problem/error during controller automatic internal circuit check	Plate Lamp : Blinking	Turn OFF and ON the main power of controller. If the sys is still under error, please contact Tokai Hit or our distributor.
Abnormal Temp. detection	When the sensor detection temp. of the heating plate falls out of the specified range.		
Controller Internal voltage fault	Digital power supply voltage inside the controller drops below a certain value.	Temp. control : STOP Plate Lamp : OFF	
Controller Internal timer fault	When the controller can not execute necessary processing within a certain period of time.	Temp. control : STOP	
Controller Display fault	Detecting error in controller circuit board and occurs error in device communication.	Plate Lamp : Blinking	

Apart from the above, please refer to the following when not working properly.

Plate temp. process value (PV) is not correct	Follow the procedure of 7. Shift Calibration (p.20) and make correction.
Plate temp. process value (PV) is not stable	Follow the procedure of 6. PID Calibration (p.19) and make correction.

After trying the above method, please contact us or our distributor if not improved.

12. Specification

Basic Specification

Method	PID Control
Increments	0.1°C
Setting method	Digital switch using UP and DOWN key
Maximum temp. setting	60.0°C
Minimum temp. setting	0.0°C
Controllable temp.	Ambient+5°C ~ 60.0°C (TPI-UNIX : ~ 50.0°C)
Temp. accuracy	Within 0.1°C (Under room temp. 25°C, Plate Center, in our terms and conditions)
Sensor	Platinum resistance thermometer (Pt100Ω)
Power source	100-240VAC
Current rating	1.6A
Maximum Power Consumption	50W

Power Code Cable

For use in areas with 100V-120V power	Use only power Supply Cable described below: Detachable cord set, 3-conductor grounding type, AC 125V7A minimum, listed in UL. In case of using with extension cord, use only Power Supply Cord with PE (protective Earth) wire.
For use in areas with 220V-240V power	Use only 3-pole Power Supply 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 Supply Cord with PE (Protective Earth) wire.

Use Conditions

Location	Indoor use only
Temperature	25°C ±2°C
Relative Humidity	5 ~ 70%RH (no condensation)
Altitude	Up to 2000m maximum
Environment Conditions	Installation category II of IEC60664-1, Pollution degree 2

Storage Conditions

Temperature	-10 ~ 50°C
Relative Humidity	5 ~ 70%RH (no condensation)
Altitude	Up to 2000m maximum

Safety

Safety device	Disables over 60.0°C setting Prevent abnormal heat generation
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Warranty

Warranty coverage	1. 10 years warranty for glass breakage from the date of shipment, (only for the models applied strengthen glass) 2. Other repairs except glass breakage are not covered by 10 years warranty. 3. Intentional glass breakage is not covered by warranty.
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