

## ***Lambda 465 Peltier Control Multi-Cell (8) with Peltier Controller Installation Instructions***

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This instruction sheet describes the installation of this accessory which is used with the Lambda 465 Spectrophotometer.

**NOTE:** *Read these instructions before you install this accessory.*

### ***Contacting PerkinElmer***

Supplies, replacement parts, and accessories can be ordered directly from PerkinElmer, using the part numbers.

See our website:

<http://perkinelmer.com>

PerkinElmer's catalog service offers a full selection of high-quality supplies.

To place an order for supplies and many replacement parts, request a free catalog, or ask for information:

If you are located within the U.S., call toll free 1-800-762-4000, 8 a.m. to 8 p.m. EST. Your order will be shipped promptly, usually within 24 hours.

If you are located outside of the U.S., call your local PerkinElmer sales or service office.

### ***Features***

- Easy to install
- 8-Position Multi-Cell holder
- Full software control of temperature and stirring
- Coolant Cooling System
- N<sub>2</sub> gas purging available



**Figure 1 Lambda 465 Peltier control Multi-Cell [P/N: N4104010]**

## *Dimensions and Specifications*

### **Peltier Controller**

<b>Physical Characteristic</b>	<b>Specification</b>
Power	100-240 VAC, 50/60 Hz, 300W, Free Voltage
Temperature Range	-10 to 100°C (Maximum Internal Temperature)
Maximum Ambient Operating Temperature	40°C
Dimension	310 (W) x 410 (D) x 275 (H) mm
Weight	20.0 kg
Coolant Volume	2 L
N <sub>2</sub> gas available	100 psi (6.9 bar)
Liquid Cooling System	
Magnetic Stirrer Control Available	
Emergency Power Off Switch Available	

### **Peltier control Multi-Cell Holder**

<b>Physical Characteristic</b>	<b>Specification</b>
The number of Cell Position	8
Dimensions	104(W) x 410(D) x 125(H) mm
Weight	3.15 kg
Temperature Accuracy	±0.15°C
Temperature Precision	±0.1°C
Temperature Stability	±0.1°C
Deviation between cells	±0.3 (at 37°C)
Ramping Time (from 0 to 100°C)	4 minutes

## Safety Warnings



**WARNING**

*When this label is attached to an instrument it means refer to the manual.*

*Lorsque cette étiquette est attachée à un instrument, il est nécessaire de voir le manuel.*

See the following figure for the location of warning labels on the back of the instrument:



**Warning**  
**FUSE**

**Avertissement**  
**FUSE**

**Warning**  
For continued protection against electrical shock, replace with same type and ratings of fuse

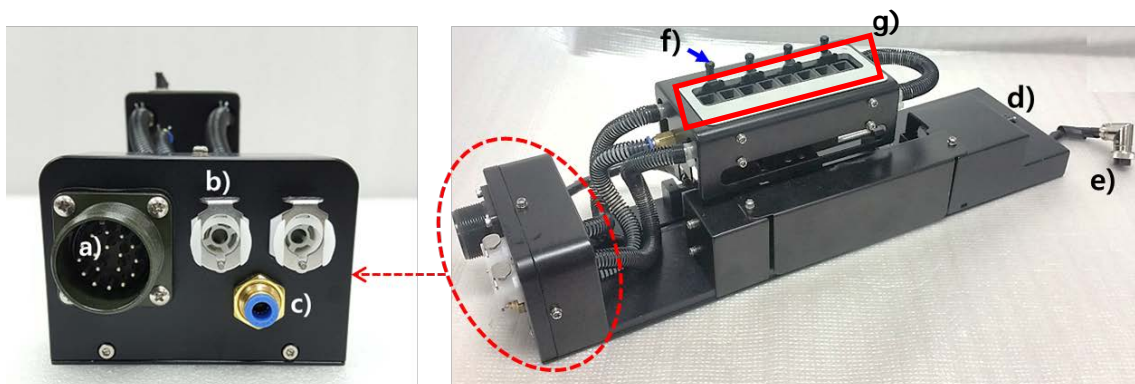
**Avertissement**  
Pour assurer la protection contre le risque de choc électrique, remplacez le fusible seulement avec le même type et la même valeur nominale.

**Warning**  
To prevent electrical shock, do not open cover.  
Refer all servicing to qualified personnel.

**Avertissement**  
Afin d'éviter tout risque d'électrocution ne pas enlever

## Description

### Peltier control Multi-Cell (8)



- a. Interface connector between the Peltier control Multi-Cell (8) and Peltier Controller
- b. Coolant Inlet/Outlet Quick Coupler
- c. N<sub>2</sub> gas fitting
- d. Interface slot for the Temperature Probe
- e. Interface connector between the Peltier Control Multi-Cell and Lambda 465 UV-Visible spectrophotometer
- f. Cell lifting knob
- g. Cell holder (8-position) : User can select the blank position and using sample positions in the UV Lab software. Refer to page 24 for more details of selecting the blank position.
- h. Temperature Probe accessory



**Figure 2 Temperature Probe Accessory**

### Front View of Peltier Controller



**Figure 3 Front view of the Peltier Controller**

- a. **Manual touch pad with Display:** Temperature Control Unit (Heating/Cooling Block)
- b. **LED Indicators:** Indicate the status of the operation of Coolant circulation, Fan, Pump, etc. (If there is a problem in the components, Red LED will flash with beep alarm.).
- c. **Manual ON/OFF button:** As the Manual ON/OFF button is ON, the temperature can be controlled manually by a) Manual touch pad with display.

**NOTE:** *Manual operation is used only for the manufacturing process so it should be turned off during the measurement.*

- d. **N<sub>2</sub> gas ON/OFF button:** It is used for using N<sub>2</sub> gas to remove the frost from the heating and cooling.
- e. **Stirrer ON/OFF button:** It is used for controlling of the stirring.
- f. **Stirrer Speed Controlling Knob:** Control the stirring speed (rpm).
- g. **Emergency switch:** Stop all the operations in an emergency situation.

**NOTE:** *During the operation, Emergency switch should be turned off.*

- h. **Coolant Inlet**

### Rear View of Peltier Controller



Figure 4 Rear view of the Peltier Controller

- a. **RS-232 port**
- b. **AC POWER:** Main Power ON/OFF
- c. **FUSE:** AC Socket + Fuse Holder
- d. **INTERFACE:** Interface cable for connecting with Peltier control Single Cell
- e. **Air Vent Manual switch:** Used for removing the air in the coolant hose.
- f. **Buzzer:** It makes an alarm sound. If there is any problem before the measurement, buzzer beeps 6 times at every 10 sec. If the malfunction occurs during the operation, buzzer beeps twice at every 10 sec.
- g. **Quick Coupler of Coolant Inlet/Outlet**
- h. **Quick Coupler of Coolant Drain**
- i. **N<sub>2</sub> Gas Inlet/Outlet ports**

**NOTE:** *N<sub>2</sub> gas is not always required [Tube for N<sub>2</sub> gas is not supplied with the accessory].*

- j. **Flow Gauge:** Indicator of the flow rate of N<sub>2</sub> gas.

## ***Configuration of the equipment***

- Peltier control Multi-Cell
- Peltier Controller
- Power Cord, 3 ea
- Magnetic Stirrer, 8 ea
- Interface Cable (RS-232 & USB to RS-232), 1 each
- Spare Fuse (AC 250 V T5AL), 2 ea
- Temperature Probe, 1 ea
- Coolant Hose, 1 ea
- Coolant, 2ea
- Waste Basket for Coolant, 1ea
- Waste Hose for Coolant, 1ea

## ***Installation***

**CAUTION**     *Make sure the instrument is turned off while installing this accessory.*

**ATTENTION**     *Assurez-vous que l'instrument est éteint lors de l'installation de cet accessoire.*

1. Place the Lambda 465, Peltier Controller and Peltier Control Multi-Cell in a location that is compatible with the required environmental conditions for the operation.
2. Open the lid of the coolant inlet on top of the Peltier Controller.



**Figure 5 Lid of coolant inlet**

3. Fill up the liquid coolant.

**NOTE:** *Keep the amount of liquid coolant to the level where the indicator is located between the 'L' (low) and 'H' (high) mark in the scale on the left side of the Peltier Controller. When the coolant is running short for the operation, the LED of Low Water Level changes to red with an alarm sounding.*

**CAUTION** *The liquid coolant must be used as refrigerant. **Do not use any water (tap water, DI, etc).** In case that the water is used as refrigerant, Peltier Controller's components might be corroded and its performance may be deteriorated.*

*Use any kind of liquid coolant in normal grade as is available (e.g. liquid coolant including Distilled Water 70 wt%, Propylene Glycol 27 wt%, Additives 3 wt%).*

**ATTENTION** *Le liquide de refroidissement doit être utilisé comme réfrigérant. **N'utilisez jamais d'eau (eau du robinet, eau déminéralisée, etc.)** L'eau risque en effet de corroder les composants du contrôleur Peltier et de réduire les performances de ce dernier.*

*Utilisez un liquide de refroidissement du commerce de qualité normale (par exemple, un liquide de refroidissement à base d'eau distillée à 70 % M/V, de propylène glycol à 27 % M/V et d'additifs à 3 % M/V).*

4. Connect the power cord and communication cable of the Lambda 465.

**NOTE:** *Make sure that the instrument is turned off when the accessory is installed.*

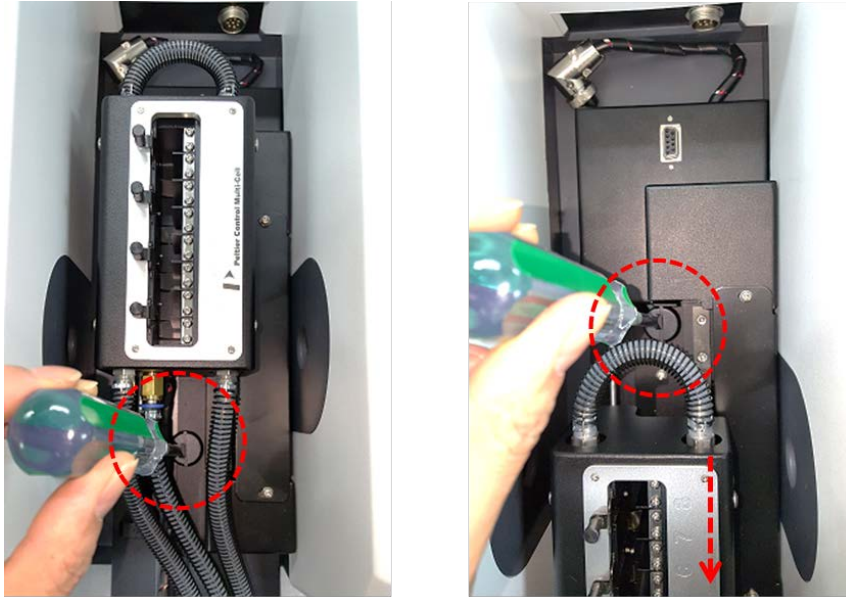
5. Take apart the existing cell holder in the sample compartment.



**Figure 6** Taking apart the existing cell holder



6. Place the Peltier control Multi-Cell in the sample compartment, and move the cell part back and forth and tighten the knob bolts with a slot-head screwdriver.



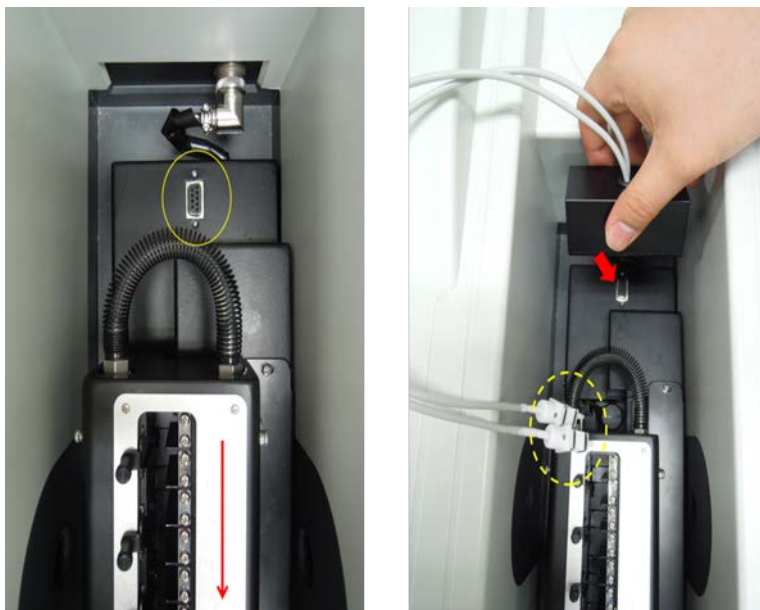
**Figure 7 Placing the Peltier control Multi-cell of the sample compartment**

7. Connect the Peltier 8-pin cable of the Peltier Control Multi-Cell to the port on the main board.



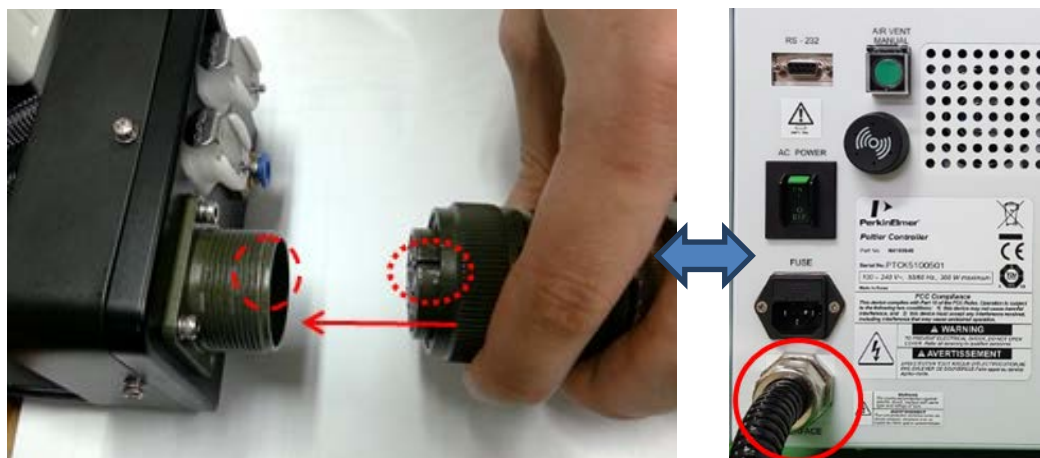
**Figure 8 Connecting the Peltier 8-pin cable of the Peltier control Multi-Cell to the port of the main board**

8. Connect the temperature probe to the interface slot of the Peltier Control Multi-Cell Holder (temperature probes are available for the 2-cell position).



**Figure 9 Connecting Temperature Probe to the interface slot of the Peltier control Multi-Cell**

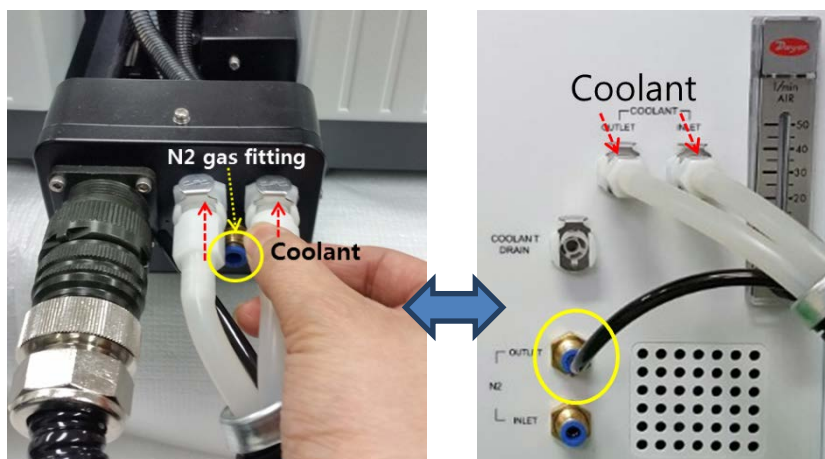
9. Connect the accessory interface cable of the Peltier Controller to the interface connector of the Peltier Control Multi-Cell.



**Figure 10 Connecting accessory interface cable of the Peltier Controller to the interface connector**

10. Connect the coolant inlet/outlet and N<sub>2</sub> gas tube between the Peltier Controller and the Peltier Control Multi-Cell.

**NOTE:** N<sub>2</sub> gas is not always required, so the gas and inlet hose are not supplied.



**Figure 11 Connecting coolant inlet/outlet and N<sub>2</sub> gas tubes**

11. Connect the Peltier Controller with the PC via the RS-232 or USB to RS232 cable. See Installing the USB to RS-232 driver on page 165 when you use the USB to RS-232 cable.



**Figure 12 Connecting the Peltier Controller**

12. Connect the power cord to the Peltier Controller.



**Figure 13 Connecting the power cord**

13. Turn on the power to the Lambda 465 and the Peltier Controller.



Figure 14 Back of instrument connections

**CAUTION** The air vent manual button should be off before turning on the main power of the Peltier Controller and also during the operation since it could make a problem in the communication between Lambda 465 and Peltier Controller.

**ATTENTION** Le bouton d'actionnement manuel de la ventilation doit être désactivé avant que le contrôleur Peltier ne soit mis sous tension et pendant le fonctionnement de ce dernier afin d'éviter qu'une erreur de communication entre le Lambda 465 et le contrôleur Peltier ne se produise.

14. Check that the Power LED is on as a blue light.



Figure 15 Power LED is blue

### Peltier controller auto tuning setup

Peltier controller can be compatible with various peltier cell holders (Single or Multi) so whenever you exchange the existing peltier cell holder to the other one, you should proceed "AUTO TUNING" set up to minimize the temperature fluctuation at the target temperature

1. Push the Manual button on the control panel of the peltier controller then button light is on.



2. Set any SP temperature between 30~37°C using the  $\wedge \vee$  button.



3. Press and hold the SET/ENT button until shown "G.AT".



4. Push the SET/ENT button again.





5. Push the  $\Uparrow$  button (OFF  $\rightarrow$  ON).



6. Press the SET/ENT button, MAN LED will blink.



7. MAN LED will be off after few minutes.



8. Push Manual Button (Stop) and then light is off.



**CAUTION** *If you hear the alarm sound during the operation, push the emergency switch to stop all functions immediately and check the status of Peltier Controller carefully. Then, turn the switch to the right again when everything is solved properly and the functions will be on again.*

**ATTENTION** *Si l'alarme se déclenche en cours de fonctionnement, appuyez sur l'interrupteur d'urgence pour arrêter immédiatement toutes les fonctions et contrôlez soigneusement l'état du contrôleur Peltier. Ensuite, tournez à nouveau l'interrupteur vers la droite une fois la situation rétablie afin de restaurer les fonctions.*



**Figure 16 Emergency switch**

9. Turn off the power after the experiment.

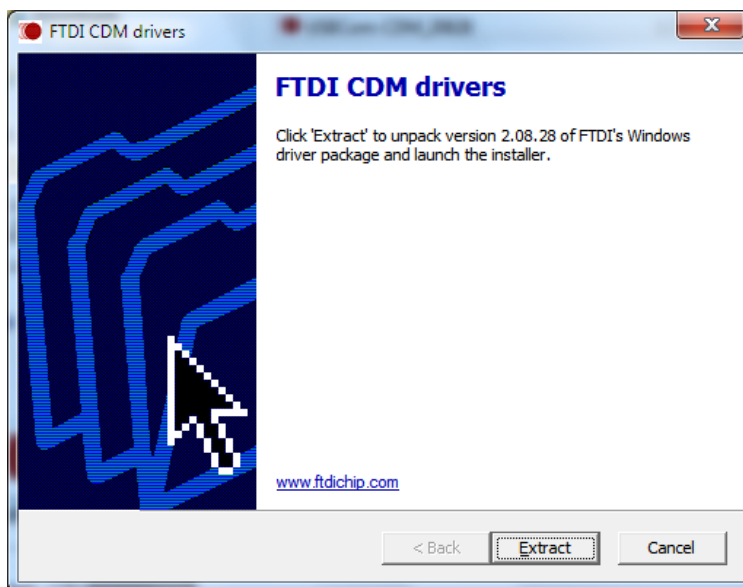
### *How to drain the coolant from Peltier Controller*

- a. Push the **Air Vent Manual** button to switch on the rear panel of Peltier Controller before operation.
- b. Connect the waste hose to the **Quick coupler of Coolant Drain** port on the rear panel and prepare a waste bucket.
- c. Turn on the power of Peltier Controller, and then the coolant will be drained automatically.
- d. As draining is completed, turn off the power of Peltier Controller.

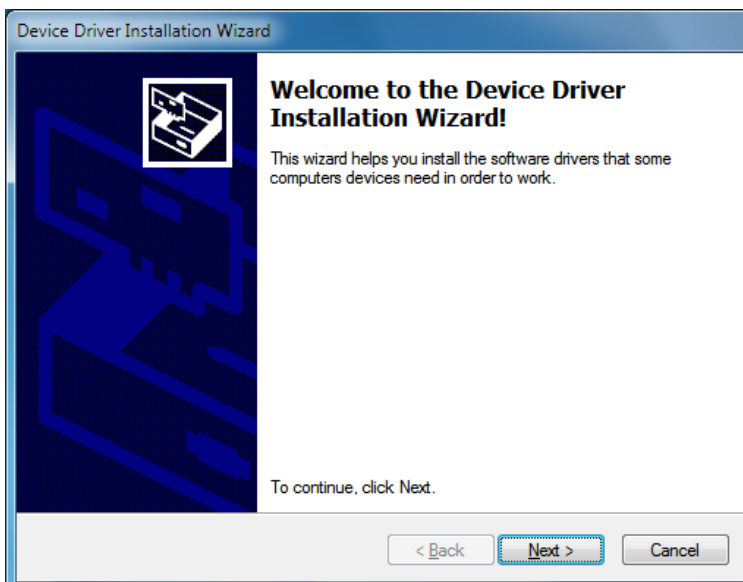
## *Installing the USB to RS-232 Driver*

When using the RS-232 cable, install the COM port drive properly according to the following procedure.

1. Turn on the computer and Peltier controller.
2. Connect the USB to RS-232 Cable between the computer and Peltier controller.
3. Select **C>UV Lab> USB Drivers> Lambda 465> USB2** folder.
4. Double Click **USBCom-CDM\_20828**.
5. Select **Extract**.

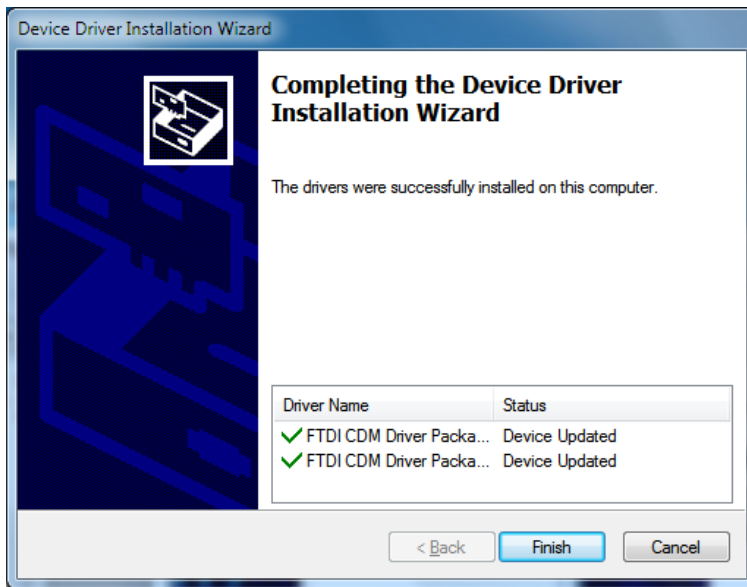


6. Select **Next**.





7. The following dialog box will appear. After installation is completed successfully, select **Finish**.

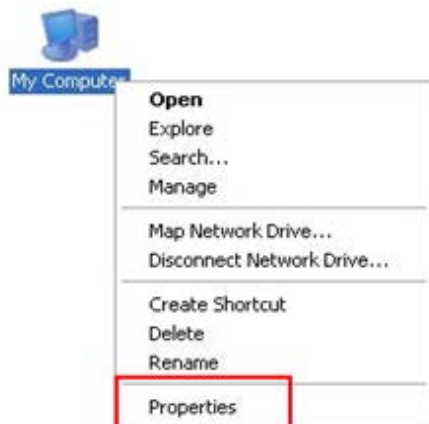


8. Change the USB serial Ports after finishing driver setup. See the following section.

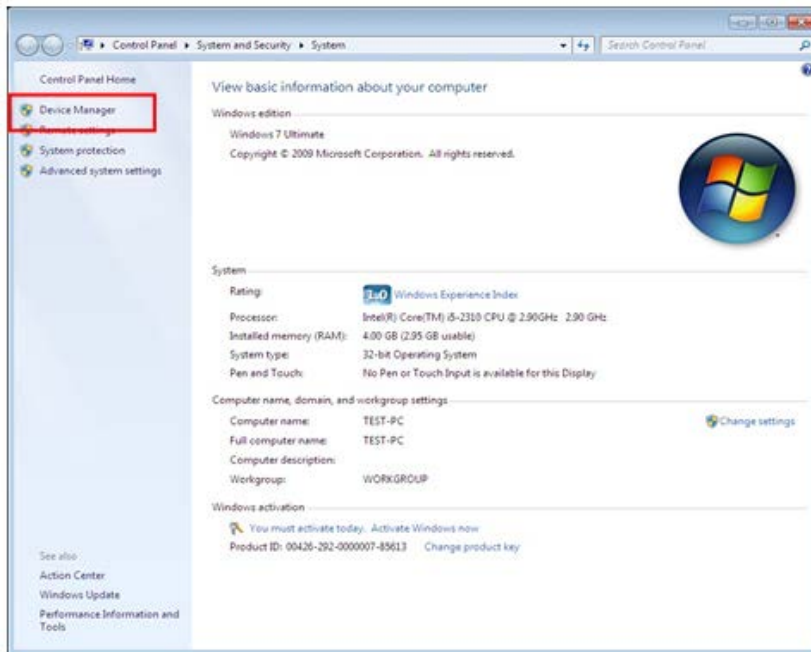
### *Setting USB to RS-232 port*

Change the port setting as follow when communication is not connected by using USB to RS-232 convert.

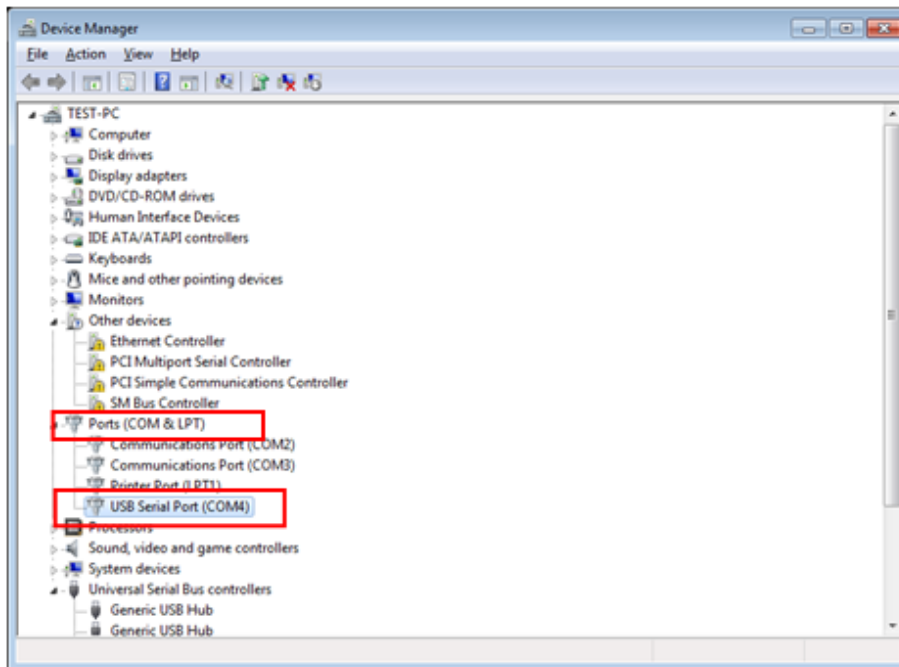
1. Select **My Computer** → **Properties**.



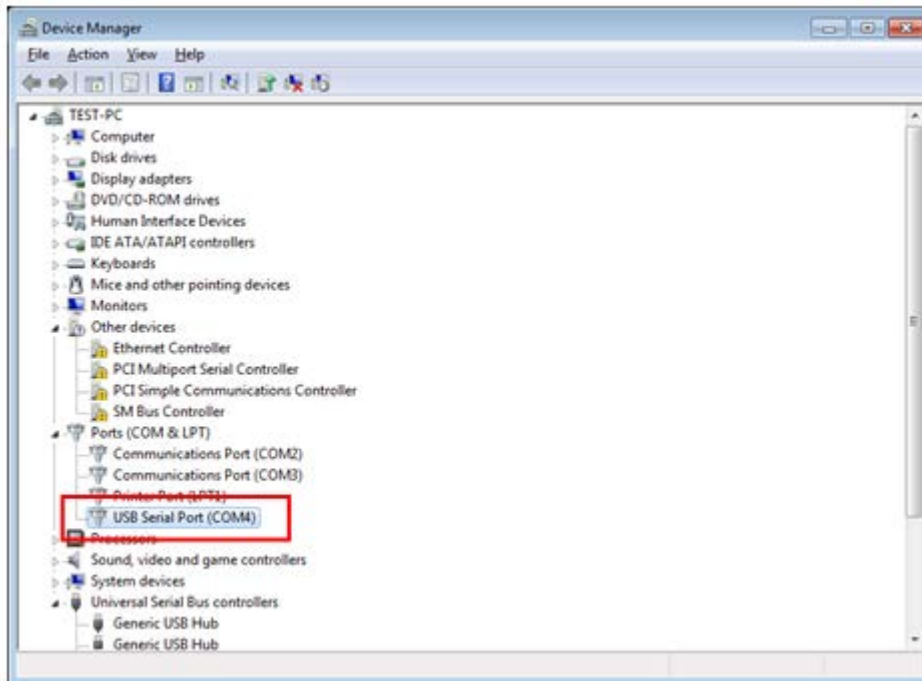
2. Select **Device Manager**.



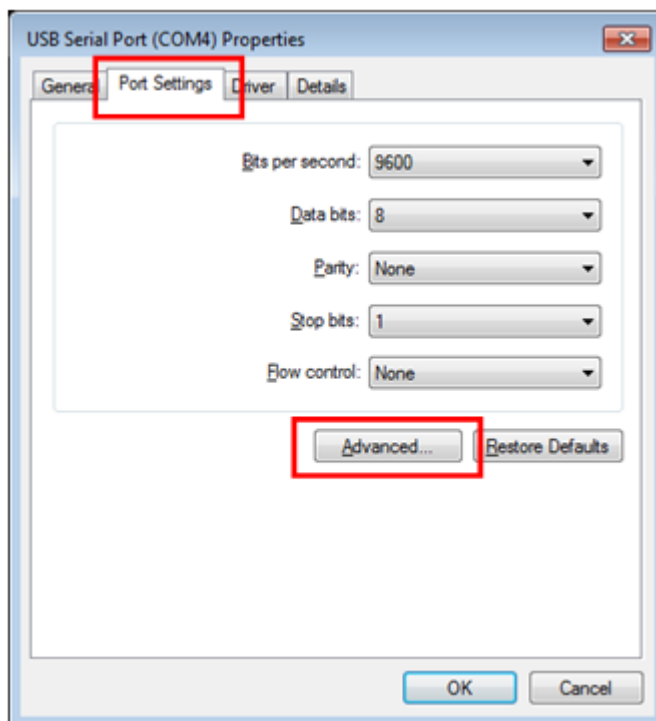
3. Select **Ports (COM & LPT)** to expand the listing. These are the devices currently connected to the COM ports. **USB Serial Port (COMx)** is visible when the driver installation is completed successfully.



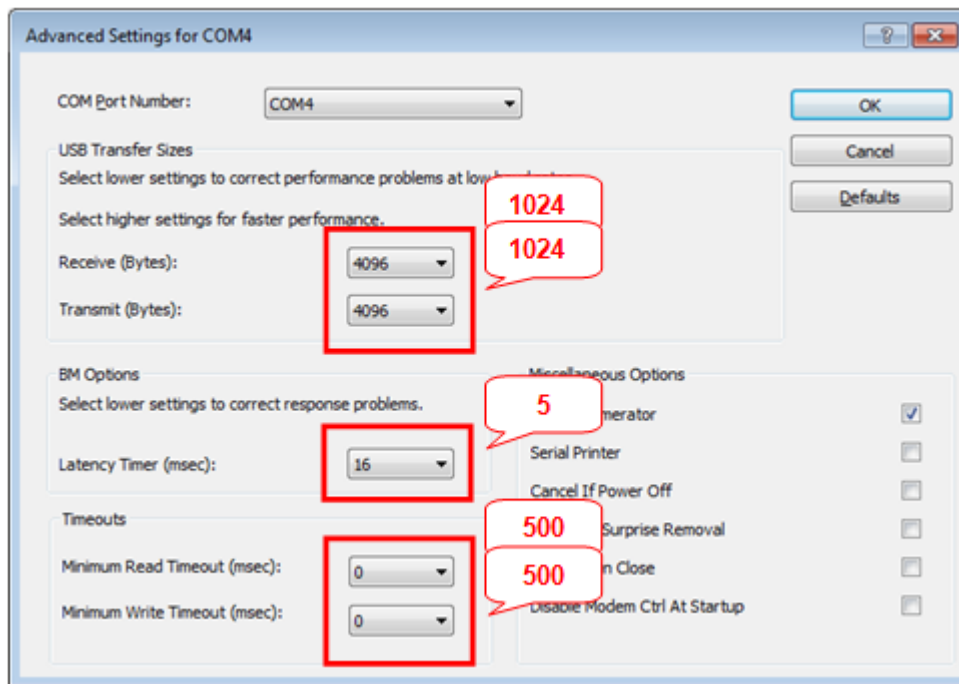
4. Double click on the **USB Serial Port (COMx)** of the **Ports (COM & LPT)** section.



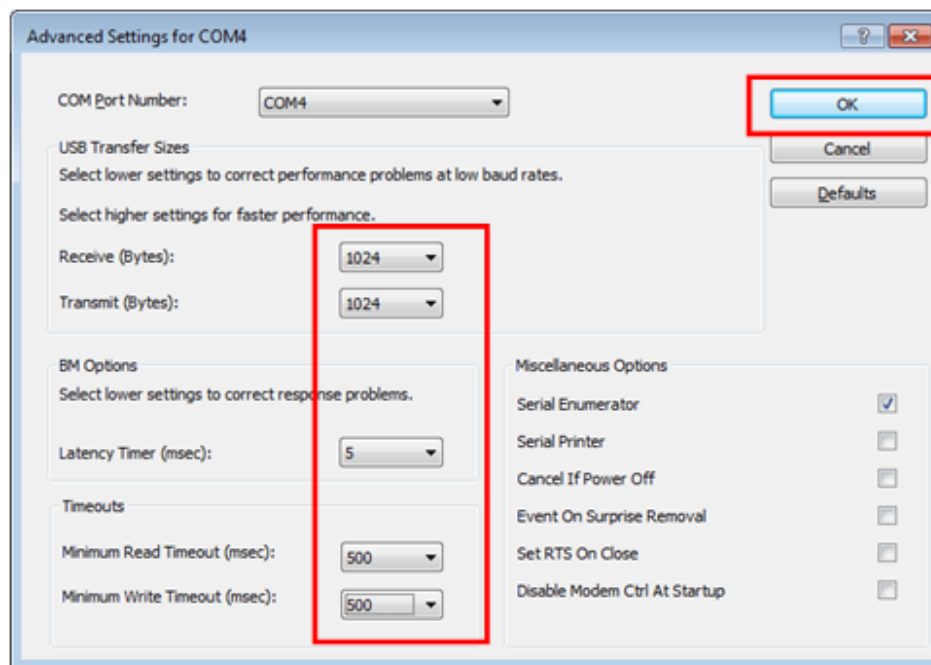
5. Select **Port Settings** tab and select **Advanced...** button.



6. Change the parameter values as shown in the following screen.

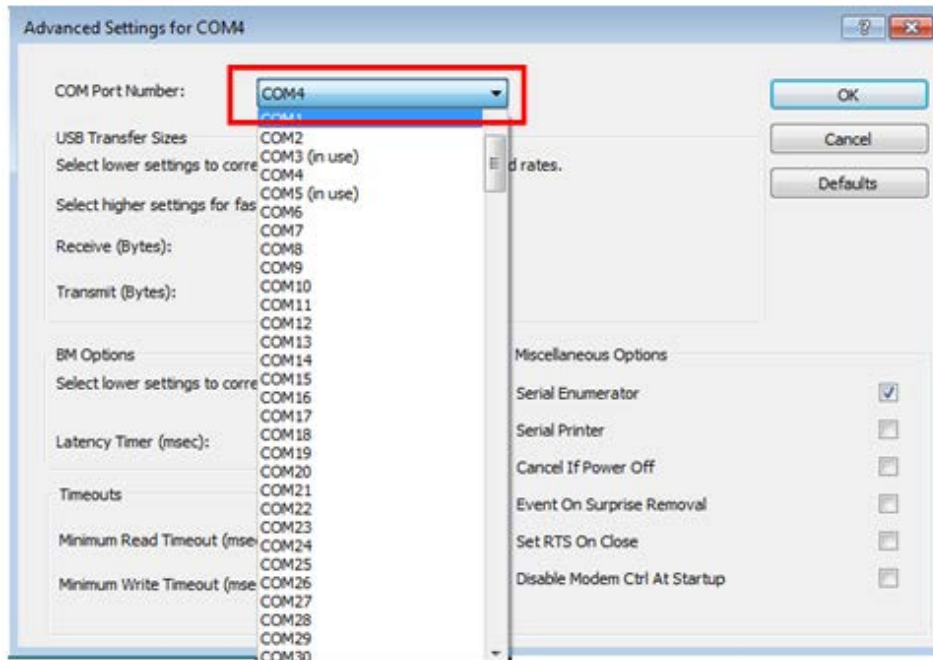


7. Select **OK** after checking the changed parameter values.

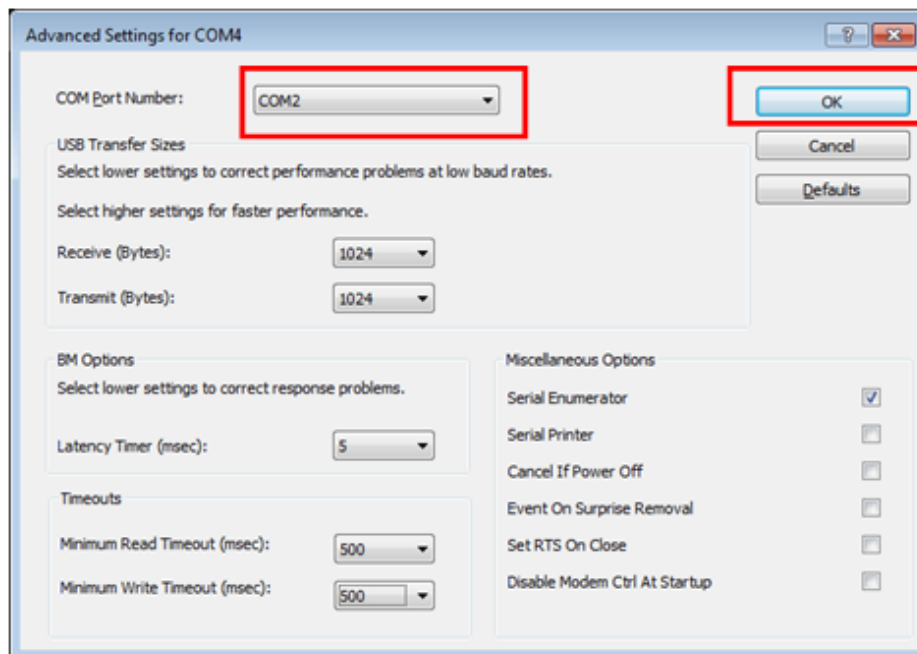


8. If the Peltier controller fails to communicate with the PC, change the COM Port Number in the following steps.
9. Open **Advanced Setting for COMx** window following steps 1 to 6 in this procedure.

10. Select the **COM Port number list** to expand it and change the COM port number another one which is not in use from COM 1 to COM 10.



11. Make sure that the changed COM Port Number is applied, and select **OK**.



12. After the port setting is changed, restart the computer.

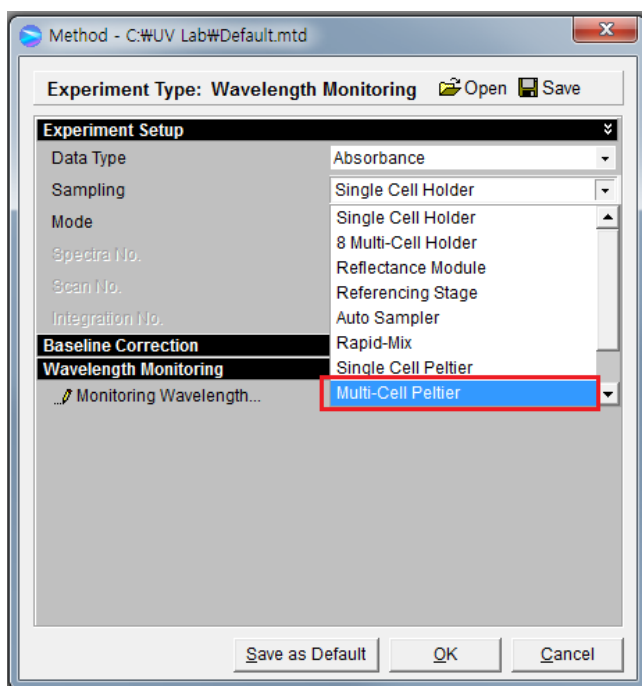
## Measurement

**NOTE:** Start the sample measurement after warming up the system for at least 20 minutes.

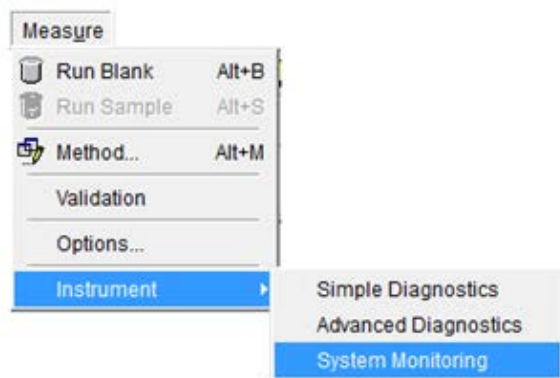
This accessory can be operated in the Temperature Based Kinetics in the Kinetics mode and Thermal Denaturation in the Bio analysis mode.

### Peltier control Multi-cell Calibration and Offset

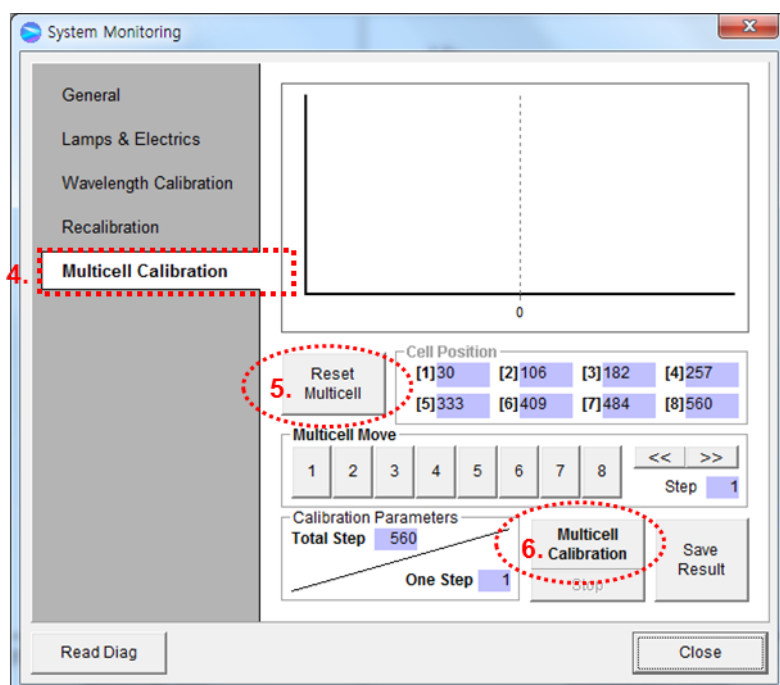
1. When Peltier Control Multi-Cell is connected for the first time, you need to correct the cell position. Launch **UV Lab** software and then select **OK** (Select anything in the **Experiment Type**).
2. Select **Multi-Cell Peltier** in the **Experiment Setup**.



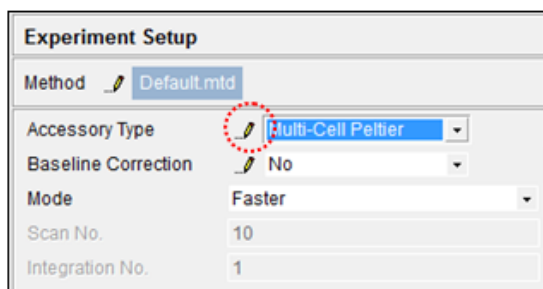
3. Select **Measure** → **Diagnostics** → **System Monitoring** in the software.



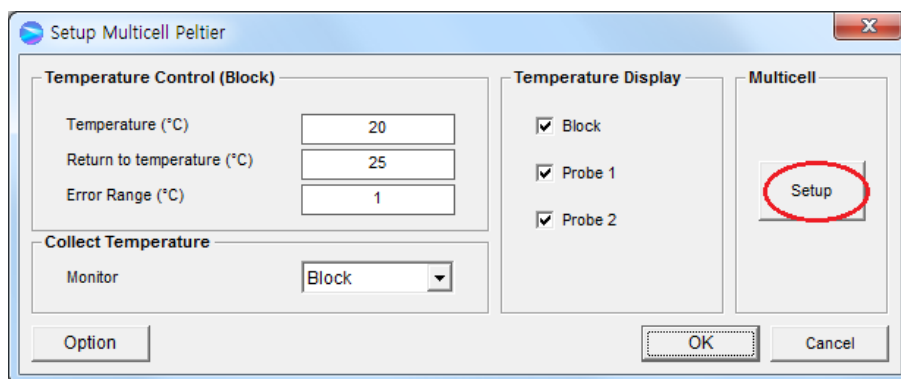
4. The following dialog box is displayed. Select **Multicell Calibration**.



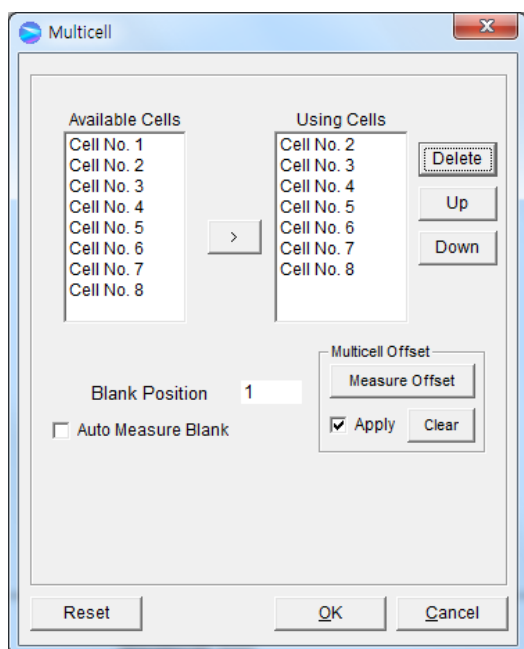
5. Select **Reset Multicell** to format the Peltier control Multi-Cell.
6. Remove all cells from the cell holder and select **OK**.
7. Select **Multicell Calibration**.
8. The **Cell Holder Calibration** will start. The current process of calibration is shown.
9. When calibration is finished, select **OK**.
10. Select **Save Result** to save data. Select **Close**.
11. Select **setup button (pencil icon)** in the **Experiment Setup** on the main screen of the software.







12. The **Setup Multi-Cell Peltier** window will be shown. Select **Setup**.



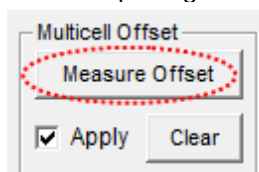
13. The following dialog box will appear. Change the parameters about the Peltier 8 Multi-Cell Holder.



- **Available Cells:** Indicate cells that are available for measurement.
- **Using Cells:** Show the cell position which are selected for the measurement.  
Using the button, , select the cell No. Using ,  and  keys, you set up the order of measurement.
- **Blank Position:** Enter the blank position of Peltier control Multi-Cell (Generally, place blank in the position No.1.), e.g. enter number 5 as blank is measured at cell position 5.
- **Auto Measure Blank**
  - Check: Each time for measuring of sample, the blank is measured previously. This function is very useful for the long-term kinetics mode.
  - No check: Only sample is measured without measurement of the blank.
- **Reset:** Use for formatting the Peltier control Multi-Cell.



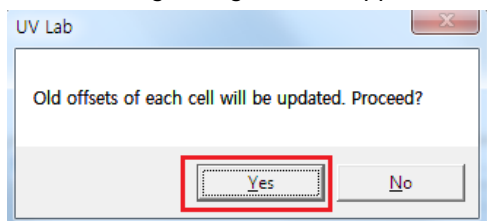
15. After completing Multicell setup, Select **Measure Offset**.



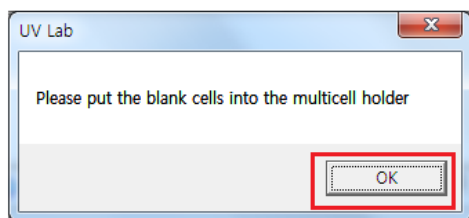
**NOTE:** *Multicell Offset is a function that corrects the transmittance difference between the cells, and it should be performed before starting experiments.*

**NOTE:** *To get reliable data with a good repeatability, it is recommended to perform the Multicell Offset whenever newly measuring samples with multicell holder.*

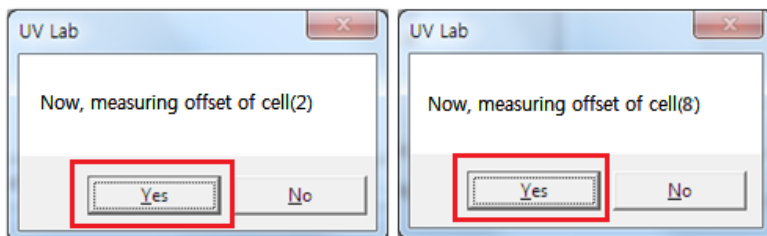
- a. The following dialog box will appear. Select **Yes**.



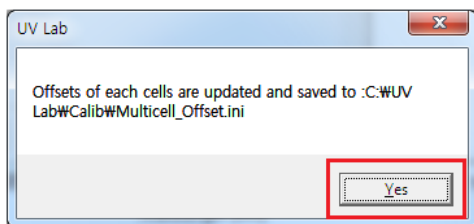
- b. This dialog box will be shown. Put all cells with blank solution into the Peltier Control Multi-Cell. Select **OK**.



- c. Select **Yes** for measurement at each position one by one.

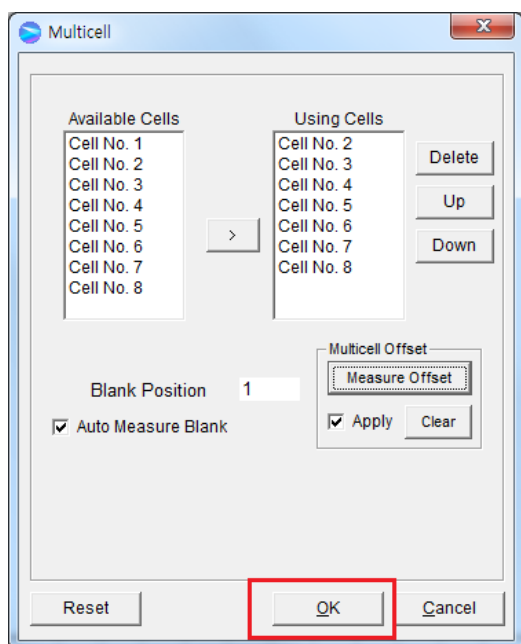


- d. The dialog box will be shown when the measuring offset is finished. Select **Yes**.

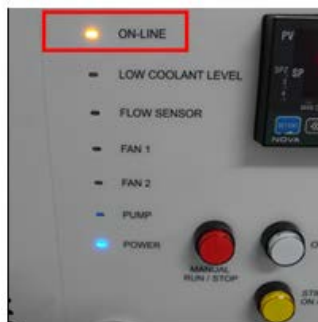
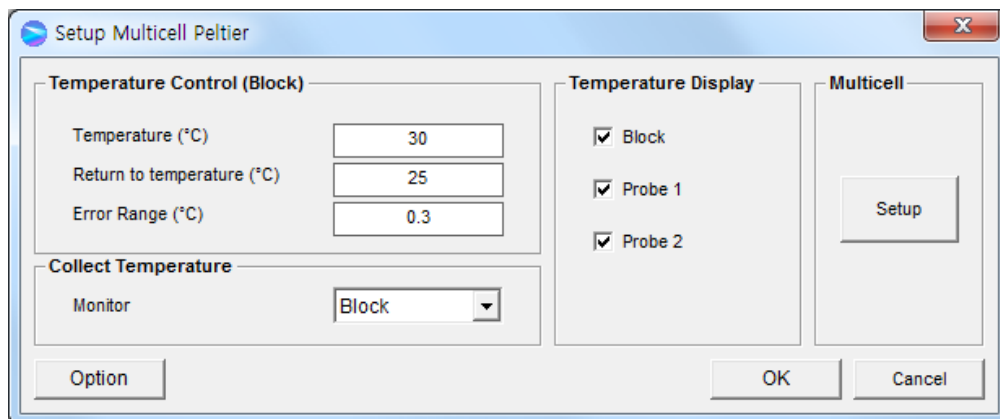


- Apply: Save the Offset values.
- Clear: Remove the saved offset data.

16. After the MultiCell Offset is completed, select **OK**.

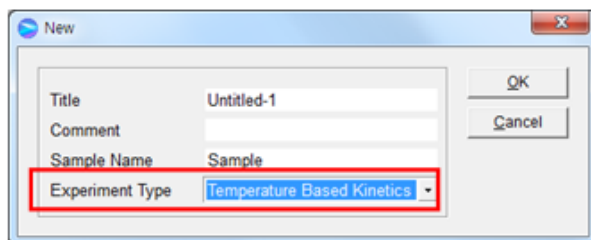


17. After completing the parameter setup, select **OK**. Then the LED for ON-LINE is turned on and it will start heating up or cooling down to the set temperature in the Setup Multicell Peltier.

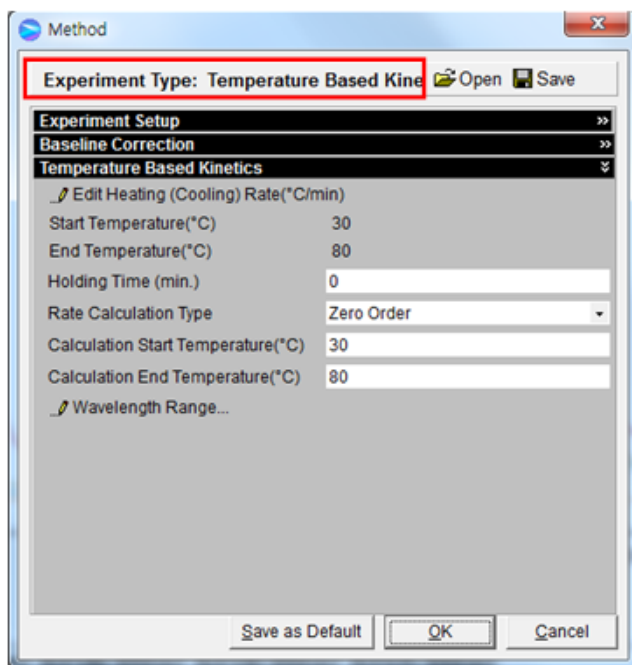


## Temperature Based Kinetics

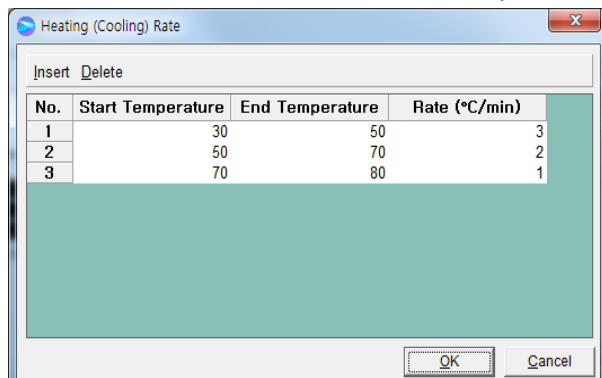
1. Launch **UV Lab software** and then, select **Temperature Based Kinetics** in the **Experiment Type** and click **OK**.



2. The following dialog box will be displayed.



3. Setup test parameters as follows:
  - a. **Edit Heating (Cooling) Rate ( $^{\circ}\text{C}/\text{min}$ ):** Set the heating (cooling) temperature rate in each temperature range. The sample is measured whenever it reaches the set temperature by the Rate ( $^{\circ}\text{C}/\text{min}$ ), and the sample is also measured at the Start Temperature and the End Temperature. Click on **Insert** and **Delete** to edit the temperature range and the rate.



- **Start Temperature:** Enter the start temperature for the measurement.
- **End Temperature:** Enter the end temperature for the measurement.
- **Rate (°C/min):** Enter the heating (cooling) rate.

- b. **Holding Time:** Enter the holding time before sample measurement after it reaches the each set temperature.
- c. **Rate calculation Type:** Select the rate calculation type. See V-3. Kinetics Mode of Lambda 465 UV Lab Software Users Guide for more information.
- d. **Calculation Start Temperature:** Enter the start temperature for the calculation.
- e. **Calculation End Temperature (°C):** Enter the end temperature for the calculation.

**NOTE:** *Calculation Start Temperature and Calculation End Temperature must be entered within the Start Temperature and the End temperature.*

4. Select the **Wavelength Range**. And enter the wavelength range for the measurement.

Wavelength Range

Insert Delete

No.	Start Wavelength(nm)	End Wavelength(nm)
1	300	300
2	500	500
3	700	700

OK Cancel

**NOTE:** *The number of **wavelength Range** should be matched the number of Using Cell. If the Wavelength Range is set as the picture below, peltier multi cell number should be selected three cells and in numerical order on **using cells** in the **8 Multi-Cell Holder Setup** window. For example, Cell No.2 for wavelength 300nm, Cell No.3 for wavelength 500nm and Cell No.5 for wavelength 700nm.*

Wavelength Range

Insert Delete

No.	Start Wavelength(nm)	End Wavelength(nm)
1	300	300
2	500	500
3	700	700

OK Cancel

8 Multi-Cell Holder Setup

Available Cells

- Cell No. 1
- Cell No. 2
- Cell No. 3
- Cell No. 4
- Cell No. 5
- Cell No. 6
- Cell No. 7
- Cell No. 8

Using Cells

- Cell No. 2
- Cell No. 3
- Cell No. 5

Delete Up Down

Blank Position 1

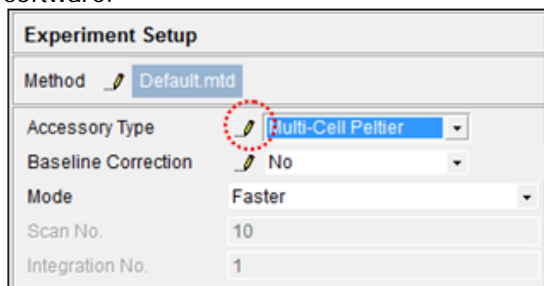
☐ Auto Measure Blank

Multicell Offset Measure Offset

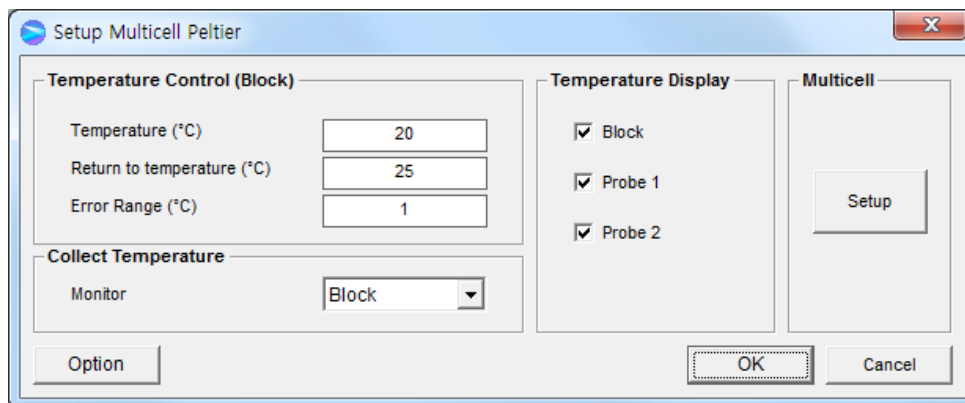
☒ Apply Clear

Reset OK Cancel

5. After setting parameters for **Experiment Setup**, **Baseline Correction** and **Temperature Based Kinetics**, select **OK**.
6. Select the **Multi-Cell Peltier** in the **Accessory Type** on the main screen of the software.
7. Select the **setup button (pencil icon)** in the **Experiment Setup** on the main screen of the software.



8. **Setup Multi-Cell Peltier** window will be shown. Set the parameters according to the experiment conditions.



#### ➤ Temperature control

- a. Temperature (°C): Enter the preset temperature for the experiment.

**NOTE:** Starting the temperature of experiment needs to be set up in the method window.

- b. Return to temperature (°C): Enter the returning temperature after the experiment is finished.
- c. Error Range (°C): Enter the temperature tolerance between the sampling temperature and monitored temperature. The measurement will start when the temperature tolerance reaches within the set Error Range.

Example: Set the starting temperature as 20°C and error range as 1°C then, the monitoring temperature will be shown as the temperature of cell block. In this case, the measurement will start when the temperature of the cell block should be between 19°C and 21°C.

**NOTE:** When selecting the probe for Monitor in Collect Temperature box, the slower the real heating speed may be, the smaller the set error range (°C) is.

#### ➤ Collect Temperature

Monitor: Select which the temperature will be monitored in the display panel.

- Block : The temperature of cell block
- Probe 1: The temperature of Probe 1

- Probe 2: The temperature of Probe 2

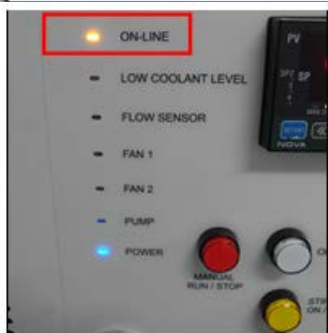
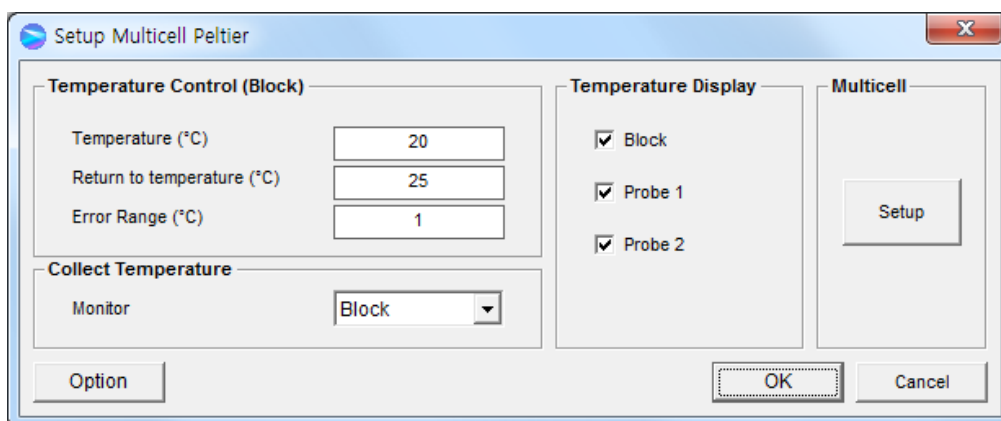
Example: If Block is selected, measurement will start when the temperature of the cell block reaches the setting temperature.

➤ **Temperature Display**

Select which temperature will be displayed on the panel: Block, Probe 1 or Probe 2.  
The selected temperature is only displayed in real time.

- **Option:** This function is used to adjust temperature. It is only used in the manufacturing process, so do not modify these values.

9. After completing the parameter setup, select **OK**. The LED for ON-LINE is turned on and it will start heating up or cooling down to the set temperature in the Setup MultiCell Peltier.



10. Insert blank solution into the cell holder. Select **Blank**, and then the blank is measured when it reaches the set Start Temperature.

**NOTE:** To monitor the probe temperature, the probes should be immersed in the sample, or to use the block temperature for monitoring, the cell lid should be closed tightly

11. Remove the blank solution from sample cell holder and insert sample solution into the sample cell holder. Select **Sample** then the measurement will be started after the temperature reaches the target temperature.

Peltier Information			
Start Temp. (°C) :	30	Monitor :	Block
Measurement Temp. (°C) :	30.0	Hold Time (min) :	0
SP Temp. (°C) :	30.0	Elapsed Time (m:s) :	0 : 11
Block Temp. (°C) :	32.6	Status :	Ramping...
Probe1 Temp. (°C) :	24.1	Error Range (°C) :	0.5
Probe2 Temp. (°C) :	23.8	<input type="button" value="Stop"/>	

- a. **Start Temp (°C)**: Shows starting temperature of the experiment.
- b. **Measurement Temp. (°C)**: Shows the temperature at which the sample will be measured.
- c. **SP Temp (°C)**: Shows the current temperature while it goes up / down to the measurement temperature.
- d. **Block Temp (°C)**: The temperature of Cell Block.
- e. **Probe 1 Temp (°C)**: The temperature of Probe 1.
- f. **Probe 2 Temp (°C)**: The temperature of Probe 2.
- g. **Monitor**: Monitored temperature is shown out of Block, Probe 1 and Probe 2.
- h. **Hold time (min)**: Shows the set holding time.
- i. **Elapsed time (m:s)**: Shows the elapsed time to reach the sampling temperature.
- j. **Status**: Shows the status of experimental progress.
- k. **Error Range (°C)**: Shows the temperature tolerance between the sampling temperature and monitored temperature. The measurement will be made only when the temperature tolerance reaches within the set Error Range.

**NOTE:** To pull out the cell easily, use the cell lifting knob.

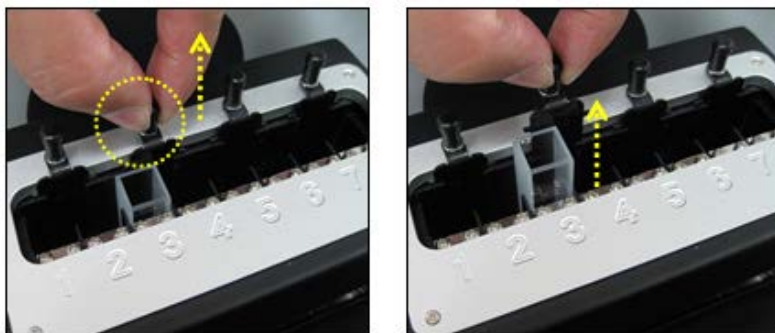


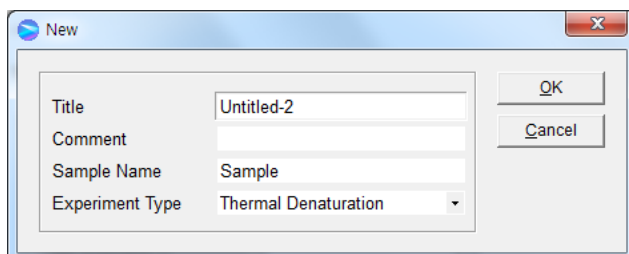
Figure 17 Using the cell lifting knob

12. After the measurement is finished, the results are displayed in the result window. Save or print results as required.

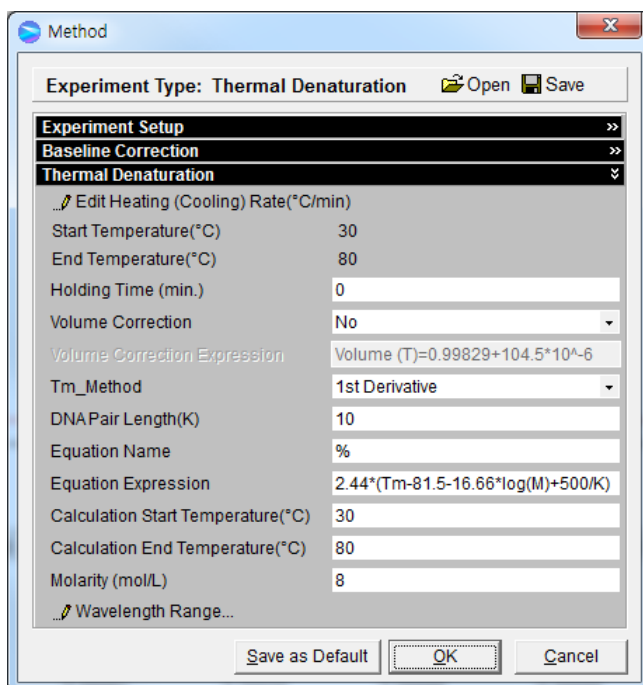
### ***Thermal Denaturation***

**NOTE:** Start the sample measurement after warming up the system for at least 20 minutes.

1. Launch the UV Lab software and then, select **Thermal Denaturation** in the **Experiment Type** click **OK**.

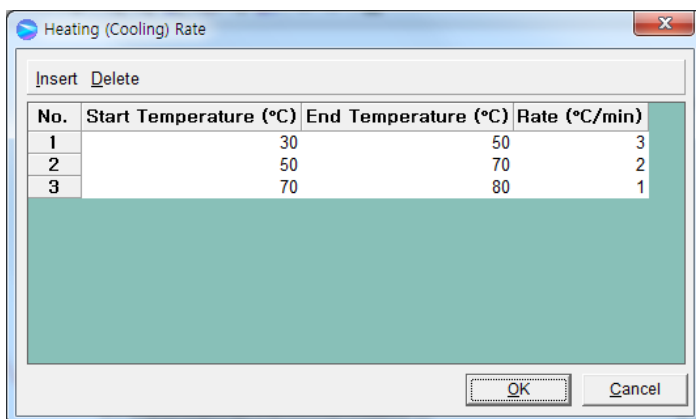


2. The following dialog box will be displayed.



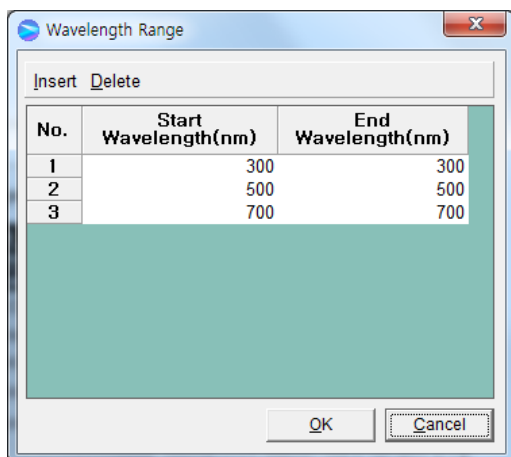
3. Setup test parameters as follows:
  - a. **Edit Heating (Cooling) Rate (°C/min):** Set the heating (cooling) temperature rate in each temperature range. Sample is measured whenever it reaches the set temperature by the Rate (°C/min), and the sample is also measured at the Start Temperature and the End Temperature. Click on **Insert** and **Delete** to edit the temperature range and the rate.



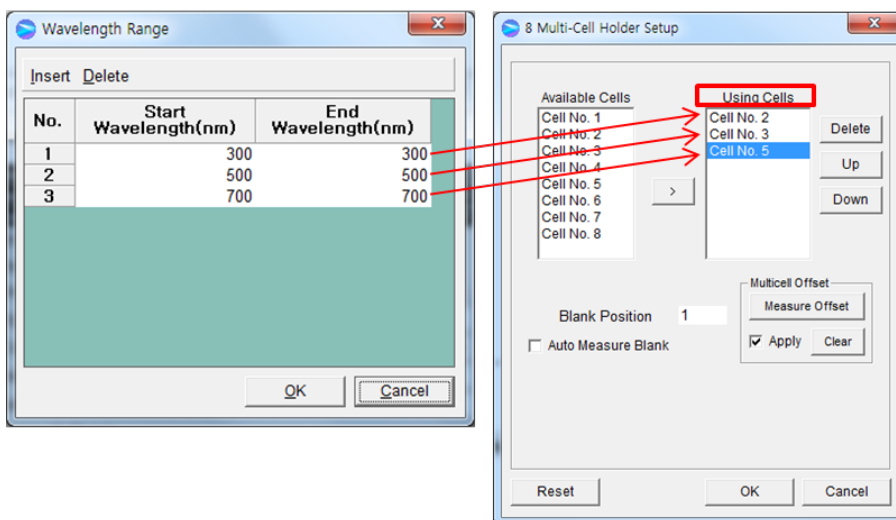


- **Start Temperature (°C):** Enter the start temperature for the measurement.
  - **End Temperature (°C):** Enter the end temperature for the measurement.
  - **Rate (°C/min):** Enter the heating (cooling) rate.
- b. **Holding Time (min):** Enter the holding time before sample measurement after it reaches the each set temperature.
- c. **Volume Correction:** If the volume correction is selected, the baseline corrected absorbance value is corrected for the thermal expansion of an aqueous buffer. The default equation for volume correction is:
- $$\text{Volume (T)} = 0.99829 + 104.5 * 10^{-6}T + 3.5 * 10^{-6}T^2$$
- T is the Celsius temperature (°C).
- d. **Tm method:** Select a method for determining Tm (DNA melting temperature). Options include: 1st derivative and Average.
- e. **DNA Pair Length (K):** Enter the DNA base pair length. If a DNA base pair length is above 5000, enter as 0.
- f. **Equation Name and Expression:** The melting range is calculated within the specified calculation range by defining the low temperature where the slope begins to increase steadily, and the high temperature where the slope approaches zero again. The default equation for the calculation of %G-C (Guanine-Cytosine) base pairs is:
- $$\%G-C = 2.44 * (T_m - 81.5 - 16.66 * \log (M) + 500/K)$$
- Where M is the molarity of salt in mol/l, K is the DNA base pair length.  
If a DNA base pair length (K) is entered as '0', then the equation becomes:
- $$\%G-C = 2.44 * (T_m - 81.5 - 16.66 * \log (M))$$
- g. **Calculation Start Temperature (°C):** Enter the start temperature for calculating the Tm value using the selected method.
- h. **Calculation End Temperature (°C):** Enter the end temperature for calculating the Tm value using the selected method.
- i. **Molarity (mol/L):** Enter the salt molarity of the solution [mol/l].

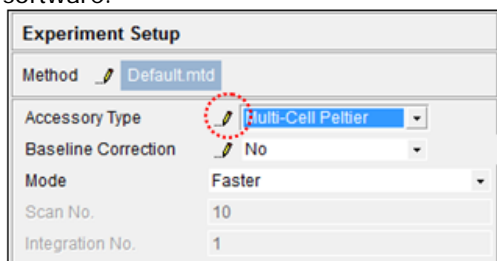
4. Select **Wavelength Range** and enter the wavelength range for the measurement.



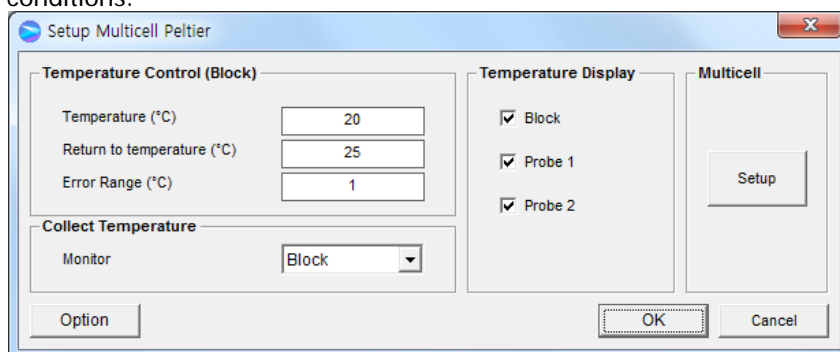
**NOTE:** The number of **wavelength Range** should be matched the number of Using Cell. If the Wavelength Range is set as the picture below, peltier multi cell number should be selected three cells and in numerical order on **using cells** in the **8 Multi-Cell Holder Setup** window. For example, Cell No.2 for wavelength 300nm, Cell No.3 for wavelength 500nm and Cell No.5 for wavelength 700nm.



5. After setting parameters for **Experiment Setup**, **Baseline Correction** and **Thermal Denaturation**, select **OK**.
6. Select the **Multi-Cell Peltier** in the **Accessory Type** on the main screen of the software.
7. Click on the **setup button (pencil icon)** in the **Experiment Setup** on the main screen of the software.



8. **Setup Multi-Cell Peltier** window will be shown. Set the parameters according to the experiment conditions.



➤ **Temperature control (Block)**

- a. Temperature (°C): Enter the preset temperature for the experiment.

**NOTE:** *Starting the temperature of experiment needs to be set up in the method window.*

- b. Return to temperature (°C): Enter the returning temperature after the experiment is finished.

- c. Error Range (°C): Enter the temperature tolerance between the sampling temperature and monitored temperature. The measurement will start when the temperature tolerance reaches within the set Error Range.

Example: Set the starting temperature as 20°C and error range as 1°C then, the monitoring temperature is set as the temperature of cell block. In this case, the measurement will start when the temperature of the cell block reaches between 19°C and 21°C.

**NOTE:** *When selecting probe for Monitor in Collect Temperature box, the slower the real heating speed may be, the smaller the set Error range (°C) is.*

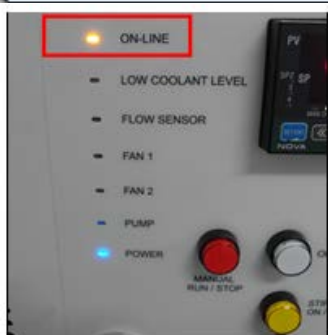
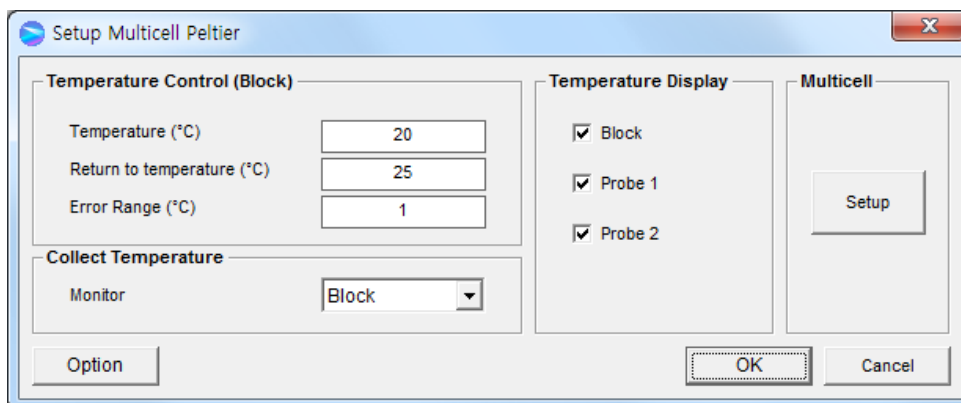
➤ **Collect Temperature**

- a. Monitor: Select which the temperature will be monitored in the display panel.
- Block: The temperature of cell block
  - Probe 1: The temperature of Probe 1
  - Probe 2: The temperature of Probe 2

Example: Select the Block then, measurement will start when the temperature of the cell block reached the setting temperature.

- **Temperature Display:** The selected temperature will be displayed on the panel: Block, Probe1 or Probe2. The selected temperature is only displayed in real time.
- **Option:** This function is used to adjust temperature. It is only used for the manufacturing, so do not modify the values.

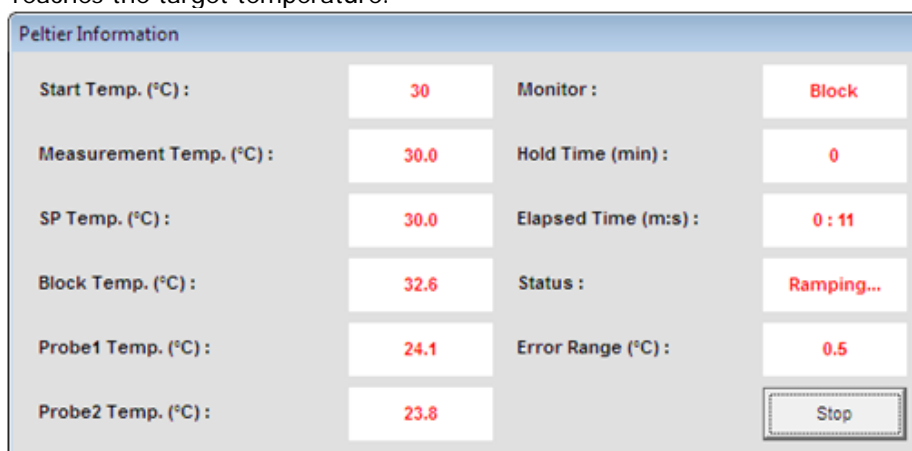
9. After completing the parameter setup, select **OK**. Then the LED for **ON-LINE** is turned on and it will start heating up or cooling down to the set temperature in the Setup MultiCell Peltier.



10. Insert blank solution into the cell holder. Select **Blank**, and then the blank is measured when it reaches the set Start Temperature.

**NOTE:** To monitor the probe temperature, the probes should be immersed in the sample, or to use the block temperature for monitoring, the cell lid should be closed tightly

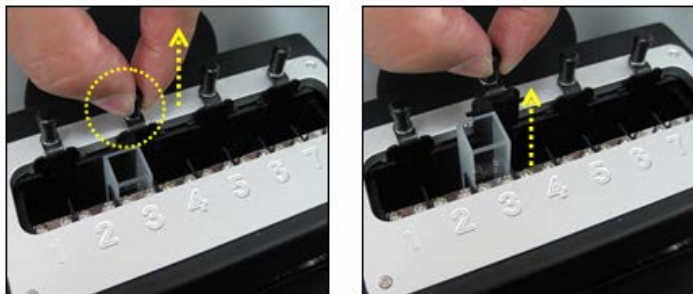
11. Remove the blank solution from the sample cell holder and insert the sample solution into the sample cell holder. Select **Sample** then the measurement will be started after the temperature reaches the target temperature.



- Start Temp (°C):** Shows the starting temperature of experiment.
- Measurement Temp (°C):** Shows the temperature at which the sample will be measured.

- c. **SP Temp (°C)**: Shows the set the current temperature while it goes up / down to the measurement temperature.
- d. **Block Temp (°C)**: Shows the temperature of Cell Block.
- e. **Probe 1 Temp (°C)**: Shows the temperature of Probe 1.
- f. **Probe 2 Temp (°C)**: Shows the temperature of Probe 2.
- g. **Monitor**: Monitored temperature is shown out of Block, Probe 1 and Probe 2.
- h. **Hold time (min)**: Shows the set holding time.
- i. **Elapsed time (m:s)**: Shows the elapsed time to reach the sampling temperature.
- j. **Status**: Shows the status of experimental progress.
- k. **Error Range (°C)**: Shows the temperature tolerance between the sampling temperature and monitored temperature. The measurement will be made only when the temperature tolerance reaches within the set Error Range.

**NOTE:** To pull out the cell easily, use the cell lifting knob.



**Figure 18 Using the cell lifting knob**

12. After the measurement is finished, the results are displayed in the result window. Save or print results as required.

## ***Troubleshooting***

### ***The cell holder position is not aligned precisely***

1. Recalibrate the cell position.
2. Select **Multicell Calibration** in the System Monitoring. For more details of Multicell Calibration, refer to page 22.

### ***Power LED is not lit on***

1. Check the connection to the power cable or the fuse. The fuse is located at the rear of the instrument.

**WARNING**

*There is risk of receiving a fatal electric shock if the fuses are replaced with the power cord connected.*

*Il y a un risque d'électrocution si les fusibles sont remplacés tandis que le cordon d'alimentation est encore branché.*

2. Turn off and unplug the instrument.
3. Locate the fuse cover on the left rear panel of the instrument.
4. Carefully open the compartment latch where the fuse is located.



Location of latch on the fuse compartment door

5. Disconnect the fuse.
6. Replace with a new T5AL fuse (AC 250V). One spare is contained in the power module.
7. Close the compartment door.
8. Plug in the instrument and turn on.

### ***On-Line LED is not lit on***

1. Check the connection between the Lambda 465 and the Peltier control Multi-Cell.
2. Check whether the communication cable is connected tightly.
3. Check whether the **Air Vent Manual** button is switched off.
4. Check whether the emergency switch is off.
5. When you use USB to RS-232 cable, change the port following the procedure *Setting USB to RS-232 Port*.

### ***Low Water Level LED blinks with an alarm sound***

1. Check the coolant level and if it is lower than L (low) mark, fill up the coolant more.



2. Restart the Peltier Controller.

### ***Flow Sensor LED is lit on with an alarm sound***

1. Check whether the tubing is bent or whether it is connected correctly, and then restart the Peltier Controller.
2. Push the **Air Vent Manual** button to be switched on and check if coolant flows properly for about one minute after the error occurs. If the Flow Sensor LED is continuously lit on with an alarm sounding, contact your PerkinElmer service representative.

### ***Pump LED is lit on with an alarm sound***

1. Check whether the tubing is bent or whether it is connected correctly, and then restart the Peltier Controller.
2. Push the **Air Vent Manual** button to be switched on and check if coolant flows properly for about 1 minute after the error occurs. If the Pump LED is continuously lit on with an alarm sounding, contact your PerkinElmer service representative.

### ***FAN LED is lit on with an alarm sound***

- Fan needs to be replaced.

### ***Connection fails***

1. Check whether the Interface connector is lined properly.
2. Check whether the **MANUAL RUN/STOP** button is pushed on. If yes, turn off the Manual button.

