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Covesion Ltd

OC2 Temperature Controller

Operating Manual v1.1



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covesion

Covesion's OC2 temperature controller provides stable temperature conditions for PPLN crystals when used in conjuction with a Covesion oven (e.g. PV oven series). The unit can tune from a 5°C above ambient temperature up to 200°C and provides a temperature stability of 0.01°C.

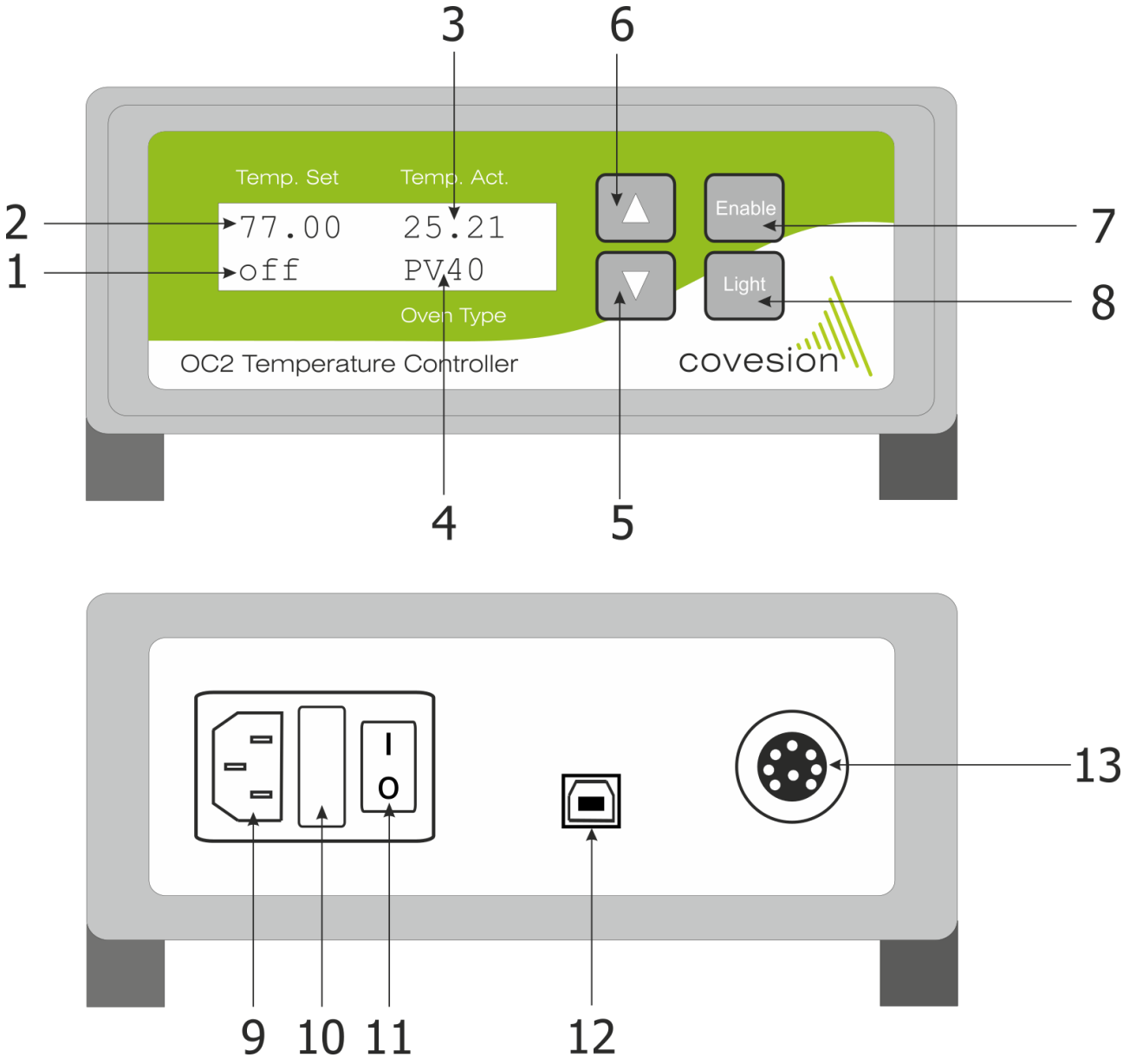
The OC2 temperature controller is suitable for Covesion ovens only. When an oven is connected to the OC2 output, the unit immediately identifies the oven type which is indicated on the LCD display.

Connection to a PC via USB allows remote control of the OC2 via Covesion's temperature controller software. LabVIEW drivers are also available.

An upgrade kit, OC1-USB, is available for OC1 units allowing connection to a PC via USB, enabling the same functionality as the OC2. Please contact us for more information.

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1 Front and Rear Panel



1. Controller output state (on/off)
2. Set temperature (°C)
3. Oven temperature (°C)
4. Oven type
5. Decrease set temperature
6. Increase set temperature
7. Enable oven heater
8. LCD backlight
9. AC power socket (120V or 240V)
10. Fuse (250V)
11. AC power switch
12. Type B USB connector
13. Controller output (oven connection)

2 Specifications

Parameter	Min	Typ	Max	Unit
Input voltage	100		250	VAC
Ouput power			35	WDC
Output voltage			24	VDC
Temperature control range [1]	15		200	°C
Set-point resolution	0.01			°C
Absolute temperature accuracy [2]		+/-0.1		°C
Temperature stability (24 hour) [3]		+/-0.01		°C
Heating time from ambient to 200°C		7		minutes
Cooling time from 200°C to 60°C [4]		20		minutes
Cooling time from 60°C to 30°C [4]		20		minutes
Operating temperature (external)	10		50	°C
External Dimensions (L x W x H)		199 x158 x74		mm

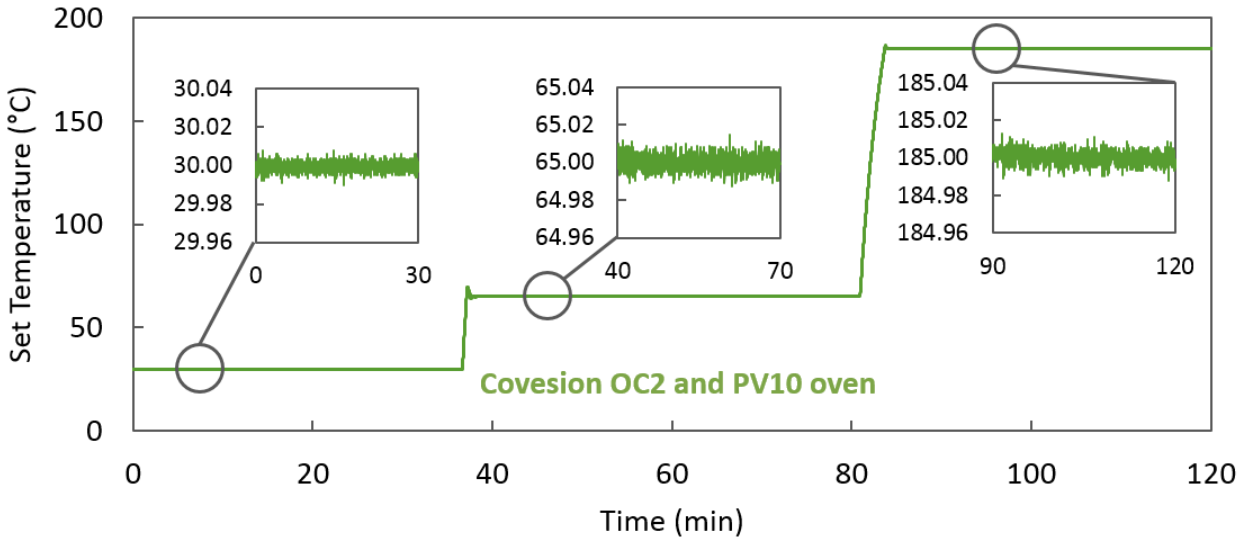
1. Covesion oven types are suitable for heating only. The external oven temperature must be lower than the set-point temperature.
2. Does not account for sensor tolerances.
3. From 5°C above ambient temperature to 200°C
4. Room temperature at 25°C

3 Stand-alone operation

- Ensure that the power switch at the back of the unit is in the OFF position. Connect the mains power lead to the unit and then plug it into the AC mains (100-250V universal input).
- Connect the oven lead to the OC2 oven connector output. Ensure the oven lead is securely screwed in place.
- Turn on the power switch at the back of the unit. The LCD screen will show a brief start up display before displaying the main operation screen. The “OVEN TYPE” should be correctly identified and displayed at the bottom right corner of the screen.
- The oven set temperature “TEMP SET” and actual operating temperature “TEMP ACTUAL” will be displayed on-screen. TEMP SET is adjusted using the up (▲) and down (▼) keypads. A single key press results in a 0.01°C increment. Holding down the key results in bigger increments from 0.1°C to 1°C, and finally to 10°C.
- Once the desired “TEMP SET” is reached, press the “ENABLE” keypad to turn on the oven. The word “ENABLED” will be displayed on-screen.
- The “TEMP ACT” display automatically shows the measured internal temperature of the oven. The oven temperature will oscillate around the set point before stability is reached. Stability is typically achieved within a few minutes of reaching the set temperature. Please

note that the system is slower on cooling than heating, particularly when the set point is close to the ambient temperature.

- The backlight of the LCD display can be turned on or off using the “LIGHT” keypad.



Faults

In the event that “Fault” is displayed in the “TEMP ACTUAL” field the controller cannot be enabled. This indicates a temperature sensor error which can be caused by:

- no sensor or oven connected
- damaged sensor

If the “OVEN TYPE” field is empty the controller cannot be enabled. Failure to recognise an oven type when an oven lead is connected can be caused by:

- incompatible oven connected
- faulty oven connection

4 Connection to a PC

4.1 Installation

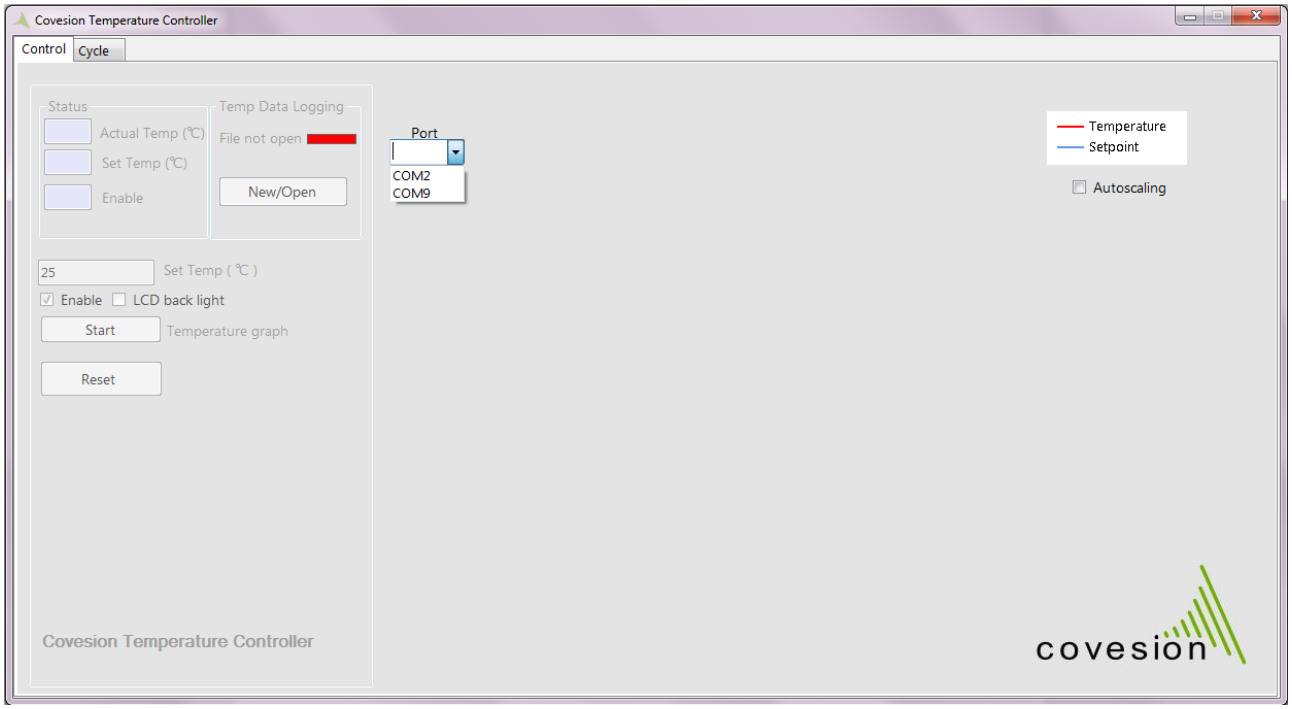
The OC2 temperature controller can be controlled from a PC via USB using the Covesion Temperature Controller software application. Please follow the installation instructions below for the USB driver:

- Connect the Temperature controller to a free USB Port on your Microsoft Windows PC. Then the PC will detect the unit automatically and the communication will be established in approximately 30 sec. If you are facing any issues related to the USB COM PORT drivers please download and execute the .exe file form the link bellow.
  http://www.ftdichip.com/Drivers/CDM/CDM%20v2.12.06%20WHQL%20Certified.exe
- If you are facing further difficulties installing the drivers (for the USB Temperature Controller) please contact us.

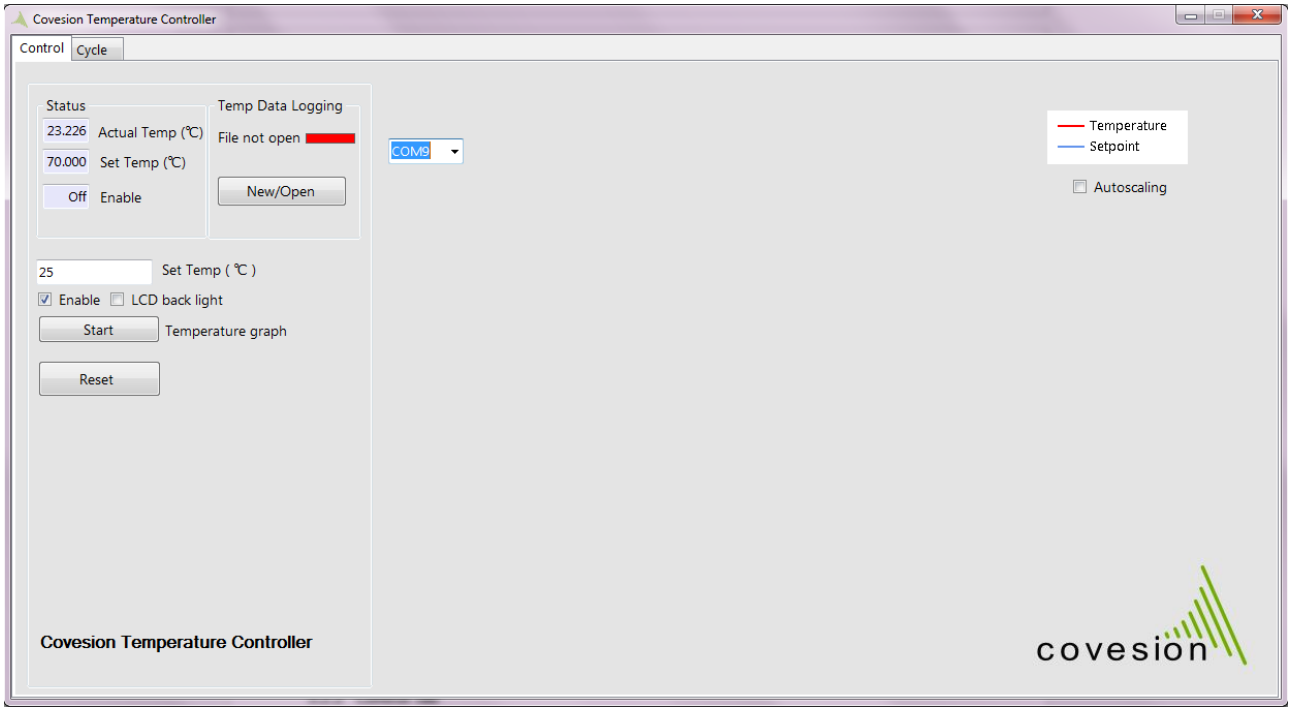
4.2 Temperature controller software application

4.2.1 COM port selection

- Open the "Covesion Temperature Controller" application
- Select the "Port" drop-down box which will reveal a list of connected COM ports. This can include other devices e.g. printer, PC monitor, as well as the Covesion OC2 unit.



- The correct COM port selection should instantly be verified by the temperature readouts in the “Status” box.
- [Note: If your computer has many COM ports connected, the correct port number can be initially identified from the Windows system Device Manager from the Control Panel.]



4.2.2 Control Tab

The control tab has all the functionality of the front LCD panel of the OC2 unit. The “Status” box displays the “Actual Temp”, “Set Temp”, and “Enable status” (ON or OFF) of the oven.

SET TEMP

To edit the set temperature, enter the desired temperature in the white text box, “Set Temp”. Then press ENTER to apply the new value. You will then see the “Set Temp” value update in the “Status” box above.

ENABLE

To enable the heater, click on the “Enable” box. A checked tick-box turns the heater ON and unchecked, the heater is OFF. The “Enable” status will show whether the heater is ON or OFF.
[On start-up of the program, you may need to initialise the value by toggling the check box on/off.]

LCD Backlight

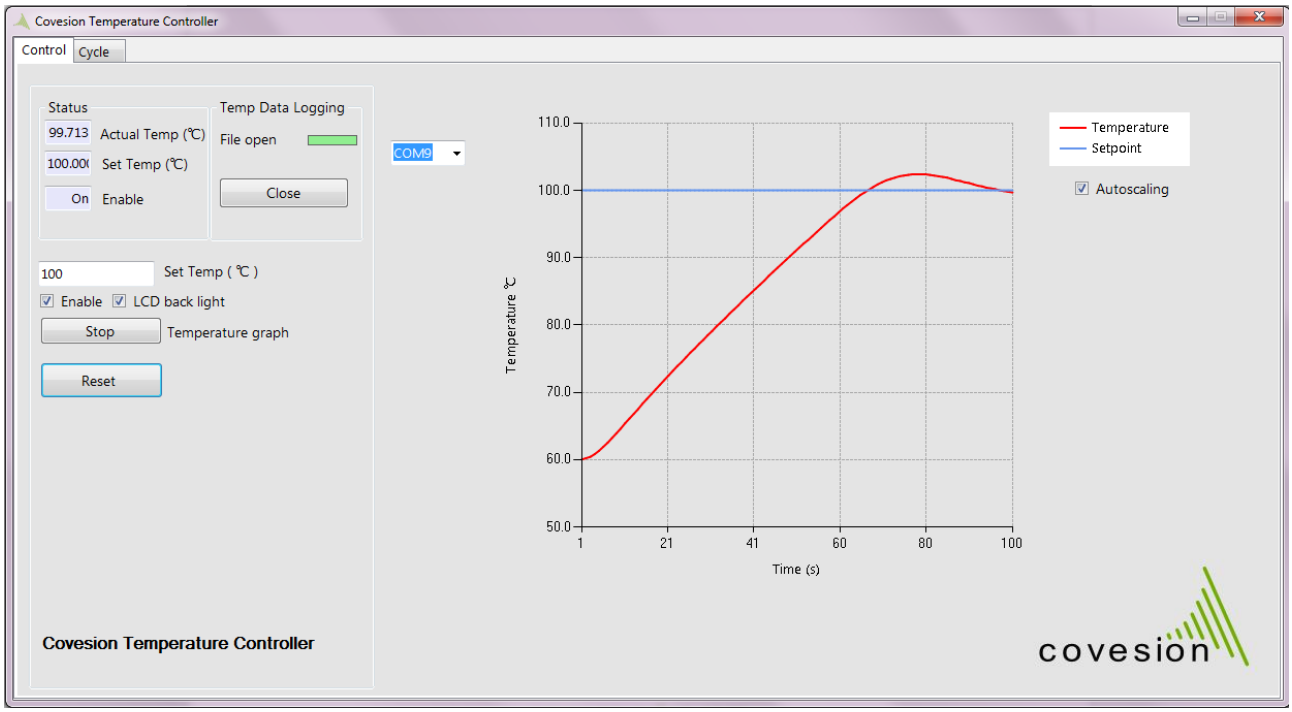
To turn on/off the LCD backlight, click on the “LCD Backlight” box. A checked tick-box turns the backlight ON and unchecked, the backlight is OFF.
[On start-up of the program, you may need to initialise the value by toggling the check box on/off.]

TEMPERATURE GRAPH

The “Start”/”Stop” button will activate/deactivate the graph displaying the “Actual Temp” and “Set Temp” as a function of time. The time axis is limited to a window of 100s. “Autoscaling” will adjust the y-axis accordingly. The “Reset” button, resets the time on the graph.

TEMP DATA LOGGING

To save the temperature data to a .csv file, select “New/Open” from which you can either create a new file or attach data to an existing file, e.g. “OC2 data.csv”. To start saving data, “Start” the “Temperature Graph” if not already running. Select “Close” to stop saving data.



4.2.3 Cycle Tab

The Cycle Tab can be used to set up to 5 different set temperatures for a defined number of cycles. This function allows you to set the “Dwell time” and “Ramp rate” (optional) between the various temperatures.

DWELL TIME

The time in seconds during which the oven maintains the “Set Temp”. Please note that the “Dwell time” counter begins as soon the “Set Temp” is reached. Therefore you may need to add extra time to allow for any overshoot.

RAMP RATE

This is the rate at which the next set temperature is reached (i.e. the set temperature in the subsequent step). The default “Ramp Rate” is the maximum ramp rate for the oven i.e. the same ramp rate as under normal operation. A checked tick-box allows the user to define the ramp rate in

C/s. Values less than 0.02C/s are recommended. The maximum recommended ramp rate is 0.05C/s, but this can be unstable at temperatures <100C, and at higher temperatures can take a few minutes to linearize. Note that the ramp rate will be limited to the passive cooling rate of the oven, so for example, at set temperatures between 30-40C the ramp rate should be limited <0.01C/s.

CYCLE COUNT
"Max" defines the maximum number of cycles, and "Actual" is the number of occurred cycles.

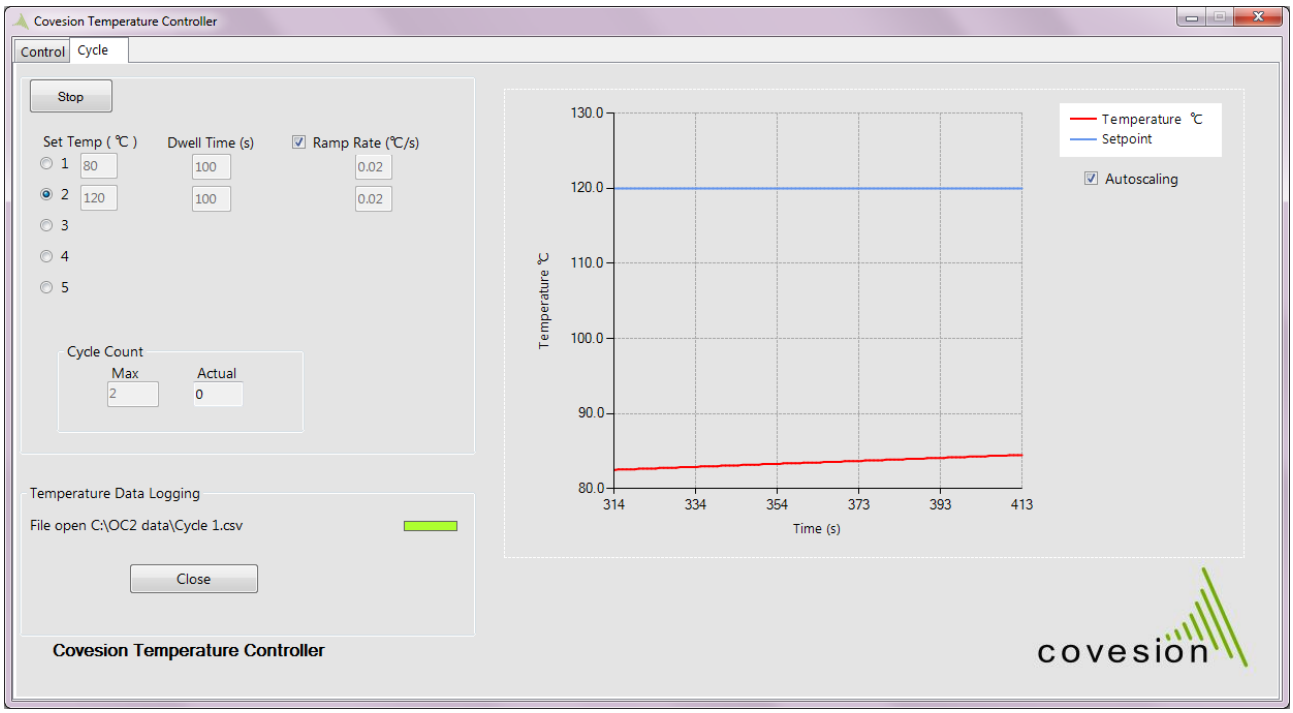
TEMP DATA LOGGING
To save the temperature data to a .csv file, select "New/Open" from which you can either create a new file or attach data to an existing file, e.g. "OC2 cycle.csv". To start saving data, "Run" the cycle function if not already running. Select "Close" to stop saving data.

4.2.3.1 Example Applications

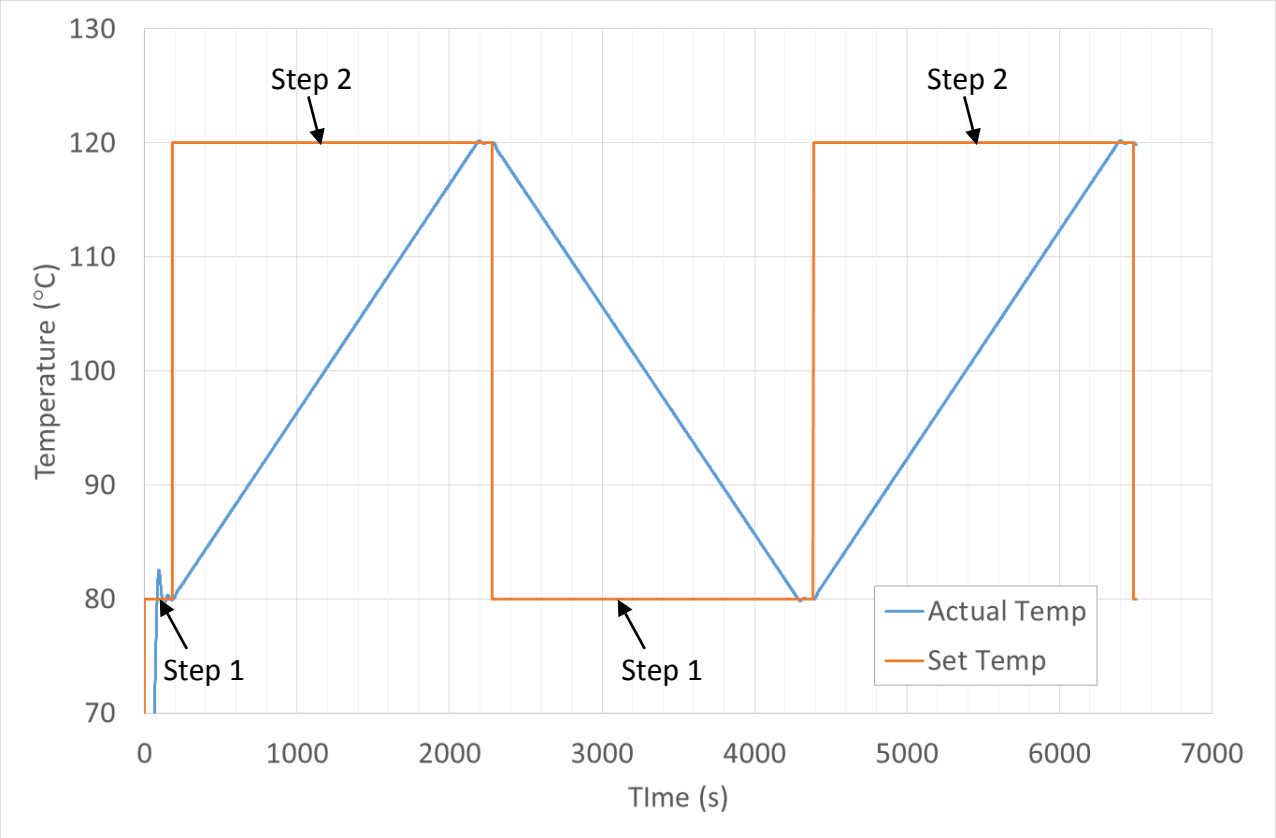
i. Finding the phase matching peak for 1550nm SHG

- For Covesion's MSHG1550-0.5-40, it is calculated that you can achieve phase matching in the 19.10µm grating period at 100°C.
- A slow ramp rate from 20C below the expected phase matching temperature to 20C above is a good search range to find the ideal phase matching temperature
- The screenshot below shows an example 2-step cycle function, set to run for 2 full cycles.

Step	Set Temperature (C)	Dwell Time (s)	Ramp Rate (C/s)
1	80	100	0.02
2	120	100	0.02



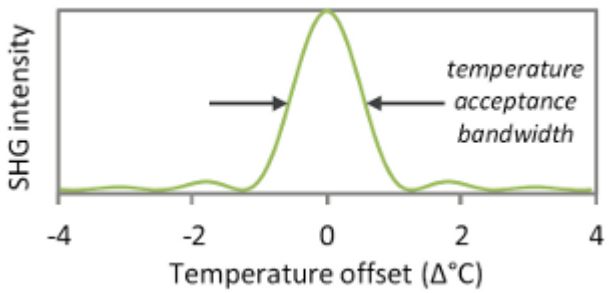
- The graph below is plotted from the saved .csv file, showing 2 full cycles. For the first step, the initial set temperature is reached using the default ramp rate.



- Monitor the SHG power output during the temperature sweep and note down where the maximum peak occurs.
- You can then narrow down the temperature range and start another cycle, or manually search for the optimum temperature using the keypad or “control tab”.

ii. Slow linear sweep for plotting the temperature dependence of SHG intensity

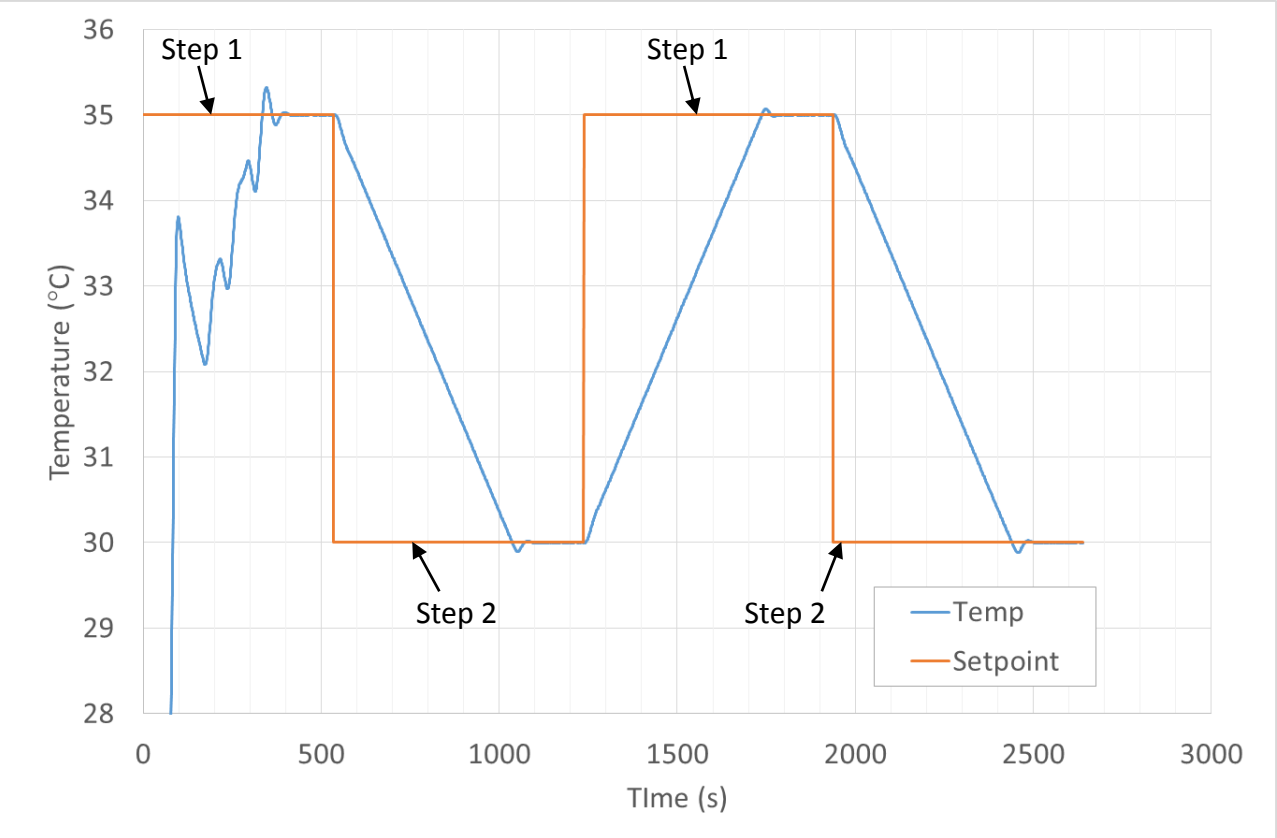
- The SHG intensity shows a $Sinc^2$ dependence with temperature whose bandwidth is dependent on the crystal length.



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- Choose a very slow ramp rate (<0.01C/s) to allow the oven and crystal to equilibrate and maintain a linear temperature ramp rate.
- We recommend that you check the temperature data to confirm the linearity of the ramp rate.
- The graph below shows an example of a 2-step cycle function for 2 cycles between 35C and 30C, at a ramp rate of 0.01C/s

Step	Set Temperature (C)	Dwell Time (s)	Ramp Rate (C/s)
1	35	200	0.01
2	30	200	0.01



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