

**STANDARD OPERATING PROCEDURE**

**HECONS ENVIRONMENTAL CHAMBER**

# HECONS ENVIRONMENTAL CHAMBER STANDARD OPERATING PROCEDURE

## A. Precautions before starting the chamber

1. Check the water level in the glass placed inside the chamber. Fill it with **Distilled Water** to almost full before doing any humidity based test. If the water level is too low, the humidity read by the controller may be wrong (as it is based on dry-bulb wet-bulb method). Ensure that the cotton wick is dipped inside the water, and not the wet bulb probe.
2. Visually check the water level in the DI tank located on top of the Ballice Environmental chamber. If the water level is less than 1/4<sup>th</sup> of tank depth, check that the supply valve (located below the RO unit on the backside wall) is open.

## B. Basic Operating Procedure

1. Place the samples evenly spaced on the trays provided inside the chamber, and firmly close the front door using the side latches.
2. If electrical connection has to be provided to the test sample, use **Teflon wires** of appropriate gauge. Wrap insulation tape at the output terminals of the test sample to avoid any short circuit due to moisture condensation.
3. Switch ON the chamber by pressing the switch at the wall socket and then the MAINS switch near the controller.
4. Set the required chamber temperature and humidity in the controller (refer section C). The temperature set point should be between -35 °C to 100 °C, and humidity set point can be between 40% RH to 100% RH.

[Remember while selecting the **EVENT** in the controller program that the compressor should not be turned on above 50 deg. °C. Also, if the compressor is used above 25 °C, the Solenoid Valve should be turned on (as it helps in cooling the compressor at high temperatures). The Fan should be kept ON at all times above -25 deg. °C.]

5. Issue “Run” command by pressing the buttons at the controller. The controller can also be programmed using the “pchlab” software available in the Lab PC (refer section C).
6. During chamber operation with humidity control, ensure constant supply of water to the reservoir tank at the back of the chamber (check every hour that the reservoir is full).

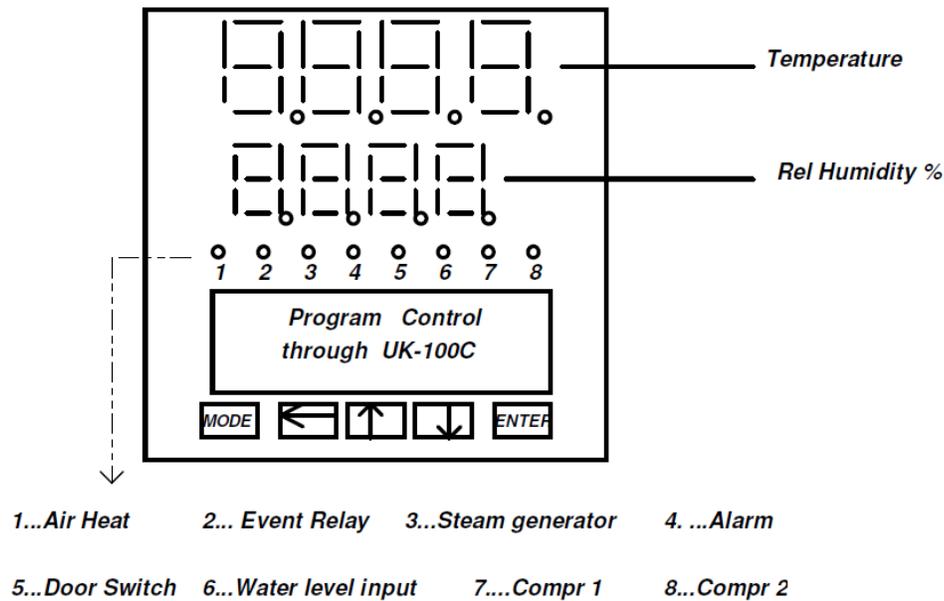
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7. After the chamber operation is over, take out the samples from the chamber, and latch the chamber door. Remember that if high temperature testing was going on, the chamber should be allowed to cool down sufficiently (to 50 °C at least) before reaching inside it.

### C. Programming the UK-100 Controller (Manually)

1. The basic layout of the controller is given below:



2. The various modes that may be used during normal operation are given below. These modes can be accessed by pressing the MODE key.
  - Read/Run: This is the default menu which shows the program status.
  - Prog Keys: This menu provides special function keys for quick launch of programmer functions (like Run, Hold, Abort etc.)
  - Set/Check: To set or check the user programs
3. To cycle between the different modes, use the UP arrow key. To select/enter a particular mode, use the ENTER key.
4. After selecting the particular mode, user can set various parameters of that mode, which are given below. Again, to cycle through the parameters, use the UP and DOWN arrow keys, and to set any value use the ENTER key.

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Mode	Parameters
<b>Read/Run</b> (only for checking status of chamber)	<ul style="list-style-type: none"> <li>• Program status + Temperature segment details</li> <li>• % RH + Wet Bulb details</li> <li>• Lap Details</li> <li>• Cascade Temperature</li> </ul>
<b>Prog Keys</b> (to run/stop/hold the chamber operation)	<ul style="list-style-type: none"> <li>• Prog. No. (which will be executed)</li> <li>• Run (starts the chamber operation)</li> <li>• Hold (will suspend the operation till its pressed again)</li> <li>• Online</li> <li>• Skip (skips the present step and goes to next step of currently running program)</li> <li>• Abort (stops the chamber operation)</li> </ul>
<b>Set/Check</b> (to feed the user program into the controller)	<ul style="list-style-type: none"> <li>• Prog No. + Step</li> <li>• Temp</li> <li>• RH%</li> <li>• Time</li> <li>• Event</li> <li>• Lap (No. of times the program will be repeated)</li> </ul>

5. The EVENT in the “Set/Check” mode has to be programmed carefully. It is a 4 bit number (XXXX), each bit signifying operation of a component as below.

F	S	N	C
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**F:** Fan    **S:** Solenoid Valve    **N:** Not Applicable    **C:** Cooling Compressor

# HECONS ENVIRONMENTAL CHAMBER STANDARD OPERATING PROCEDURE

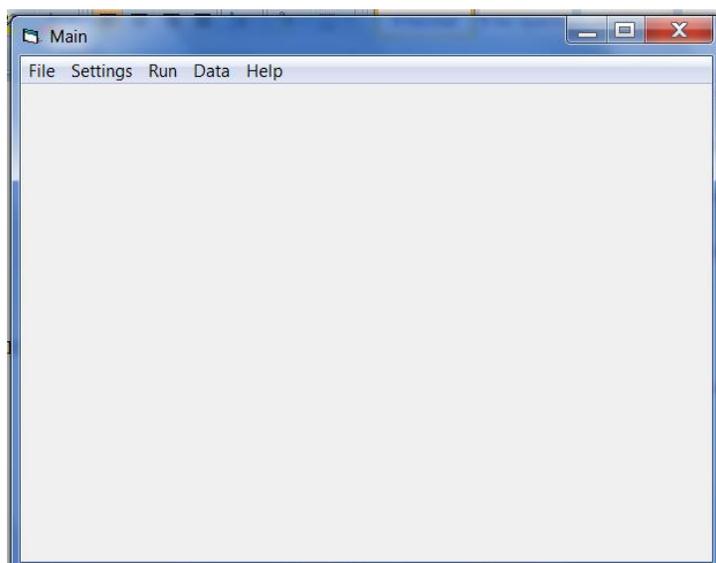
Temperature Range (C)	EVENT Settings
-35 to -25	F=0, S =0, N=0, C=1
-25 to +25	F=1, S =0, N=0, C=1
+25 to +45	F=1, S =1, N=0, C=1*
+45 to 100	F=1, S =0, N=0, C=0

\*C=1 only if fast cooling is genuinely needed, else C=0. In this temperature range, if C=1, then S=1 (must).

6. For entering a value, first press the ENTER key and check that the desired number starts blinking. Then use the arrows (UP, DOWN and LEFT) to change the value. UP arrow increments the digit, DOWN decrements it, while the LEFT arrow shifts the digit to the left. Finally press ENTER key to set the value.
7. Further details for manual programming (with examples) are given in the UK-100C Controller Operating Manual.

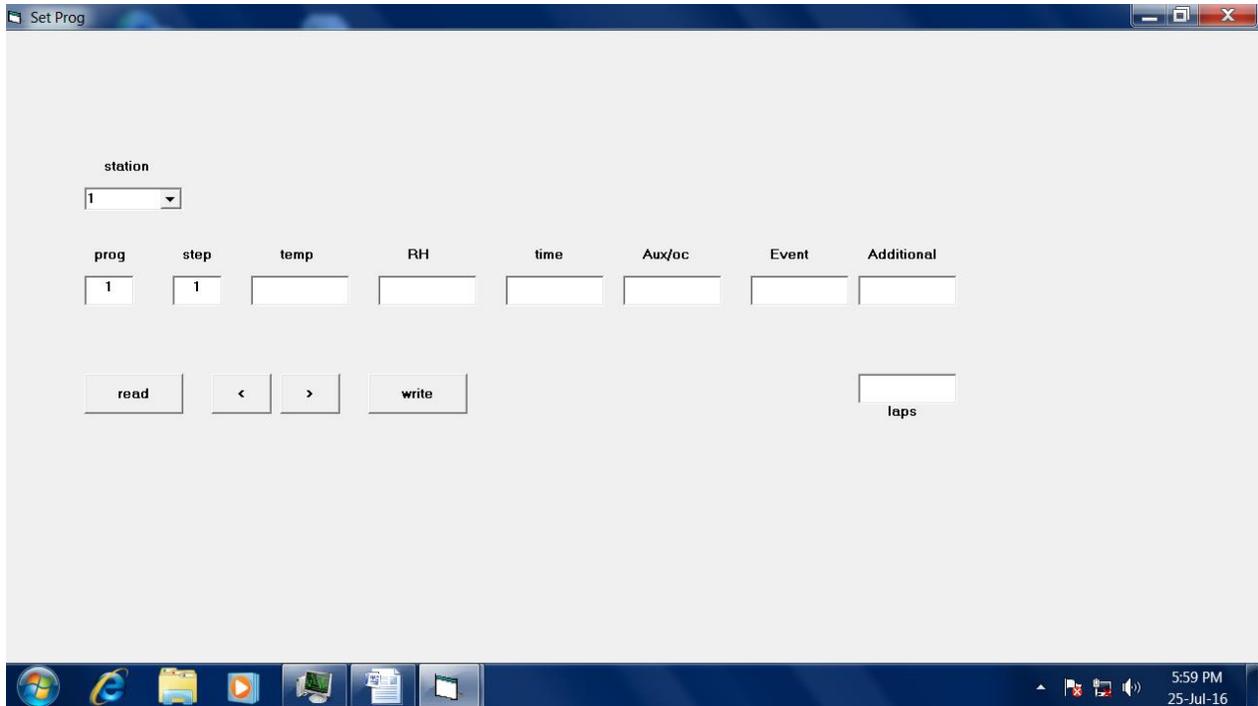
## D. Programming the UK-100 Controller (from PC)

1. Open the Controller software by clicking the shortcut “HECONS Chamber” in the PC desktop. Enter the password “uk100” (lower case letters) when prompted. Then the Main window will appear.



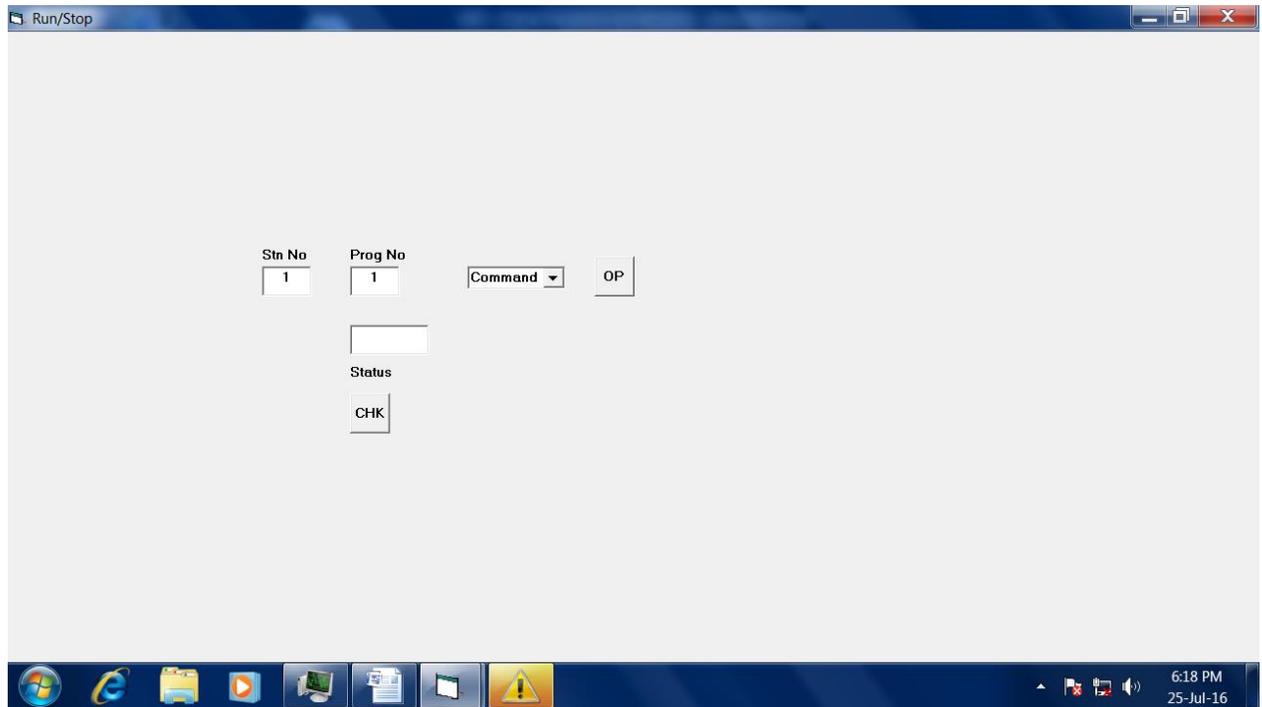
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- For programming the controller, go to the “Settings” tab and select “program”. The “Set Prog” window will appear as shown below.



- In the “Set Prog” window, the “Station” id should be kept 1. A program can have many steps, like ramping up, dwell time, and then ramp down etc. For each step, the parameters can be entered in this window. If the segment needs no RH control, set the RH to 0. The time is entered in the “hh.mm” format (“10.30” means 10 hours and 30 mins.). Do not enter anything in the “Aux/oc” and “Additional” boxes. To end the program, set temperature to “-”. “Laps” refers to the number of times the program has to be repeated. The read button is used to fetch the details of the program currently stored in the controller. After entering the values for the present step, click on the “write” button to transfer the step details to the controller. The user may again click “read” button to check that the step details has been properly fed into the controller. Then the user can go to the next step using the “>” button. The user can also go back to previous step by pressing the “<” button. After the entire program is fed to the controller, it is advisable to manually check the program in the controller (using the push buttons on controller body).
- To start the chamber, go to the “Run” tab in the Main window, and click “Start/Abort”. Following window will appear.

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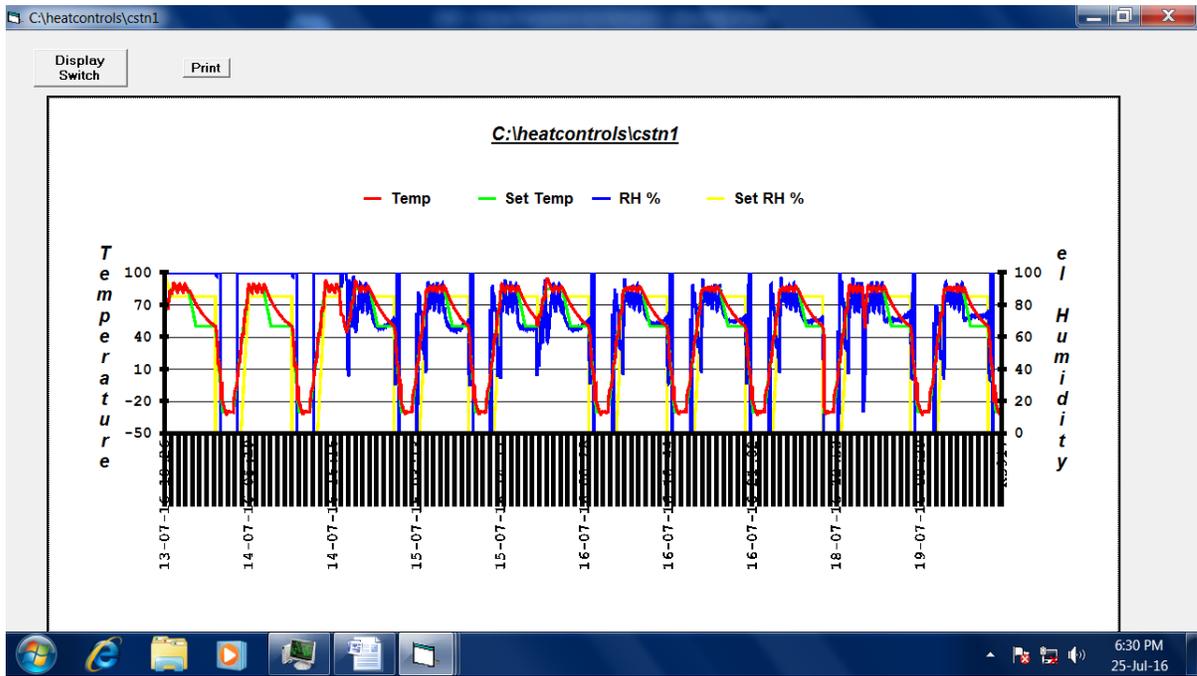


5. In the Run/Stop window, user can set the “Program No. and then select the “Run” command from the drop down menu. Alternately, if the chamber is running, the user can select the “Abort” command from the same menu to stop the chamber. The chamber status (running/stopped) can be checked by pressing the “CHK” button.
6. To look at the data (set temperature & humidity, and operating values), user can go to the “Data” tab in the Main window. On selecting “Real Time”, the “Scan-On-Line” window will appear, as follows. It will show the present status of the chamber.

M/C	STATION	DATE	TIME	PV TEMP	PV RH	SV TEMP	SV RH	PROG	STEP
	1								

7. On clicking inside any of the cells of the “Scan-On-Line” window, the graphical display window will appear, showing how the chamber parameters (temperature and humidity) have varied over time. In this window, user can click on the “Display Switch” button to see the tabulated data. This data is actually saved in the “c:/heatcontrols/cstn1” file (as indicated at the top of the window). Option to print this data is also available in this window.

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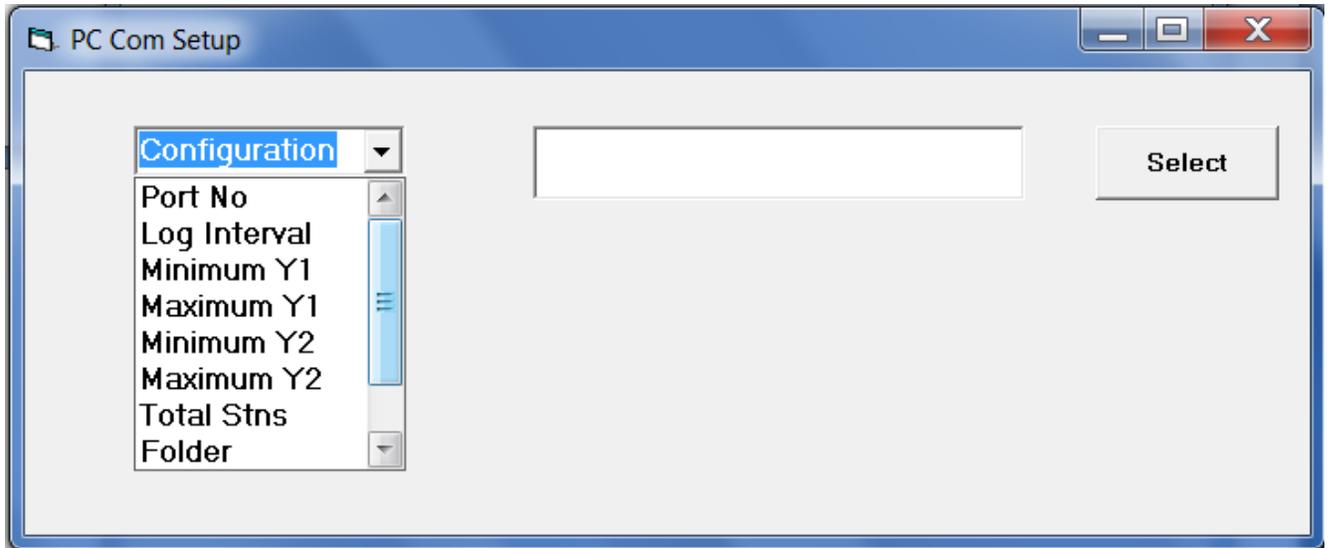


STATION	DATE	TIME	PV TEMP	PV RH %	SV TEMP	SV RH %	PROG	STEP	El time
1	13-07-16	18:26	59.7	99.5	60.2	099.1	04	01	00:03
1	13-07-16	18:27	60.6	100.0	60.6	098.9	04	01	00:04
1	13-07-16	18:28	61.7	100.0	61.1	098.6	04	01	00:05
1	13-07-16	18:30	62.9	100.0	61.5	098.4	04	01	00:06
1	13-07-16	18:31	64.1	100.0	62.0	098.1	04	01	00:07
1	13-07-16	18:32	65.2	100.0	62.4	097.9	04	01	00:08
1	13-07-16	18:33	66.2	100.0	62.9	097.6	04	01	00:09
1	13-07-16	18:34	66.9	100.0	63.3	097.3	04	01	00:10
1	13-07-16	18:35	67.4	100.0	63.8	097.1	04	01	00:11
1	13-07-16	18:36	67.8	100.0	64.2	096.8	04	01	00:12
1	13-07-16	18:37	68.0	100.0	64.6	096.6	04	01	00:13
1	13-07-16	18:38	68.1	100.0	65.1	096.3	04	01	00:14
1	13-07-16	18:39	68.2	100.0	65.5	096.1	04	01	00:15
1	13-07-16	18:40	68.2	100.0	66.0	095.8	04	01	00:16
1	13-07-16	18:41	68.1	100.0	66.4	095.6	04	01	00:17
1	13-07-16	18:42	68.1	100.0	66.9	095.3	04	01	00:18
1	13-07-16	18:43	68.0	100.0	67.3	095.0	04	01	00:19
1	13-07-16	18:44	67.8	100.0	67.8	094.8	04	01	00:20
1	13-07-16	18:45	67.7	100.0	68.2	094.5	04	01	00:21
1	13-07-16	18:46	67.5	100.0	68.7	094.3	04	01	00:22
1	13-07-16	18:47	67.3	100.0	69.1	094.0	04	01	00:23
1	13-07-16	18:48	67.1	100.0	69.6	093.7	04	01	00:24
1	13-07-16	18:49	66.9	100.0	70.1	093.5	04	01	00:25
1	13-07-16	18:50	66.7	100.0	70.5	093.2	04	01	00:26
1	13-07-16	18:51	66.7	100.0	71.0	093.0	04	01	00:27
1	13-07-16	18:52	66.9	100.0	71.4	092.7	04	01	00:29
1	13-07-16	18:53	67.3	100.0	71.9	092.4	04	01	00:30
1	13-07-16	18:55	68.1	100.0	72.4	092.2	04	01	00:31
1	13-07-16	18:56	69.2	100.0	72.8	091.9	04	01	00:32

- The controller keeps saving the data but regularly this saved data should be downloaded to the PC, and the memory of the controller should be cleared. For this, user should go to the "Stored Data" window from the "Data" tab in the Main window.

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9. Under the “Settings” tab in the Main window, there are other sections like “Setpoints”, “Configuration” and “M/c selection”. The “M/c Selection” is already set, and should not be changed by the user. In the “Configuration” section, one can set various parameters as follows:



- Port No. – Do not change it unless the communication to controller fails.
  - Log Interval – Usually set to 1 minute
  - Minimum Y1 – Minimum value of the Temperature axis in the graphical plot
  - Maximum Y1 – Maximum value of the Temperature axis in the graphical plot
  - Minimum Y2 – Minimum value of the RH axis in the graphical plot
  - Maximum Y2 – Maximum value of the RH axis in the graphical plot
  - Total Stns – Equal to 1 in our case
  - Folder – User can specify here the folder where the chamber performance data will be saved.
  - User Org – This is set to “NCPRE”
  - Var Nos. – No. of variables to be traced in the graphical plot (= 4).
10. Further details for PC-based controller programming are given in the PC Interface Manual for UK-100C Controller.

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## TECHNICAL DETAILS

<b>PARAMETER</b>	<b>RANGE</b>
Temperature Range	-35 C to +100 C
Temperature Sensor	RTD
Humidity Range (RH)	40% to 100%
RH Sensor	Dry Bulb – Wet Bulb type
Accuracy	+/- 1 C, +/- 3% RH
Glass Window	3" x 3" Quartz Glass
Compressor Gas	404
Working Space	50 cm x 50 cm x 50 cm
Power Supply	230 V, 1 Ph. , 50 Hz

NOTE: Additional information can be found in the following Manuals:

- Operating & Instruction Manual of HECONS Environmental Chamber
- UK-100C Controller Operating Manual
- PC Interface Manual for UK-100C Controller