OPERATING INSTRUCTIONS

Humidity Cabinet

39-1300, 39-1601

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Contents

1 General Description

The cooled laboratory humidity cabinet provides the user with extremely accurate and safe temperature control over a wide temperature range.

1.1 Heating

Low wattage heaters are attached to the outer surface of the inner chamber in such a manner as to ensure even heating throughout the chamber.

1.2 Cooling

Direct expansion coils are coupled to a hermetic condensing unit via a solenoid valve. When the refrigeration switch is switched on, the compressor will run continuously. The coolant flow is controlled by a solenoid valve, which is electronically opened and closed by the temperature controller.

1.3 Temperature Controller

The temperature is accurately controlled by a Jumo dTRON 316 microprocessor temperature controller. The controller uses the signal from a PT100 sensor located in the chamber to control the current supplied to the heaters. The temperature can be easily adjusted. See Section 3 for details.

1.4 Over / Under Temperature Safety Cut Out

A TLK38 digital cut out protects the contents of your incubator by allowing you to program over & under temperature safety cut out set points. When the chamber temperature goes out of limits, an audible alarm and visible red neon will bring to your attention any problems. Reset buttons are provided below the cut out for you to manually reset the out-of-limit system.

1.5 Circulating Fan

Air is drawn up through the chamber by a circulating fan located in the top and returned to the base via a full width duct at the rear of the chamber. A door micro-switch stops the fan when the door is opened.

1.6 Humidity

A wide range of fixed relative humidities can be maintained by adding a suitable saturated salt solution to the base of the chamber. See Section 4 for details.

2 Installation

2.1 Connect the 3-core cable to a 240V AC, 50Hz mains supply as follows:

BROWN	-	LIVE
BLUE	-	NEUTRAL
GREEN/YELLOW	-	EARTH

2.2 The incubator is internally protected by a fuse, which isolates the cabinet from the electrical supply if excessive current is drawn. The fuse holder is located on the rear of the cabinet. The instruments on the control panel will illuminate when the supply is connected correctly and POWER switch is on.

2.3 General Precautions


A qualified electrician or other competent person must carry out any electrical work required to install the incubator.


Do not place the incubator in direct sunlight or near a heat source.


Make sure the incubator is not standing on its electrical supply cable.


Before the incubator is switched on for the first time, it should stand still for 2 hours after final positioning to allow the refrigerant to settle.


Keep all ventilation grilles clear. Failure to do so may result in component failure.


The refrigeration system gives off heat when operating. Always ensure there is adequate ventilation around the incubator. NEVER PLACE ANYTHING ON TOP OF THE INCUBATOR.


Before any cleaning or maintenance work is carried out, the mains supply must be switched off and the plug removed from the electrical socket.

3 Temperature Setting Procedure

Switch both the POWER and COOLING switches ON. DO NOT switch the HIGH HUMIDITY switch on yet! *Please see Section 4.1 for more details.*

3.1 The JUMO dTRON 316 microprocessor temperature controller on your incubator has two LED displays. The upper display, which is red, represents the actual chamber temperature. The lower display, which is green, represents the target temperature. The controller has 4 buttons marked as follows;

PGM - Program button (Enters the programming mode).
▲ - Increases the temperature set point
▼ - Decreases the temperature set point.
EXIT - Exits the programming mode.

The **yellow 3** on the temperature controller shows when heat is being supplied. The **yellow 5** shows when cooling is being supplied.

3.2 The incubator operating temperature or set point (SP) can be altered by simply pressing either the ▲ button to increase the temperature or the ▼ button to decrease the temperature. When the required temperature has been entered, release all buttons and the green display will blink once to confirm that a new target temperature has been stored.

3.3 Over / Under Temperature Safety Cut Out

A TLK38 digital safety cut out unit provides essential over & under temperature protection for the products inside the chamber. The cut out has buttons labelled as follows:

P - Enters the programming mode.

U - *No function.*

▲ - **INCREASES** the displayed value.

▼ - **DECREASES** the displayed value.

3.4 Setting An Over Temperature Cut-Out Value

If, for example, you would like to operate your incubator at +20.0°C, an over temperature cut-out value needs to be programmed into the cut-out. We recommend that the cut-out value is set to **2 degrees higher** than your chamber temperature. In the example above, the over temperature cut-out set point needs to be set +22°C. To do this follow steps 1 - 3 below:

a) Press the [P] button **once only**. Flashing **AL1** will be displayed plus a value (the **over temperature** cut out value).

b) Press the [▲] button to increase the **over temperature** cut-out value or the [▼] button to decrease the **over temperature** cut-out value.

c) Once the value of your choice is displayed, press the [P] button again and the new value will be stored and retained in permanent memory.

3.5 Over Temp Neon, Buzzer & Reset Button

If your incubator overheats, the buzzer will sound and the over temperature neon will illuminate. **The heaters will automatically disconnect to prevent further overheating**. Once the chamber temperature has stopped rising, and has fallen below the cut out set point, the heaters will re-connect automatically. The buzzer & neon will remain on until a member of staff has acknowledged the alarm. To reset the buzzer & alarm, press the reset button alongside the illuminated neon.

3.6 Setting An Under Temperature Cut Out Value

If, for example, you would like to operate your incubator at +20.0°C, an under temperature cut out value needs to be programmed into the cut out. We recommend that the cut-out value is set to **2 degrees lower** than your chamber temperature. In the example above, the under temperature cut out set point needs to be set +18°C. To do this follow steps 1 - 3 below:

a) Press the [P] button **twice**. Flashing **AL2** will be displayed plus a value (the **under temperature** cut out value).

b) Press the [▲] button to increase the **under temperature** cut out value or the [▼] button to decrease the **under temperature** cut out value.

c) Once the value of your choice is displayed, press the [P] button again and the new value will be stored and retained in permanent memory.

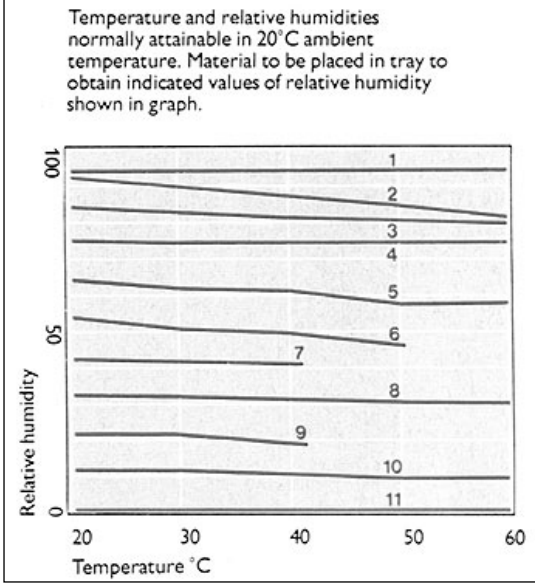
3.7 Under Temp Neon, Buzzer & Reset Button

If your incubator overcools, the buzzer will sound and the under temperature neon will illuminate. **The cooling system will automatically disconnect to prevent further overcooling**. The buzzer & neon will remain on until a member of staff has acknowledged the alarm. To reset the buzzer & alarm, press the reset button alongside the illuminated neon.

3.8 Allow the chamber temperature to stabilise before putting your products into the chamber.

4 Humidity Control

A wide range of fixed and relative humidities can be achieved by adding a suitable saturated salt solution to the base of the chamber. The relative humidity of air in contact with saturated salt solutions reaches known equilibrium values at certain temperatures.



Curve	Material
1	Distilled water
2	Potassium nitrate-saturated solution
3	Potassium chloride-saturated solution
4	Sodium chloride-saturated solution
5	Sodium nitrite-saturated solution
6	Sodium dichromate-saturated solution
7	Potassium carbonate-saturated solution
8	Magnesium chloride-saturated solution
9	Potassium acetate-saturated solution
10	Lithium chloride-saturated solution
11	Silica gel-dried

Salts Graph

The graph above shows the temperatures and relative humidities for several of the more common saturated salts. The distilled water/saturated salt solution should be topped up regularly and should fully cover the floor AND high humidity element at all times.

4.1 High Humidity Option

A high humidity level of approx. 98%RH is maintained by placing distilled water in the base of the chamber and switching the HIGH HUMIDITY switch ON.

Do not use the HIGH HUMIDITY switch unless the floor of the chamber is fully covered with water. It is essential that the heating element on the chamber floor is covered at all times. This must be checked daily.

4.2 Allow the chamber humidity to stabilise before putting your products into the chamber.

5 Maintenance

No routine maintenance is necessary but regular cleaning of the inner chamber is essential.

5.1 Keep ventilation grilles clear and unobstructed.

5.2 The chamber should be regularly de-frosted as a substantial build-up of ice in the air circulation duct will restrict the airflow and affect the incubators performance. It is recommended that the service ports on the right of the incubator remain sealed with the threaded red bungs supplied to reduce the tendency for humidity in the air to condense out in the chamber.

APPENDIX A

Digital Data Recorder (Temperature & Humidity)

1 Introduction

The Eurotherm nanodac Digital Data Recorder is a simple to use modern version of an analogue paper chart recorder. Data can be viewed on screen or downloaded for viewing on a computer. The digital data recorder has the following features and benefits:

- 3.5" colour TFT screen.
- 50 MB built in non-volatile memory for recording temperature and humidity data.
- Panel mounted USB socket (for downloading recorded data).
- Scrollable colour graphs for **temperature** and **humidity** displayed in real time.
- Data is recorded and stored every few seconds in .csv format
- Recorded data can be imported into Microsoft© Excel© via a USB flash drive.

Recording of data (to built-in memory) starts automatically after power on.

The recorder will hold approximately 1 years' worth of data before data is overwritten.

Recorded data can be downloaded onto a USB flash drive for analysis (as required).

The recorder does not need a USB flash drive inserted to record data. (It only needs one for *downloading* recorded data).

In the event of a power cut, stored data will remain safe in the recorder. Recording will not happen during a power cut.

2 Operation

2.1 Switching On

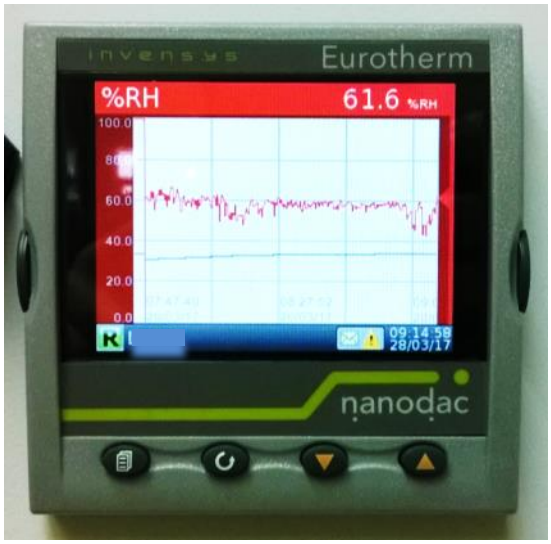
After plugging the cabinet in, the data recorder will switch on and show a logo while starting up. (A fuel gauge below the logo shows the loading progress).

Please wait for the recorder to start up

The recorder has been factory configured to record data automatically, once it has fully started up. No button pressing required.

The screen (below) will appear once the recorder is operating normally:

Normal operating screen (°C)



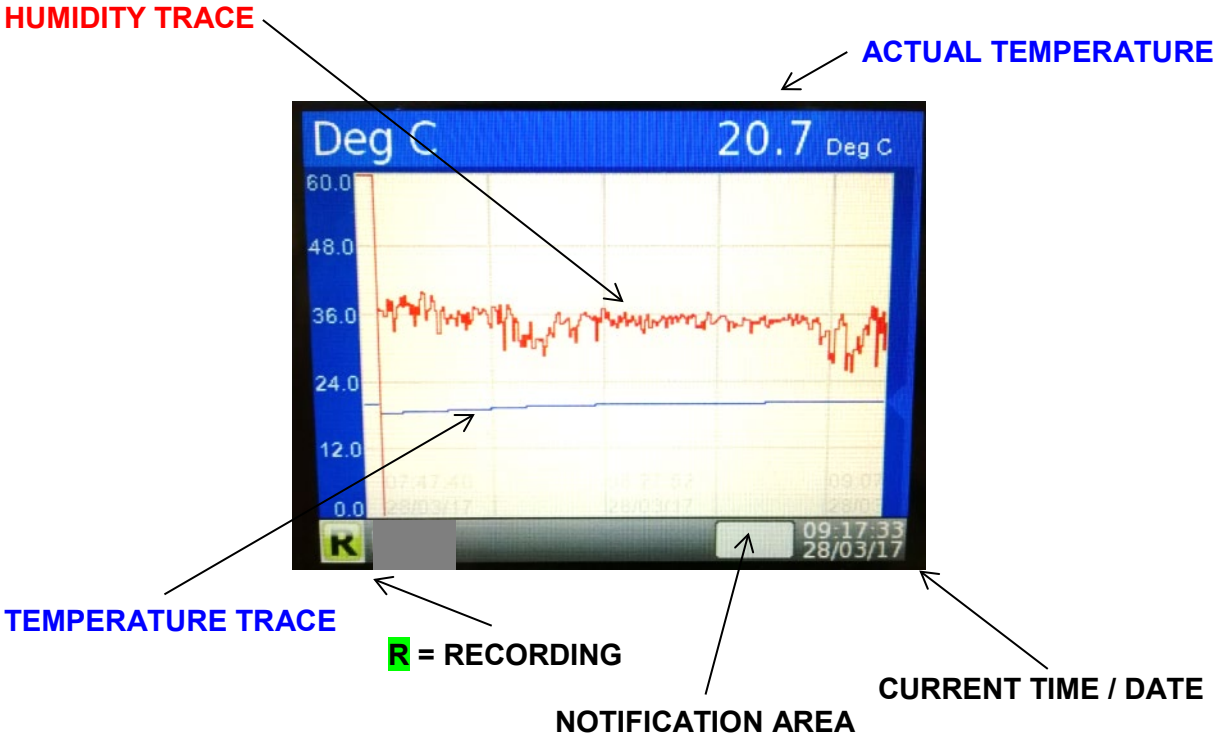
Normal operating screen (%RH)

The screen changes automatically between **temperature** and **humidity** every few seconds during normal operation.

2.2 Normal Operation

The recorder starts recording data automatically. The screen shows a live animated graph (in real time) for both the **temperature** and the **humidity**. The screen changes between **temperature** and **humidity** every few seconds. Large numbers in the top right corner of the screen show the actual **temperature** or actual **humidity** so it can be verified easily.

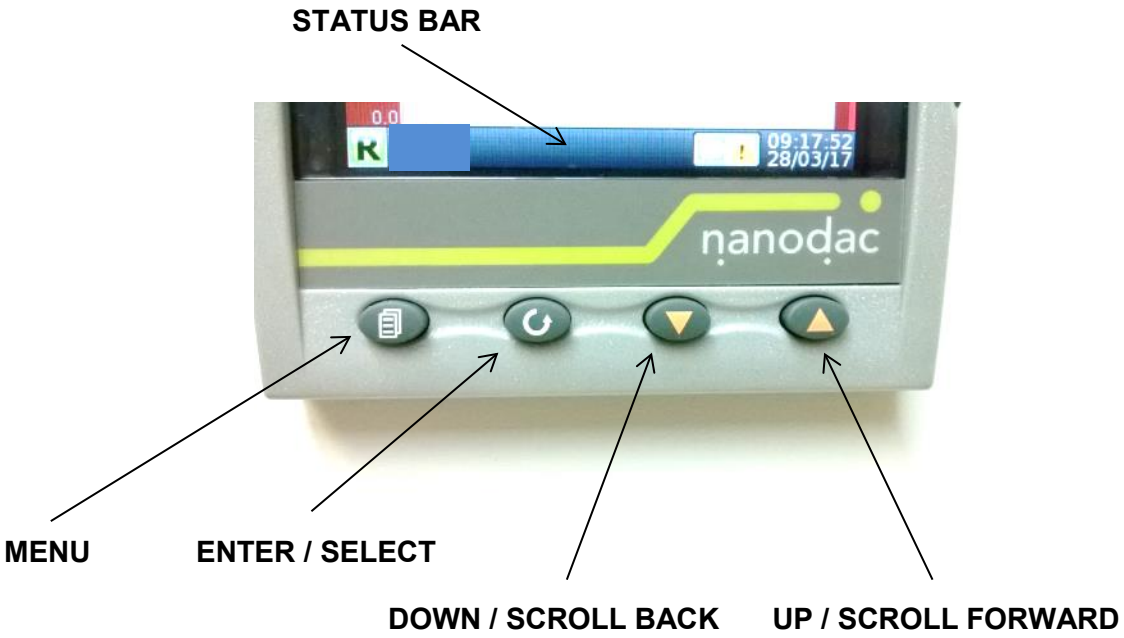
The graph updates itself every few seconds and draws a history line. Historic data from this time line can be viewed from the main menu.



2.3 Control Panel Buttons

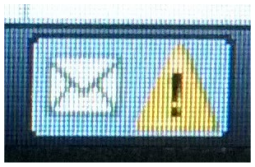
It is not necessary to enter the menu or change any settings for normal operation. The recorder has been pre-configured to work optimally without any adjustment or input from the user.

The buttons on the recorders control panel perform these functions:



2.4 Screen Icons

The lower part of the screen contains the status bar, which shows the current date / time. The following icons may also be visible:



A flashing yellow warning triangle means there is no USB flash drive connected.
A white envelope is a system message (used by engineers only).

A green and black R icon means data is being recorded and stored in internal memory (temperature and humidity).

2.5 Viewing Graph Data On Screen

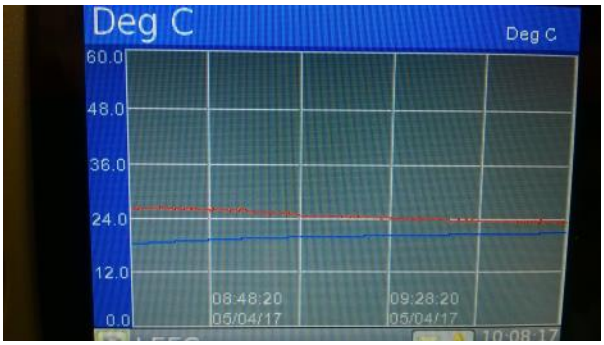
Historical graph data can be viewed on-screen without affecting the recording process.
To view historical graph data:

1) Press the  button.

   The following screen will appear:

2) Press the  button and select **History**.

3) Press the  button and a grey background graph screen will be visible. (This is historic graph data that has been recorded for temperature and humidity).



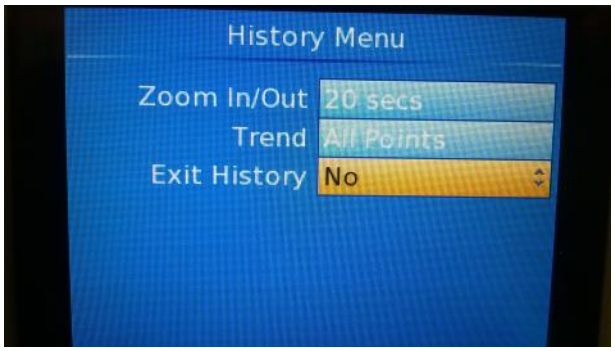
4) Press the  button to scroll BACK in time.

5) Press the  button to scroll FORWARD in time.

6) Press the  button to change between **temperature** and **humidity** screens.

7) When you have finished viewing the historic graph data, press the  button.

The following screen will appear:



8) Press the  button and change **No** to **Yes** with the  or  button.

9) Press the  button

The following screen will appear:

10) Select **Home**.

11) Press the  button to exit the Menu.

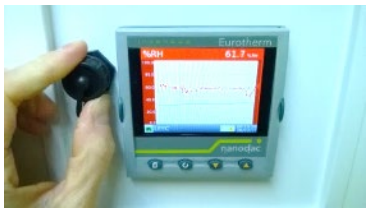
The normal operation screen (white background) will be displayed. The screen changes automatically between **temperature** and **humidity** every few seconds.

2.6 USB Socket

A panel mounted USB socket is included next to the recorder. The recorder does not need a USB flash drive inserted to record data - the data is recorded and stored inside the recorder as standard.

The USB socket is only needed when data download to a USB flash drive is required.

A removable screw cap prevents dirt / dust / moisture from entering the USB socket when not in use. Remove the screw cap by turning the cap anti-clockwise to expose the USB socket.


Unscrew cap


Cap removed


Inserting a USB flash drive

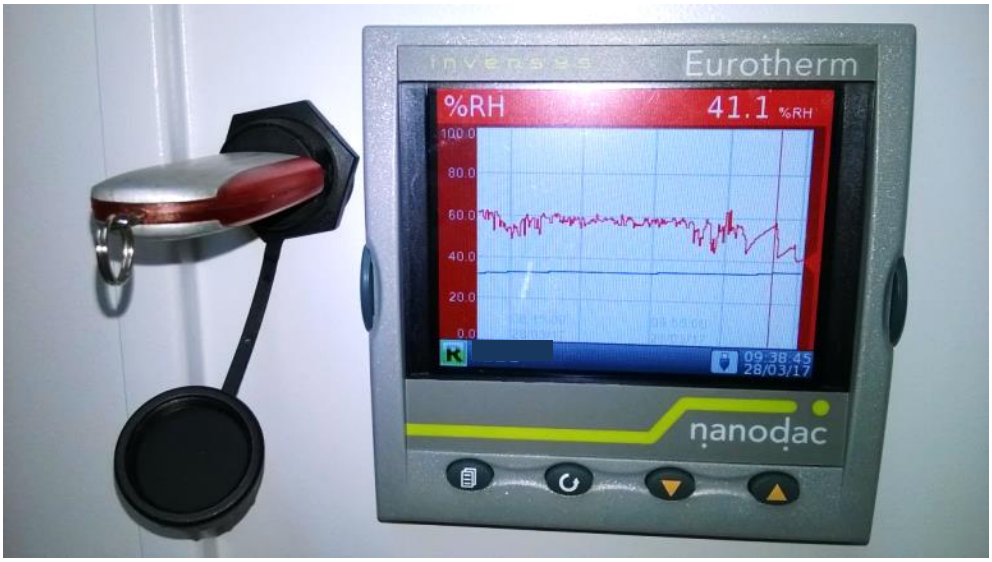
Replace the screw cap when you have finished downloading.

2.7 USB Flash Drive Compatibility

The recorder will accept any brand of USB flash drive **up to 8GB** in capacity.
Do not use a USB flash drive larger than 8GB in capacity.

1GB ✓
2GB ✓
4GB ✓
8GB ✓
16GB ✗
32GB ✗
64GB ✗
128GB ✗
256GB ✗

2.8 Downloading Graph Data



The recorder holds approximately 1 years' worth of data internally before data is overwritten. The recorded data is stored in .csv format.

Recorded data can be downloaded onto a USB flash drive when required. This can be done daily, weekly, or monthly.

After the downloaded data has been analysed in a computer, the USB flash drive does not need inserting back into the recorder.

The recorder will continue recording and storing data internally after the USB flash drive has been removed.

When the USB flash drive is next inserted back into the recorder, it will synchronise and update the existing data on that USB flash drive with any new recorded data which has been captured since the last download.

No data acquisition software required for data analysis.

When the recorded data is needed for analysis on a computer, follow this procedure:

Insert a USB flash drive into the USB socket (max. capacity 8GB).

Wait 15 minutes (for the recorded data to synchronise) before removing the USB flash drive.

If it has been a month or longer since you last downloaded recorded data, you may have to wait up to 30 minutes for the data to synchronise.

Remove the USB flash drive from the USB socket.

Insert the USB flash drive into a computer running Microsoft© Excel© (or equivalent).

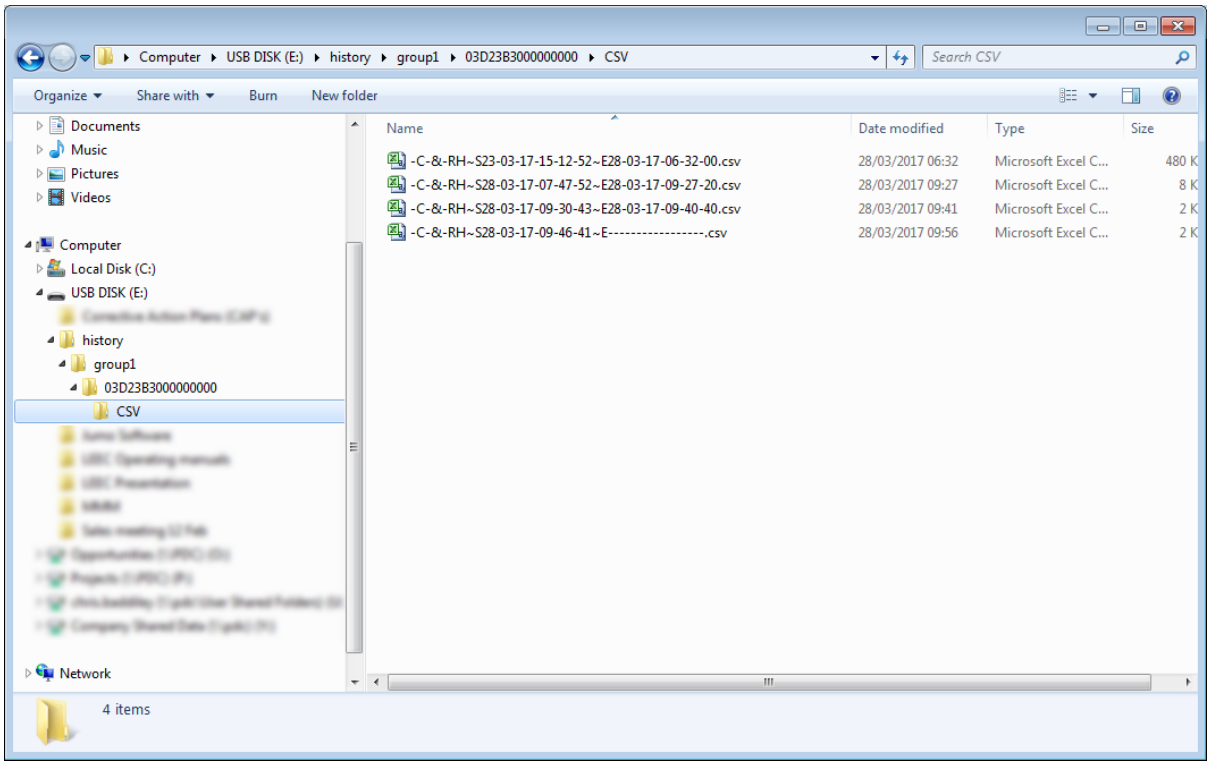
2.9 Viewing the Downloaded Graph Data

On your computer, navigate to where the downloaded data has been stored on the USB flash drive.

The normal data storage location will be on the flash drive in a folder called “history”. (There may be other sub folders within the “history” folder).

The recorded data will be stored in .csv format in a sub-folder called “CSV”.

An example is shown below:



Open the .csv data in Microsoft© Excel© and display the data in a graph of your own choice.

APPENDIX B

Programming an Offset Parameter into a JUMO dTRON 316 temperature controller

If the temperature displayed by your replacement Jumo 316 controller does not match the actual chamber temperature, an offset parameter may have to be programmed into the controller. To do this, follow the steps below:

1. When the controller is in its normal mode, press the **PGM** button once.
2. **OPr** should be displayed.
3. Press the _ button twice. **ConF** should appear.
4. When **ConF** is displayed, press the **PGM** button once. **iNP** should appear.
5. Press the **PGM** button twice. **SEnS** should be displayed.
6. Press the _ button twice. **OFFS°C** should be displayed.
7. To adjust the offset value, press the **PGM** button (**OFFS** flashes), then use the _ button to increase the OFFS value, or the _ button to decrease the OFFS value. (If, for example, the temperature display was originally reading 2.0° too high, you need to put a negative offset value in of -2.0. If the temperature display was originally reading 1.0° too low, you need to put a positive offset value in of +1.0).
8. When the desired offset has been entered, **wait a few seconds** and the display will blink to confirm the new offset parameter has been stored.
9. Press the **EXIT** button four times.
10. The current chamber temperature will then be displayed which will include the additional offset value that you have just programmed in.
11. If at any stage during this procedure, the buttons are not pressed for 10 seconds or more, the controller will automatically return to its normal mode and you will have to restart from step 1.

APPENDIX C

TLK38 OFFSET Instructions

1. If the temperature displayed by the TLK38 does not match the calibrated test equipment, the TLK38 can be adjusted by means of an **offset parameter**.
2. Insert a calibrated probe (from your independent test equipment) into the incubator chamber via the access port.
3. Leave the incubator to reach its set point and stabilise.
4. Press and hold the P button for 5 seconds. ConF will be displayed.
5. Press the P button. 0 will be displayed.
6. Use the ▲ button to make the display read 381
7. Press the P button. SP will be displayed.
8. Press the ▼ button once only. InP will be displayed.
9. Press the P button. SEnS will be displayed.
10. Press the ▼ button several times until OFSt is displayed.
11. Press the P button.
12. Change the value of OFSt from 0 (factory default) to whatever value is needed to correct the misreading display. (A positive or negative value can be entered).
13. Press the P button.
14. Hold the ▼ button for 1 second. InP will be displayed.
15. Press the ▼ button. OUt will be displayed.
16. Press the ▼ button. AL1 will be displayed.
17. Press the ▼ button. AL2 will be displayed.
18. Press the ▼ button. LbA will be displayed.
19. Press the ▼ button. rES will be displayed.
20. Hold the ▼ button for 2 seconds.
21. **The correct temperature should now be showing on the TLK38.**
22. POWER OFF / POWER ON to store the settings and reboot the incubator.

DO NOT CHANGE ANY OTHER SETTING IN THE TLK38 CONTROLLER

DIRECTIVE ON WASTE ELECTRICAL & ELECTRONIC EQUIPMENT (WEEE)

Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August of 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of life equipment to the Producer for disposal at no charge to the user.

Note: *For return for recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment for proper disposal.*

Important document. Retain with product records.

GERMAN

Elektrogeräte, die mit diesem Symbol gekennzeichnet sind, dürfen in Europa nach dem 12. August 2005 nicht mehr über die öffentliche Abfallentsorgung entsorgt werden. In Übereinstimmung mit lokalen und nationalen europäischen Bestimmungen (EU-Richtlinie 2002/96/EC), müssen Benutzer von Elektrogeräten in Europa ab diesem Zeitpunkt alte bzw. zu verschrottende Geräte zur Entsorgung kostenfrei an den Hersteller zurückgeben.

Hinweis: *Bitte wenden Sie sich an den Hersteller bzw. an den Händler, von dem Sie das Gerät bezogen haben, um Informationen zur Rückgabe des Altgeräts zur ordnungsgemäßen Entsorgung zu erhalten.*

Wichtige Informationen. Bitte zusammen mit den Produktinformationen aufbewahren.

FRENCH

A partir du 12 août 2005, il est interdit de mettre au rebut le matériel électrique marqué de ce symbole par les voies habituelles de déchetterie publique. Conformément à la réglementation européenne (directive UE 2002/96/EC), les utilisateurs de matériel électrique en Europe doivent désormais retourner le matériel usé ou périmé au fabricant pour élimination, sans frais pour l'utilisateur.

Remarque : *Veuillez vous adresser au fabricant ou au fournisseur du matériel pour les instructions de retour du matériel usé ou périmé aux fins d'élimination conforme.*

Ce document est important. Conservez-le dans le dossier du produit.

ITALIAN

Le apparecchiature elettriche con apposto questo simbolo non possono essere smaltite nelle discariche pubbliche europee successivamente al 12 agosto 2005. In conformità alle normative europee locali e nazionali (Direttiva UE 2002/96/EC), gli utilizzatori europei di apparecchiature elettriche devono restituire al produttore le apparecchiature vecchie o a fine vita per lo smaltimento senza alcun costo a carico dell'utilizzatore.

Nota: *Per conoscere le modalità di restituzione delle apparecchiature a fine vita da riciclare, contattare il produttore o il fornitore dell'apparecchiatura per un corretto smaltimento.*

Documento importante. Conservare con la documentazione del prodotto.

DANISH

Elektriske apparater, der er mærket med dette symbol, må ikke bortskaffes i europæiske offentlige affaldssystemer efter den 12. august 2005. I henhold til europæiske lokale og nationale regler (EU-direktiv 2002/96/EF) skal europæiske brugere af elektriske apparater nu returnere gamle eller udtjente apparater til producenten med henblik på bortskaffelse uden omkostninger for brugeren.

Bemærk: *I forbindelse med returnering til genbrug skal du kontakte producenten eller leverandøren af apparatet for at få instruktioner om, hvordan udtjente apparater bortskaffes korrekt.*

Vigtigt dokument. Opbevares sammen med produktdokumenterne.

SWEDISH

Elektronikutrustning som är märkt med denna symbol kanske inte kan lämnas in på europeiska offentliga sopstationer efter 2005-08-12. Enligt europeiska lokala och nationella föreskrifter (EU-direktiv 2002/96/EC) måste användare av elektronikutrustning i Europa nu återlämna gammal eller utrangerad utrustning till tillverkaren för kassering utan kostnad för användaren.

Obs! *Om du ska återlämna utrustning för återvinning ska du kontakta tillverkaren av utrustningen eller återförsäljaren för att få anvisningar om hur du återlämnar kasserad utrustning för att den ska bortskaffas på rätt sätt.*

Viktigt dokument. Spara tillsammans med dina produktbeskrivningar.

SPANISH

A partir del 12 de agosto de 2005, los equipos eléctricos que lleven este símbolo no deberán ser desechados en los puntos limpios europeos. De conformidad con las normativas europeas locales y nacionales (Directiva de la UE 2002/96/EC), a partir de esa fecha, los usuarios europeos de equipos eléctricos deberán devolver los equipos usados u obsoletos al fabricante de los mismos para su reciclado, sin coste alguno para el usuario.

Nota: *Sírvase ponerse en contacto con el fabricante o proveedor de los equipos para solicitar instrucciones sobre cómo devolver los equipos obsoletos para su correcto reciclado.*

Documento importante. Guardar junto con los registros de los equipos.

DUTCH

Elektrische apparatuur die is voorzien van dit symbool mag na 12 augustus 2005 niet meer worden afgevoerd naar Europese openbare afvalsystemen. Conform Europese lokale en nationale wetgegeving (EU-richtlijn 2002/96/EC) dienen gebruikers van elektrische apparaten voortaan hun oude of afgedankte apparatuur kosteloos voor recycling of vernietiging naar de producent terug te brengen.

Nota: *Als u apparatuur voor recycling terugbrengt, moet u contact opnemen met de producent of leverancier voor instructies voor het terugbrengen van de afgedankte apparatuur voor een juiste verwerking.*

Belangrijk document. Bewaar het bij de productpapieren.

POLISH

Sprzęt elektryczny oznaczony takim symbolem nie może być likwidowany w europejskich systemach utylizacji po dniu 12 sierpnia 2005. Zgodnie z europejskimi, lokalnymi i państwowymi przepisami prawa (Dyrektywa Unii Europejskiej 2002/96/EC), użytkownicy sprzętu elektrycznego w Europie muszą obecnie przekazywać Producentowi stary sprzęt lub sprzęt po okresie użytkowania do bezpłatnej utylizacji.

Uwaga: *Aby przekazać sprzęt do recyklingu, należy zwrócić się do producenta lub dostawcy sprzętu w celu uzyskania instrukcji dotyczących procedur przekazywania do utylizacji sprzętu po okresie użytkowania.*

Ważny dokument. Zachować z dokumentacją produktu.

PORTUGESE

Qualquer equipamento eléctrico que ostente este símbolo não poderá ser eliminado através dos sistemas públicos europeus de tratamento de resíduos sólidos a partir de 12 de Agosto de 2005. De acordo com as normas locais e europeias (Directiva Europeia 2002/96/EC), os utilizadores europeus de equipamentos eléctricos deverão agora devolver os seus equipamentos velhos ou em fim de vida ao produtor para o respectivo tratamento sem quaisquer custos para o utilizador.

Nota: *No que toca à devolução para reciclagem, por favor, contacte o produtor ou fornecedor do equipamento para instruções de devolução de equipamento em fim de vida para a sua correcta eliminação.*

Documento importante. Mantenha junto dos registos do produto.