OPERATING INSTRUCTIONS FOR
PLANTGROWTH INCUBATOR
MODELS PL2, PL3, PL33
WITH JUMO dTRON 316 CONTROL,
SMITH'S DIGITAL TIMERS &
TLK38 OVER & UNDER
TEMPERATURE CUT OUT.

PLEASE TAKE TIME TO READ THIS MANUAL

1.0 Incubator features

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1.0 INCUBATOR FEATURES

Your incubator is constructed from stainless steel and has high efficiency polyurethane insulation. The refrigeration & electrical system is located in the top housing underneath a removable lid. Inner glass doors allow you to view the contents of your incubator without disturbing the internal atmosphere.

1.1 HEATING & COOLING SYSTEM

The unique LEEC temperature control system ensures exceptionally good stability. A powerful refrigeration system provides cooling whilst low wattage heaters provide heating. A door micro switch stops the internal fan(s) when the door is opened to minimise temperature disturbance.

1.2 JUMO TEMPERATURE CONTROLLER

The temperature is accurately controlled by a Jumo dTRON 316 microprocessor controller that uses a signal from a PT100 type sensor located in the chamber. Its purpose is to control the cooling system and the current supplied to the heaters. Operating temperatures can be programmed into this controller electronically. Two set points (SP 1 & SP 2) can be programmed which in turn allows the cabinet to cycle between two different temperatures e.g. day & night, or operate constantly at one temperature e.g. day.

1.3 TLK38 OVER & UNDER TEMPERATURE SAFETY CUT OUT

A TLK38 digital cut out protects the contents of your incubator. When the chamber temperature goes out of limits, the appropriate cut out will operate an audible alarm and visible red neon. Two reset buttons are provided below the cut out for you to manually reset the offending system.

1.4 SMITH'S DIGITAL TEMPERATURE CYCLING TIMER

The light grey coloured Smiths digital 24 hour timer can be programmed with several ON & OFF times for cycling between two pre-programmed temperatures over a 24 hour period. The LCD display shows the current time and cycle stage. The timer has an integral switch labeled ON, OFF & TIMED. This switches between SP 1 & SP 2 temperatures, which are programmed into the temperature controller. The switch positions correspond to:

ON	-	Incubator will operate constantly at the HIGH (SP 1) temperate set point e.g. +37℃.
OFF	-	Incubator will operate permanently at the LOW (SP 2) temperature set point e.g. +20℃.
TIMED	-	Incubator will cycle between HIGH & LOW (SP 1 & SP 2) temperatures at the pre-programmed times.

ON & OFF times can be programmed into the timer as detailed in the instructions at the back of this manual.

1.5 SMITH'S DIGITAL LIGHTING TIMER

A light grey coloured Smiths digital 24 hour timer, located on the incubators control panel, controls the fluorescent lights in the outer door. Times can be programmed into the unit. The LCD display shows the current time and cycle stage.

The timer has an integral switch labelled ON, OFF & TIMED. The switch positions correspond to:

ON - Lights are permanently ON.

OFF - Lights are permanently OFF.

TIMED - Lights will switch ON and OFF automatically at the programmed times.

ON & OFF times can be programmed into the timer as detailed in the instructions at the back of this manual.

2.0 INSTALLING YOUR INCUBATOR

Your incubator has a factory fitted UK style moulded plug. The wiring inside the plug and mains flex is colour coded as follows: -

- **BROWN = LIVE**
- **BLUE = NEUTRAL**
- **GREEN / YELLOW = EARTH**

Your incubator requires a 240V 50Hz supply. An internal fuse provides secondary protection.

2.1 REFRIGERATION PRECAUTIONS!

- Your incubator should be left to settle for 4 hours after final positioning before it is switched for the first time to allow the refrigerant to settle.
- Do not place the cabinet in front of a window in direct sunlight.
- A qualified electrician or other competent person must carry out any electrical work required to install this cabinet.
- Make sure that your incubator is not standing on its electrical cable.
- There are parts in your incubator that heat up. Always ensure there is adequate ventilation, as failure to do so can result in component failure.
- Keep all vent grilles clear.
- Before any cleaning or maintenance work is carried out, the mains supply must be switched off and the plug removed from the socket.

3.0 INITIAL SET UP PROCEDURE

Switch the incubator on using the POWER switch located on the left hand side of the control panel. The green neon inside the switch will illuminate if the supply is connected correctly. If a warning buzzer sounds, press the reset button to cancel it.

3.1 The COOLING switch will need to be ON if the operating temperature you require is near or below the ambient temperature of your laboratory.

3.2 The chamber circulating fan will only run if:

- The incubator is connected to the electrical supply,
- & the power switch is ON,
- & the outer door is closed.

3.3 TLK38 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 labeled as follows:

P - Enters the programming mode.

U - *No function.*

▲ - **INCREASES** the displayed value.

▼ - **DECREASES** the displayed value.

3.4 SETTING AN <u>OVER</u> TEMPERATURE CUT OUT VALUE

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

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

2) Press the **▲** button to increase the **over temperature** cut out value or the **▼** button to decrease the **over temperature** cut out value.

3) Once the value of your choice is displayed, release all buttons and after a short delay the new value will be stored and retained in permanent memory.

3.5 **SETTING AN UNDER TEMPERATURE CUT OUT VALUE**

If, for example, you would like to operate your incubator at +20.0℃, 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℃. To do this follow steps 1 - 3 below:

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

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

3) Once the value of your choice is displayed, release all buttons and after a short delay the new value will be stored and retained in permanent memory.

3.6 **OVER & UNDER TEMP NEON'S, BUZZER & RESET BUTTONS**

If the temperature in the incubators chamber goes above it's upper set point, the buzzer will sound and the over temperature neon will illuminate. The heaters will automatically disconnect to prevent further over heating. The buzzer & neon will remain on until a member of staff has acknowledged the alarm. To reset the buzzer & alarm, press the reset button along side the illuminated neon.

3.7 If the temperature in the incubators chamber drops below it's lower set point, the buzzer will sound and the under temperature neon will illuminate. The refrigeration system will automatically disconnect to prevent further over cooling. The buzzer & neon will remain on until a member of staff has acknowledged the alarm. To reset the buzzer & alarm, press the reset button along side the illuminated neon.

4.0 SETTING A SINGLE OPERATING TEMPERATURE

The Jumo 316 temperature controller on your incubator has a multi-function LED display. The upper display (red) represents the actual chamber temperature. The middle display (green) represents the target temperature. The lower display (yellow) indicates when the controller is heating or cooling. The yellow numbers on the temperature controller may be on, off or flashing. They represent:

3 - **Heating**
If the yellow 3 LED is off, heat is not being supplied to the chamber. If the yellow 3 LED is on, heat is being supplied to the chamber. If the yellow 3 LED is pulsing, the target temperature has been reached and the heaters are being pulsed to maintain a stable temperature.

5 - **Cooling**
If the yellow 5 LED is off, cooling is not being supplied to the chamber. If the yellow 5 LED is on, cooling is being supplied to the chamber. The yellow 5 LED should not pulse.

The Jumo 316 temperature controller has 4 buttons:

PGM	-	Program button (enters the engineering mode).
▲	-	Increases the chamber temperature.
▼	-	Decreases the chamber temperature.
EXIT	-	Exits the programming mode.

4.1 The controller also has two set points: SP1 & SP2 (Set Point 1 & Set Point 2). When your incubator is to run constantly at one temperature, e.g. +37.0°C, **only a value for SP1 needs to be entered into the controller**. To program a single operating temperature, proceed as follows:

4.2 **Make sure the Dual Temperature Cycling Timer slide switch is in the ON position. This automatically selects SP1 on the temperature controller.** Then press either the ▲ button to increase the chamber temperature or the ▼ button to decrease the chamber temperature. The new value will be stored automatically.

4.3 The incubator should now be programmed for +37.0°C, the over & under temperature cut outs should be set and the cycling timer is programmed to operate at the SP1 temperature only. Allow the chamber temperature to stabilise before putting products in the incubator.

5.0 SETTING TWO TEMPERATURES FOR DUAL TEMPERATURE CYCLING

The Jumo 316 temperature controller on your incubator has a multi-function LED display. The upper display (red) represents the actual chamber temperature. The middle display (green) represents the target temperature. The lower display (yellow) indicates when the controller is heating or cooling. The yellow numbers on the temperature controller may be on, off or flashing. They represent:

3 - **Heating**
If the yellow 3 LED is off, heat is not being supplied to the chamber. If the yellow 3 LED is on, heat is being supplied to the chamber. If the yellow 3 LED is pulsing, the target temperature has been reached and the heaters are being pulsed to maintain a stable temperature.

5 - **Cooling**
If the yellow 5 LED is off, cooling is not being supplied to the chamber. If the yellow 5 LED is on, cooling is being supplied to the chamber. The yellow 5 LED should not pulse.

The Jumo 316 temperature controller has 4 buttons:

PGM	-	Program button (enters the engineering mode).
▲	-	Increases the chamber temperature.
▼	-	Decreases the chamber temperature.
EXIT	-	Exits the programming mode.

5.1 The controller also has two set points: SP1 & SP2 (Set Point 1 & Set Point 2). When your incubator is to cycle between two temperatures, e.g. +37.0℃ and +20.0℃, **SP1 & SP2 values need to be entered into the controller**. To program two operating temperatures, proceed as follows:

5.2 First you need to programme SP1. **Make sure the Dual Temperature Cycling Timer slide switch is in the ON position. This automatically selects SP1 on the temperature controller.** Then press either the ▲ button to increase the chamber temperature or the ▼ button to decrease the chamber temperature. The new value will be stored automatically.

5.3 Next you need to programme SP2. **Make sure the Dual Temperature Cycling Timer slide switch is in the OFF position. This automatically selects SP2 on the temperature controller.** Then press either the ▲ button to increase the chamber temperature or the ▼ button to decrease the chamber temperature. The new value will be stored automatically.

5.4 The Dual Temperature Cycling timer can now be programmed with several ON & OFF times for cycling between two pre-programmed temperatures over a 24 hour cycle. The LCD display shows the current time and cycle stage.

The timer has a slide switch labelled ON, OFF & TIMED. It interacts with the temperatures that are programmed as SP1 & SP2 on the temperature controller. The switch positions correspond to:

ON - Incubator will operate constantly at the HIGH (SP1) temperate set point e.g. +37.0℃.

OFF - Incubator will operate permanently at the LOW (SP2) temperature set point e.g. +20.0℃.

TIMED - Incubator cycles between HIGH & LOW (SP1 & SP2) temperatures at the programmed times.

To cycle automatically between the two temperatures at the pre-programmed times, move the slide switch to the TIMED position.

The incubator should now be programmed for +37.0℃ and 20℃, the over & under temperature cut outs should be set and the cycling timer is programmed to cycle between the SP1 & SP2 temperatures. Allow the chamber temperature to stabilise before putting products in the incubator.

6.0 LIGHTING

6.1 SMITH'S DIGITAL LIGHTING TIMER

A light grey coloured Smiths digital timer, located on the right of the incubators control panel, controls the fluorescent lights in the outer door. Times can be programmed into the unit. The LCD display shows the current time and cycle stage.

The timer has an integral switch labelled on, off & timed. The switch positions correspond to:

ON - Lights are permanently on.

OFF - Lights are permanently off.

TIMED - Lights will switch on and off automatically at the programmed times.

6.2 Near the lighting timer, you will find a bank of switches. These switches allow individual fluorescent tubes to be switched permanently off. If for example, a lower lighting intensity is required. One or more switches can be switched off. One switch is provided for each fluorescent tube.

6.3 If lighting is required, ensure that these switches are ON, otherwise the tubes will fail to illuminate automatically when the lighting timer calls for 'lights on'.

6.4 Program the ON & OFF times into the timer as detailed in the instructions at the back of this manual.

7.0 MAINTENANCE

The chamber should be defrosted if there is a build up of ice in the air duct as this will restrict the airflow and affect the incubators performance. To do this, either raise the operating temperature of the incubator to +40℃ for several hours, or switch the cabinet off completely and leave the outer door open over night

7.1 Regular cleaning & de-fluffing of the condenser is recommended. Keep all ventilation grilles clear & unrestricted. The inner chamber & exterior of your incubator can be cleaned with a damp cloth and a mild detergent solution.

7.2 In the event of spillage of hazardous materials use the appropriate decontamination method as prescribed by the HSE or local Safety Officer.