

## Appendix A.

### **RKCCB100 Controller Instructions**

#### **Description of Controls**

##### **General**

The control panel is fitted with two controls: an ON/OFF SWITCH, and a TEMPERATURE CONTROLLER.

##### **On/Off Switch**

The On/Off switch isolates mains power to the temperature controller and to the solid state relay. If access to electrical connections inside the equipment is required, ensure that the electrical power is switched off where the equipment is connected to the main supply.

#### **Temperature Controller**

The microprocessor based RKCCB100 temperature controller is used to set the temperature at which the equipment holds.

The temperature controller uses a three term (PID) control action to hold temperatures stable with minimum overshoot. The temperature controller incorporates a program to automatically calculate and store the PID parameters.

The temperature controller has two 4 digit LED displays. The upper display indicates the equipment temperature and the lower display indicates the temperature setpoint and alarm messages when required.

#### **Programming**

##### **Key Pad Functions**

The controller keypad has 4 buttons:

- |    |     |   |   |
|----|-----|---|---|
| a. | SET | - | Scroll Key alternates display to read setpoint, and alarm |
| b. | <   | - | Setting shift key   |
| c. | Λ   | - | Up Key increases the displayed variable;                  |
| d. | V   | - | Down Key decreases the displayed variable;                |

Amber LED labelled OUT indicates that the equipment elements are being cycled on and off.

##### **Setting Temperatures**

To set the desired operating temperature:

- Press SET key once
- Press the Λ or V buttons to adjust the setpoint to the desired temperature;
- Press the SET key to store the new value into memory;

## Settings

### Auto-Tuning PID Parameters

To run the PID auto-tuning program carry out the following steps:

- a. Set the desired operating temperature as shown above;
- b. Press and hold the SET key for longer than 7 seconds until AL1 displays. The press SET again for one second at time until AT appears. Press on using up or down arrow and then press SET. The AT will flash until finished. This may take up to one hour, or faster if fan is present.

### Setting PID Parameters

The PID control action reduces the power as the equipment reaches the set point to minimise over shoot and temperature cycling. The equipment has different heating and cooling characteristics at different temperatures so the optimum PID parameters are different for different temperatures and loads.

For most applications the control range will be adequate without adjusting the PID values. However if control is critical it may be necessary to reset the values. When running the equipment at a new temperature that varies more than about 25% from the previous temperature it may be necessary to run the auto-tuning program to reset the PID parameters. **The equipment will overshoot the setpoint when running the auto-tune program especially at low temperatures**

After calculating the PID values for different temperatures they can be read from the long scroll list and noted for future use.

## Safety Controller

The controller is fitted with an inbuilt over heat safety protection. It must be set to slightly above the desired setpoint temperature and will prevent overheating. It will maintain the Alarm Set Value. Change the AL1 value to slightly above the setpoint temperature as set out in the instruction page. The Alarm will be activated if the incubator exceeds the AL1 value or if the sensor is broken or damaged. Adjusting the Alarm Hysteresis value AH1 will cause the incubator to cool down by that value before it begins heating again. For example if the AH1 is set to 100 the incubator must cool down by 100°C below AL1 before it will begin to reheat. Where you require the incubator to switch off completely should an alarm condition result then please contact the manufacturer to purchase the OST100 manual overtemperature reset control system.

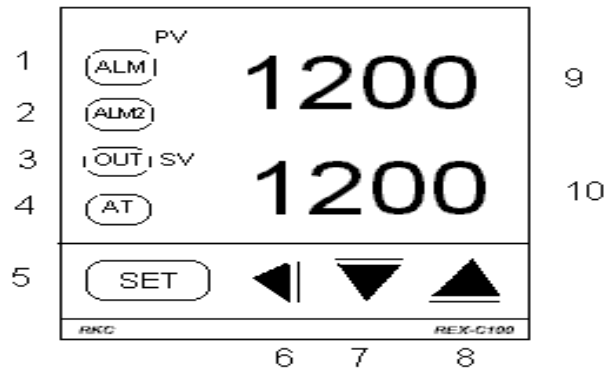
## Operating

To operate the equipment set the desired temperature on the Temperature Controller as follows.

## Description of Controls

# RKC-CB100 CONTROLLER

## DESCRIPTION OF PARTS AND INSTRUCTIONS FOR USE



1. ALARM LIGHT INDICATES ALARM IS ACTIVATED
  2. INDICATES WITH GREEN LIGHT OUTPUT CONTROL.
  3. INDICATES HEATING IN PROGRESS
  4. INDICATES AUTOTUNING IN PROGRESS.
  5. SET KEY, PRESS ONCE TO CHANGE VALUES OF SET POINT OR PROGRAM SETTINGS.
  6. SETTING DIGIT SHIFT.
  7. SET – VALUE DECREMENT KEY.
  8. SET- VALUE INCREMENT KEY
  9. MEASURED- VALUE PV DISPLAY (PV IS THE CURRENT TEMPERATURE)
  10. SV IS THE SET VALUE.
- A. TO SET TEMPERATURE PRESS '5' THEN USE KEYS 6,7 AND 8 TO SET TEMPERATURE, THEN PRESS 5 AGAIN.
- B. TO AUTOTUNE, (FROM A COLD START) FIRST SET YOUR REQUIRED TEMPERATURE USING PROCEDURE 'A' ABOVE. THEN HOLD DOWN KEY '5' FOR 6 SECONDS, 'ATU' APPEARS, CHANGE THIS VALUE TO READ '001' THEN HOLD AGAIN KEY '5' UNTIL THE DISPLAY RETURNS TO HOME DISPLAY POSITION, GREEN INDICATING LIGHT '4' SHOULD BE FLASHING.

### ALARM

SET THE ALARM OVER TEMPERATURE BY HOLDING SET FOR 6 SECONDS AND SET "AL1" FOR SAFETY OVERHEAT PROTECTION. PRESS ONCE TO STORE SET VALUE THEN HOLD SET FOR 6 SECONDS TO RETURN TO MAIN MENU. THIS WILL CONTROL AT "AL1" SHOULD THE HEATERS FAIL ON.