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Certificate No. IND14.8776U/Q

ISO 9001 BUREAU VERITAS Certification

UKAS MANAGEMENT SYSTEMS 008

Temperature Controller for BOD Cooling Incubator (Model: ITC-3003)

Model Wise Description:

Model	Product Description
ITC-3003	Microcontroller based PID-On/Off Temperature controller (1 AI + 1 DI and 2 DO) with RTC, Printer port, RS-485 Serial port and Extra 256KB memory bank.

Description:

Libratherm offers Microcontroller based Temperature Controller Model ITC-3003 with input and output suitable for measuring and controlling the Temperature of BOD Cooling Incubator or Deep Freezer. Such chambers are mainly used in Pharma, Petroleum, Chemical and Food Industries to test and store the product / sample under the desired simulated and control climatic condition.

Since this controller is basically designed to achieve accurate low temperature, sometimes below the ambient, the chamber Air heater is required to be controlled using PID control action with compressor being ON all the time. The compressor output is operated in ON/OFF action with time delay facility. Since the compressor may not require to be kept ON above certain level of temperature, the user selectable mode is provided to program the compressor operation in AUTO mode, Continuous ON mode or Continuous OFF mode.

The controller ITC-3003 accepts input from the standard Pt-100 sensor. The input signal is processed by 16 bit ADC for very accurate and stable display. The time tested PID algorithm gives accurate control of Temperature.

In model ITC-3003, the process values and set values are displayed simultaneously on independent 4 digit 7-segment Red / Green LED displays. The real time is indicated on an extra 4digit display.

ITC-3003 has many other useful features:

a) In-built real time data storage facility, which can be retrieved on demand or can be down loaded on to a computer or on a printer for hard copy via the built in serial printer port. The storage capacity depends on the logging time. Maximum 3600 records can be stored which can

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1

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be printed in OFF line mode. The battery backed non-volatile flash memory is used for the data storage.

b) ITC-3003 is ready with the serial communication port RS 485 with RTU modbus protocol for interfacing to the computer for data logging and storage.

Specially designed window based **E-INCUBATOR Software** allows user to monitor and program the controller through laptop or PC. See the software write up on page no.5.

Features:

❖ Microcontroller based design.
❖ Easy front panel keyboard programmable.
❖ Independent 2 control outputs for Air heater and Compressor
❖ User programmable alarm limits with auto snooze facility.
❖ PID or ON/OFF control action for Air heater, and ON/OFF control action for Compressor with programmable time delay.
❖ Direct dot matrix serial output for EPSON printer model LX-300+ or Equivalent.
❖ RS-485 port for computer interface.
❖ User friendly and expandable Window based PC software.

Technical Specifications:

No. of Inputs	2 (one each for Temperature (T) and % Relative Humidity (%RH)).
Input	RTD(Pt-100).
Range	-40.0 to 60.0ºC or 0.0 to 60.0ºC
Resolution	0.1ºC
Accuracy	Better than +/-0.1ºC
Display	4 digit 0.5″ Red 7-segment LED display for Process Temperature. 4 digit 0.5″ Red 7-segment LED display for Set Temperature. 4 digit 0.5″ Red 7-segment LED display for RTC and other programming parameters.
Tuning	User settable PID values for fine tuning, On/Off hysteresis, Alarm values and snooze time.
Open Sensor Indication	Display shows Fault messages (OPEn/O.r.) and control outputs will be turned OFF.
Settings	Using front panel membrane keyboard to set the various values.
Memory Backup	Retention of PID and set values in the non-volatile memory in the event of power failure.
Control Action	PID for Air Heater On-Off with programmable hysteresis and time delay for Compressor.
Control Output	For Air Heater, Compressor in the form of DC pulses 0 to 12 VDC to drive external SSRs.
External Input	Potential free contact input for door switch.
Data Logging	Real Time with programmable log time and storage time.

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2

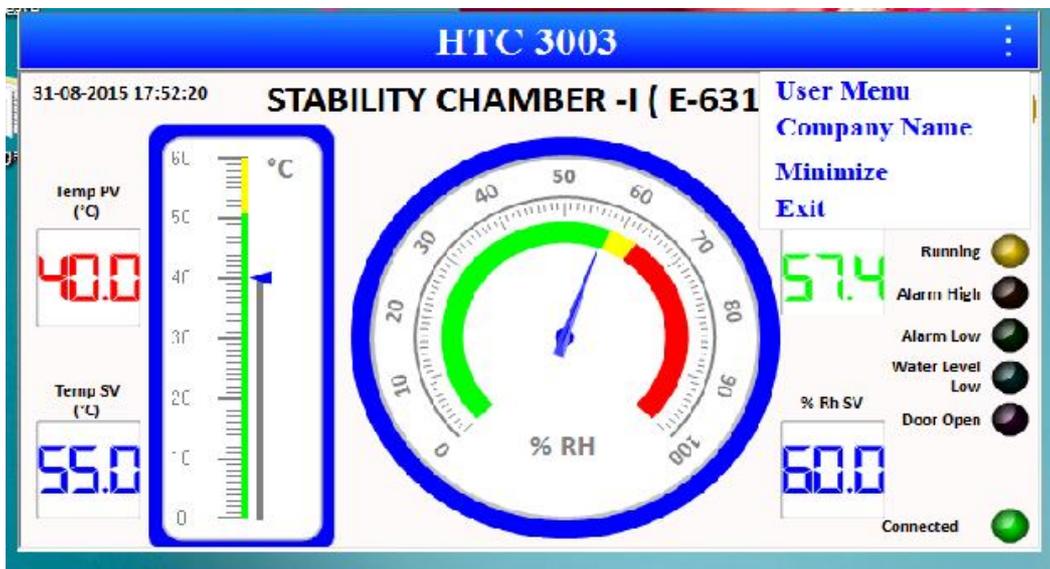| Data Storage	256K memory bank – sufficient to store 3600 records (log interval = 1 to 99 minutes)
Serial Interface	Serial port (9 pin D connector) for 80 column dot-matrix serial printer (EPSON or Equivalent). Serial port (RS485 - 2 wires) on Modbus RTU protocol for PC or PLC
Supply	90 - 250 VAC ± 10% (10VA), 50/60Hz.
Size	192 x 96 x 200 mm
Panel cut out	186 x 92 mm +/- 0.5 mm.
Enclosure	Metal Powder coated with ABS front bazel and polycarbonate graphics.

E-INCUBATOR Software – developed to interface with our controller **ITC-3003** to On line or Off line monitor and control temperature of the cooling incubator. This software works on operating system - Windows7 and above.
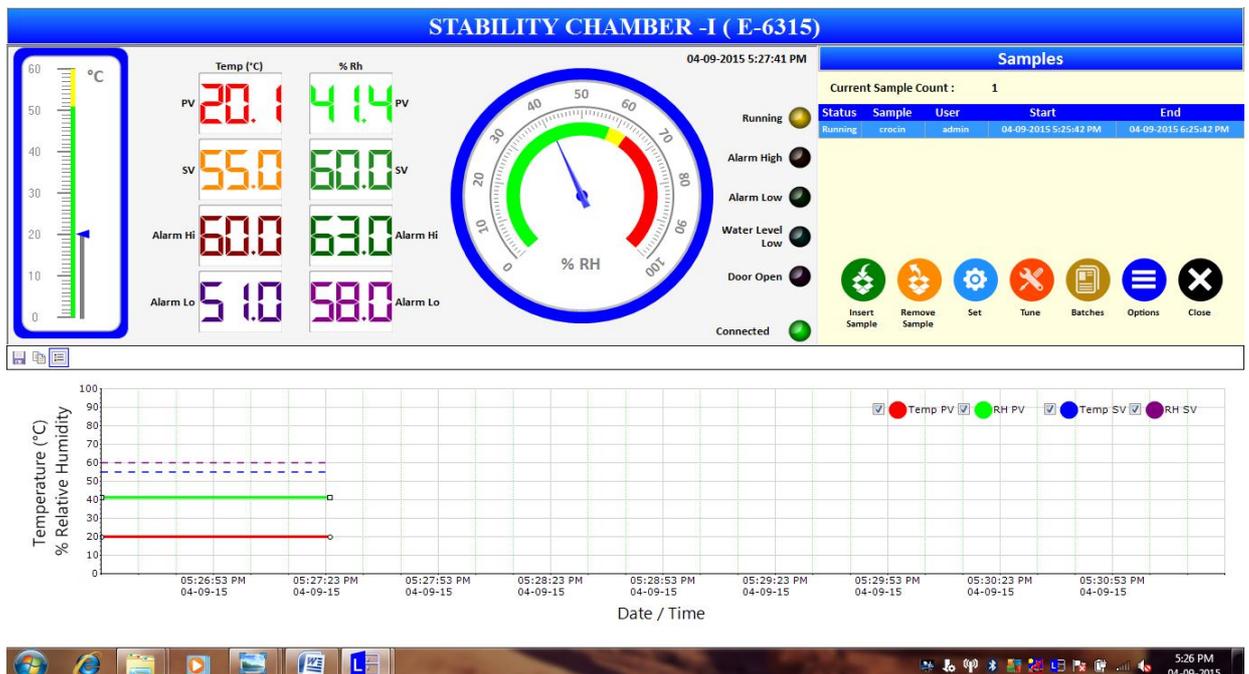
Key Features of the PC Software:

1) Maximum 3 chambers can be interfaced to a single computer. (More chambers can be connected against the requirement)
2) PC software has facility to create unlimited number of users – with user programmable access rights for administrator and user.
3) The Graphical User Interface (GUI) is user friendly and allows front screen viewing of process temperature set values, actual values, alarm status and on line graph.
4) Users are allowed to insert sample in the chamber and whose detail log sheet and real time based report can be created.
5) Each user can create their own batch and which can be tracked and monitor with respective access rights.
6) Admin will have access to all the required rights to monitor the activity of each user.
7) User with Admin rights can set and alter the parameters, such as controller tune values, set values, alarm values.
8) User with restricted rights can only monitor the system on the computer screen. User with password can insert and remove the samples from the stability chamber.
9) FDA Compliance can be provided as per 21 CFR part 11.
10) User can create the report (graphical or tabular) with respect desired date and time to monitor or analyze real time data of specific duration.
11) User with admin rights can set the options to control the operation of the chamber such as i) to turn off the chamber automatically when all the running batches are completed or ii) to turn off the chamber when all samples are removed either by user or admin and iii) The chamber can be made to remain ON permanently irrespective of completion of batch or emptiness of the chamber.
12) User with Admin rights can add or delete the users, can alter the user password.
13) When the PC is not connected to the controller ITC-3003, the data storage will take place within the controller built-in flash memory. When the PC is connected the stored datas will be captured by this software and will reset the controller memory. User can view the down loaded data. The down loaded data will be automatically linked to the existing on-going and created batch. This facility allows user to not to left the computer ON during nonworking days.
14) The hard copy or printout of the created batches and reports can be generated by the user with the Admin right or by a specific user. The report will display in tabular format the date,

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3

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time, set values and process values. In addition, the print out of the report will also include the user name and user type to identify the report user wise.

15) User with Admin right or own right can create the report with Chamber name, Sample name, Start and end of batch date/time and specific user name. The report will also include the maximum and minimum values of Temperature and %Rh.

16) Various screen shots of this software are shown below. (Screen shots are for stability chamber and hence T and RH both are displayed. But in actual E-Incubator software only temperature related values will be displayed.

Screen Shot no. 1 (Main Screen)

Screen Shot no. 2 (User Menu with Main screen / On-line graph)

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4

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Screen Shot no. 3 (Menu for Parameter settings)

Screen Shot no. 4 (Real time graph of Process value / Set value)

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5