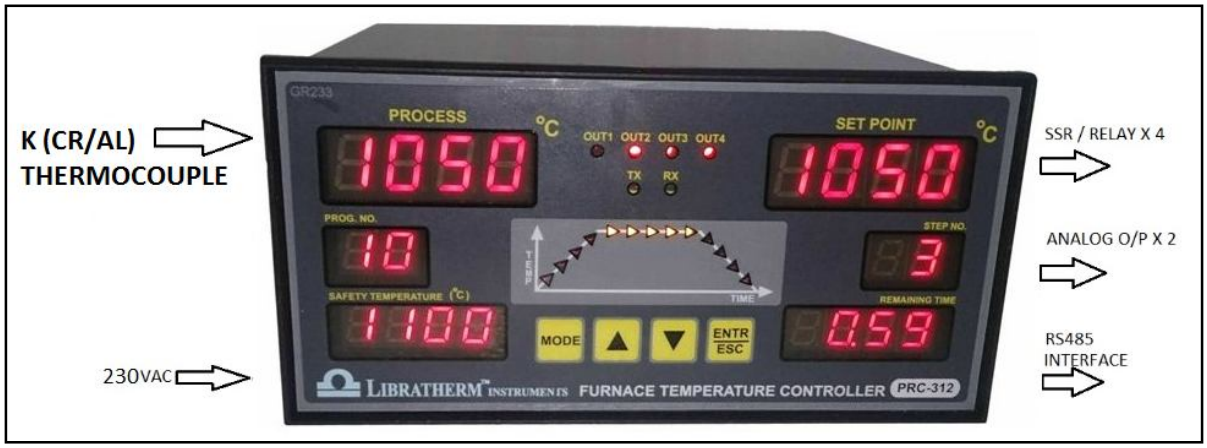
Programmable Ramp / Soak PID Temperature Controller For Jewelry Wax Burn Out Furnace (20 digit display – Model: PRC-312)



Model Wise Descriptions:

Sr. No	Model	Product Description
12.7	PRC-312	Programmable PID temperature controller with 10 profiles each of 16 ramp/soak steps.

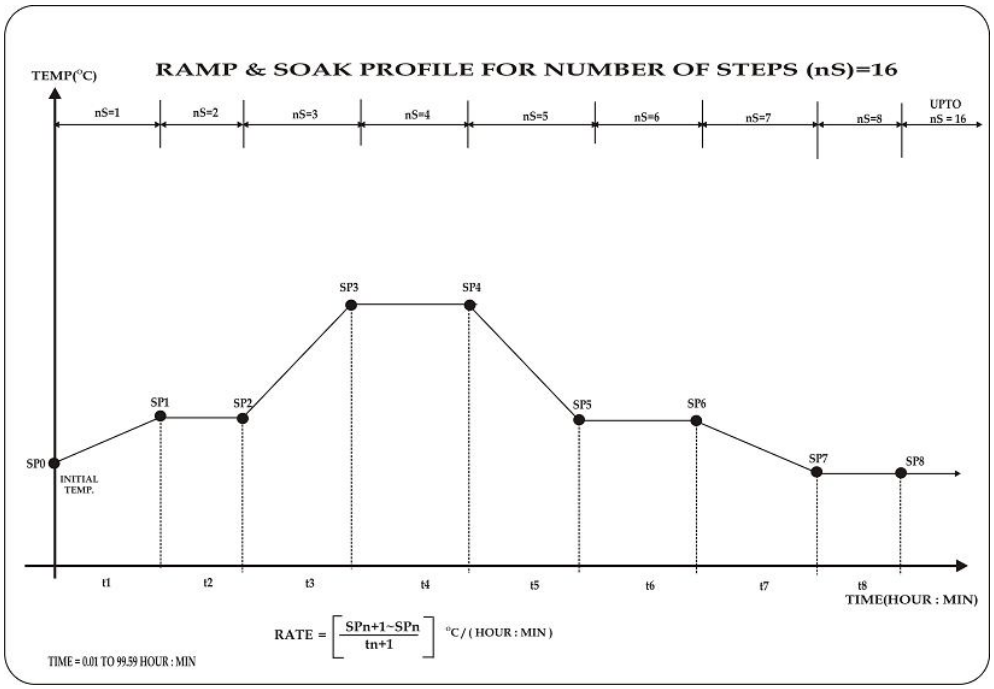
Description:

Libratherm offers Microcontroller based multiple Ramp / Soak programmable PID temperature controller Model **PRC-312,** which is designed to improve reliability, accuracy and control for all investment casting applications. It features Ramp and Soak functions (the capability to control the temperature and its rate of change over a predetermined time span). One to ten different patterns each of total sixteen (ramp/soak) steps can be programmed into the memory with the user-friendly membrane keyboard. Separate displays are provided to monitor simultaneously the Process temperature, Set temperature, Program number, step number, safety temperature and remaining time. Servo start and auto tracking facilities are additional useful features available in this model. Multiple display allows user to view the program status in one glance, without having to press multiple keys. The front panel LED graph shows the status of current step in progress, whether heating ramp, cooling ramp or soaking step. PRC-312 can also be used as single set point control when the profile control is not desired.

PRC-312 offers both switching outputs in the form of SSR or relay to drive external load contactor and continuous control outputs in the form of (4-20)mA or (0-5)volt etc., which can be used to control heater power through Thyristor power pack (for electrical heating system) or to control the position of a modulating motor valve (for oil or gas fired heating systems). The analog outputs can be directly connected to Libratherm make single phase / three phase SCR phase angle fired power controller which is ideally suitable for both resistive and inductive heating load. Additional 3 relays are also provided for High Alarm, Low Alarm and End of profile relay. The programmed profile and other parameters are retained in the nonvolatile memory in the event of power failure and allows automatic execution on power resumption.

The delayed start built in timer allows user to start the burn out cycle at the desired time gap.

To monitor the on line temperature profile of the heating system, serial communication port on RS 485 interface can also be optionally provided, the same can be connected to the computer. Libratherm provides the window based software to view the on line behavior of the heating system in both graphical and tabular format on the computer screen.



Features:

- Accepts standard K type t/c. (can also be provided for other types)
- Control output of DC pulse or TRAIC or (4-20)mA or (0-5)Volt or (0-10)Volt.
- Servo start from the process temperature.
- Delayed start – built in timer.
- Auto tracking and run the program from the desired step.
- User programmable 10 different ramp/soak patterns each of 16 steps
- Retention of program in case of power failure.
- Automatic program resumption.
- Facility of delayed start of heating cycle.
- Facility to use as analog/time proportional PID or ON / OFF controller.
- Security-lock for unauthorized tampering of the PID and set values.

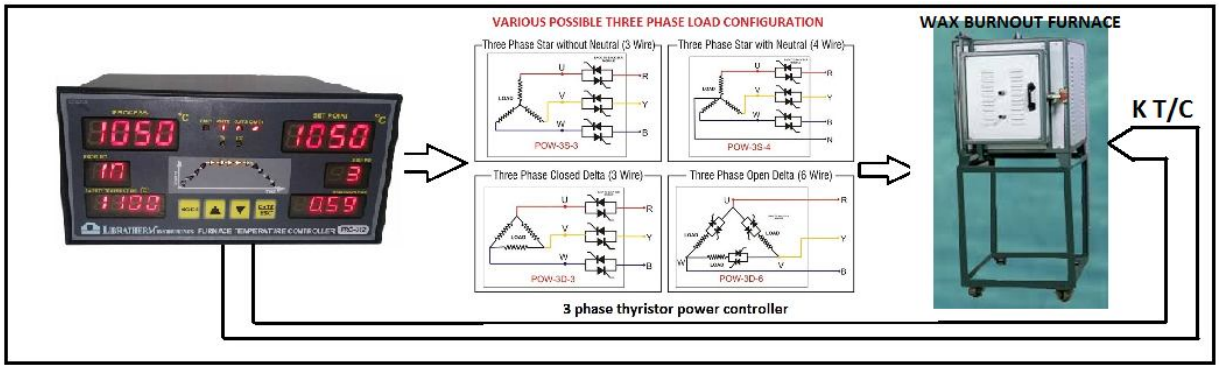
Applications:

- Heat Treatment
- Investment casting
- Metallurgical / Ceramic research
- Furnace / oven control

Technical Specifications:

Design	Microcontroller based with 12 bit ADC and 12 bit DAC
Input	Thermocouple type K
Range	0 to 1200 ^{o}C
Resolution	1^{o}C Subject to the specified input and range.
Indicating Accuracy	Better than ± 0.1% of the range (by software linearization of curves)
Display	4 digit 0.5" for Process value, 4 digit 0.5" for set value 2 digit 0.3" for current Program number, 2 digit 0.3" for step number 4 digit 0.3" for safety temperature and 4 digit 0.3" for remaining time of the current step.
Tuning	Manual tuning of PID and Hysterisis values.
Control Algorithm	Time and linear proportional PID mode for heating control On/Off mode with programmable hysteresis. (**OUT1**).
PID values	Proportional Band (**P**)= 0.0 to 100.0% of Span, Integral value (**I**)= 0.00 to 5.00 resets/minute, Derivative value (**D**) = 0.00 to 5.00 minutes Cycle Time (**CYC**)= 2 to 100 seconds, On/Off Hysterisis (**HYSt**)= 0 to 10^{o}C (When Prb = 0),
Control mode	Single set point or Ramp/Soak profile mode – user selectable
Delayed Start	Internal timer to start the burn out cycle after the time delay elapses. 0.0 to 99.0 Hour (increment @ 0.5 Hr)
Set Point	Programmable throughout the range. In single set point control mode, the set point can be changed.
Control Outputs	10V DC pulses to drive external SSR and built in Triac (5A @ 230VAC) Or 4-20mA/0-5V/0-10V – to control thyristor based system
Ramp/Soak Steps	1 to 16 Steps. (No restrictions in programming – a ramp can be followed by a ramp and a soak can be followed by a soak).
Set Temperature	Programmable for each steps in the full range of the specified input
Time per Step	1 to 540 minutes per step (max. 9 hours per step)
Run from desired step facility (rFSn)	This rFSn facility allows user to skip the ramp/soak steps and run the profile from the desired step number. With servo start facility (to start the step from the current furnace temperature) the rate of heating/cooling can be kept same.
Memory Backup	Retention of PID and set values in the non-volatile memory in the event of power failure. Auto resumption from last point on resumption of power. No need to restart the program.
Alarm Outputs	Configurable Alarms for High or Low or Deviation. End of Profile Alarm Relay (contacts rated for 5A @ 230VAC).
Serial Communication (Optional)	RS485 on Modbus RTU protocol (in Slave mode). Standard window based PC software available at extra cost.
Supply	115VAC or 240 VAC ± 10% (approx. 5VA), 50/60Hz.
Size	192 h x 96 w x 160 d mm , Panel cutout : 186 x 92 + 0.5 mm.
Enclosure	Metal Powder coated with ABS bazel and polycarbonate front graphic.

Closed Loop Control Schematic :



Ready to use Thyristor based Furnace Temperature Control Panel:

Note: Libratherm offers ready to use control panel for single phase or 3 phase wax burnout furnace built using solid state relays or thyristor based power regulators (3 KW to 100KW)

As on today Libratherm has supplied more than 2000 such systems in Jewelry manufacturing industry.

EPRC-312 software features - Libratherm provides customized window based computer software on a single CD, Which is very useful to log the furnace temperature as per real time clock. The software can be loaded on the computer hard disk and controller PRC-312 can be interfaced to the same computer using RS485 to 232 or USB convertor. The software allows user to operate the controller through PC to program the PID values, Ramp/Soak profile and also allows user to monitor the online behavior of heating system either in the graphical format or in the tabular format. The special features allows user to feed the information related to the heating cycle such as operator name, batch name, heat number, co.name etc… , so that the information is visible on the computer screen and the same can be taken on the print format. The historical trends can be searched using these field as well as by giving the desired date and time information. The software is user friendly and easy to operate.