

## Programmable Ramp / Soak PID Temperature/Process Controllers

(Product Code 12.1 to 12.3)



**PRC – 300**



**PRC – 967**



**PRC – 309**

### Model Wise Descriptions:

Sr. No.	Model	Product Description
12.1	PRC-300	Ramp / Soak Programmable PID Temperature Controller – Single profile of 16 steps (Basic Model)
12.2	PRC-967	Ramp / Soak Programmable PID Temperature Controller (Bigger display) – Single profile of 16 steps
12.3	PRC-309	Ramp / Soak Programmable PID Temperature Controller – 1 to 10 profiles – each of 16 steps (Advance model)

### Description:

Libratherm offers Microcontroller based multiple Ramp / Soak programmable PID temperature controller Models **PRC-300**, **PRC-967** and **PRC-309**, which are designed to improve reliability, accuracy and control for all processing applications. It features Ramp and Soak functions (the capability to control the temperature and its rate of change over a predetermined time span). PRC-300 and PRC-967 offers single profile of 16 steps and PRC-309 offers one to ten different patterns each of 16 (ramp/soak) steps, which can be programmed into the memory with the user-friendly membrane keyboard. Separate displays are provided to monitor simultaneously; the Process temperature, Set temperature and the Program number. They can also be used as single set point control when the profile control is not desired. They accepts user selectable standard temperature sensors like K, R, S and B type thermocouples, or RTD(Pt-100) or 4-20mA/0-10VDC from infrared pyrometers or 0 to 1200mV from oxygen probe.

The controllers offers both switching outputs in the form of SSR driver or Triac to drive external single or three phase Solid state relays or load contactors and linear analog control outputs in the form of (4-20)mA or (0-5)volt or (0-10)VDC, which can be used to control heater power through Thyristor power regulators (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 based phase angle fired power controllers, which are ideally suitable for both resistive and inductive heating load. Additional 4 relays are also provided for time or temperature dependent event outputs as per the system requirement. The programmed profile and other parameters are retained in the nonvolatile flash memory in the event of power failure.

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To monitor the on line temperature profile of the heating system, serial communication port on either RS232 or RS 485 interface can also be optionally provided, the same can be connected to the computer. Libratherm provides standard window based software to view the on line behavior of the heating system in both graphical and tabular format. The controllers can also be operated and programmed through PC.

### Features:

- ❖ Accepts thermocouple, RTD(Pt-100), Infrared pyrometer
- ❖ Both switching and linear PID control outputs.
- ❖ Servo start from the process temperature.
- ❖ User programmable 1-10 different patterns of ramp/soak steps.
- ❖ Retention and auto-execution of program in case of power failure.
- ❖ Facility to use as PID and ON / OFF controller.
- ❖ Interface to computer with window based software

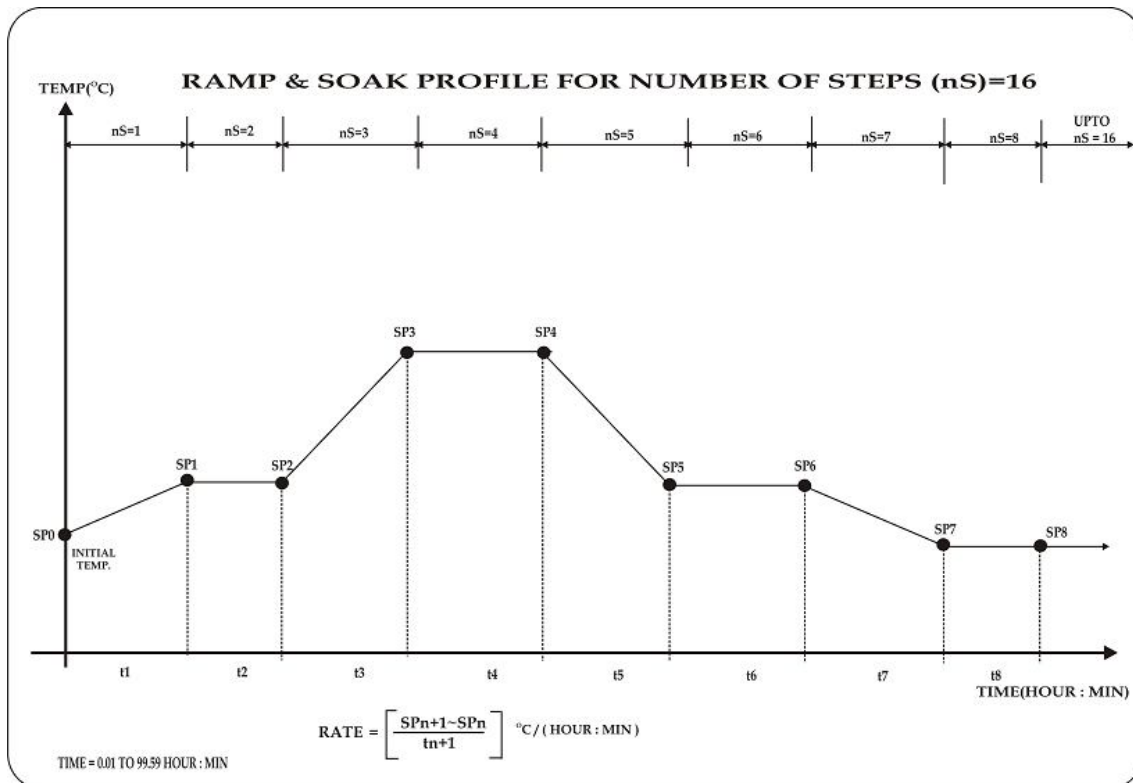
### Applications:

- ◆ Heat Treatment
- ◆ Investment casting
- ◆ Environmental Chambers
- ◆ Laboratory and Industrial Furnace / Oven control
- ◆ Laboratory and Industrial high temperature furnace control

### Technical Specifications:

<b>Design</b>	Microcontroller based with 12 bit ADC and dual 12 bit DAC
<b>Input</b>	Thermocouple type J, K, R, S, B, or RTD(Pt-100)/2 or 3-wire, 4-20mA/0-10V from Infrared pyrometer, (0-1200)mV from oxygen probe . (user selectable)
<b>Range</b>	Subject to the full range of the specified input.
<b>Resolution</b>	0.1 / 1°C Subject to the specified input type and range.
<b>Indicating Accuracy</b>	Better than $\pm 0.1\%$ of the range ( by software linearization of curves)
<b>Display (PRC-300)</b>	4 digit 0.5" for process value. 4 digit 0.3" for set value and other parameters.
<b>Display (PRC-967)</b>	4 digit 0.8" for process value. 4 digit 0.3" for set value and other parameters.
<b>Display (PRC-309)</b>	4 digit 0.5" for process value. 4 digit 0.3" for set value and other parameters. 2 digit 0.3" for Program number and other codes.
<b>Tuning</b>	Auto / Manual tuning of PID values.
<b>Control Algorithm</b>	PID mode for heating control, On/Off mode with programmable hysteresis.
<b>PID values</b>	Proportional Band ( <b>P</b> )= 0.0 to 100.0% of Span, Integral value ( <b>I</b> )= 0.00 to 5.00 resets/minute, Derivative value ( <b>D</b> ) = 0.00 to 5.00 minutes Cycle Time ( <b>CYC</b> )= 2 to 100 seconds, On/Off Hysteresis ( <b>HYSt</b> )= 0 to 50 oC,

<b>Soft Start (rt) and Power Limit (PL)</b>	Built in power on soft start (rt) for analog output = 1 to 99 seconds. Power Limit to restrict the analog control output = 1 to 100 %.
<b>Control Outputs</b>	a) DC pulses to drive external SSR, b) (4-20)mA, RL max = 300 Ohms. Or c) (0-5)VDC, RL min = 10K ohms. d) (4-20mA) retransmission output proportional to temperature
<b>Ramp/Soak Steps</b>	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).
<b>Set Temperature</b>	Programmable for each steps in the full range of the specified input. In single set point or profile control mode.
<b>Time per each Ramp/Soak Step</b>	1 to 999 mins. (16 Hrs. per step) Or 1 minute to 100 hours (Two or more steps can be combined for longer time duration).
<b>Program Hold Facility</b>	Manual Hold or Auto Hold (Hold back feature for guaranteed Ramp/Soak facility) dHLD= 1 to 50 °C. (Effective from 2 <sup>nd</sup> step)
<b>Front Panel LEDs</b>	To display the status of control output, Alarms and Ramp/Soak status
<b>Memory Backup</b>	Retention of PID and set values in the non-volatile memory in the event of power failure and auto resumption of heating cycle.
<b>Alarm Outputs</b>	High or Low or End of Profile Alarm Relays ( <b>OUT2</b> and <b>OUT3</b> ) (contacts rated for 5A @ 230VAC).
<b>Serial Communication (Optional Feature)</b>	Optically isolated 2 wire RS485 interface on Modbus RTU protocol (in Slave mode with programmable slave ID)
<b>Supply</b>	230 VAC ± 10% ( approx. 5VA), 50/60Hz.
<b>Sizes</b>	96 x 96 x 160 mm
<b>Panel cut out</b>	92 x 92 mm +/- 0.5 mm
<b>Enclosure</b>	ABS plastic enclosure with ABS bazzel and polycarbonate front.



### Input and Range Selection Table:

Code	Input	Range
<b>A0</b>	<b>User selectable J,K,R,S,B,Pt-100 and 4-20mA</b>	<b>As below</b>
A1	J type : Fe/Con thermocouple	0 to 760 °C
A2	K type : Cr/Al thermocouple	0 to 1372 °C
A3	R type : Pt/PtRh13% thermocouple	0 to 1768 °C
A4	S type : Pt/PtRh10% - thermocouple	0 to 1768 °C
A5	B type : Pt30%Rh/Pt6%Rh thermocouple	200 to 1820 °C
A6	C type : W5%Re/W26%Re thermocouple	0 to 2200 °C
A7	D type : W3%Re/W25%Re thermocouple	0 to 2200 °C
A8	Pt-100 (Alpha = 0.00385) DIN 43760	0.0 to 400.0 °C
A9	Oxygen Probe	0 to 1200 mV
A10	4-20mA Infrared pyrometer (scalable range)	0 to 3000 °C

### Ordering Information:

Model	A- Input	B- Two inputs	C- Control o/p(OUT1)	D- Relay-1 (OUT2)	E- Relay-2 (OUT3)	F- Serial Communication
PRC-300	A0 – User selectable	Two Fixed inputs (any two of A1 to A10) (available only in PRC-309)	C1- (DC pulse) C2- (0-5) V C3- (4- 20) mA C4- (DC pulse + 4-20mA) C5 -- (DC pulse + 0-5V)	D1- (High Alarm) D2- (Low Alarm) D3 – (Deviation) 00- (None)	E1- (High Alarm) E2- (Low Alarm) E3- (End of Profile) 00- (None)	F1 - RS485 00 – None (available only in PRC-309)
PRC-967						
PRC-309						
	Single Fixed Input (any one of A1 to A10)					

### Example:

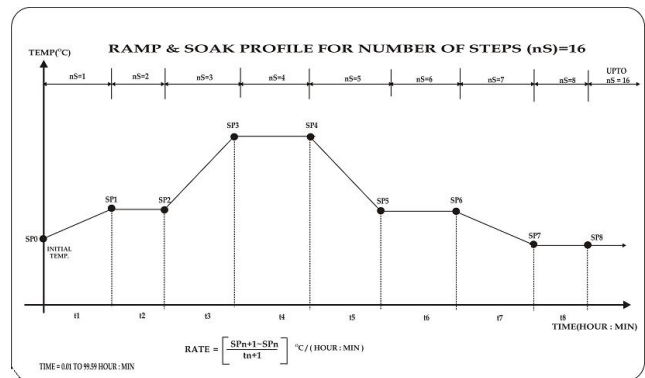
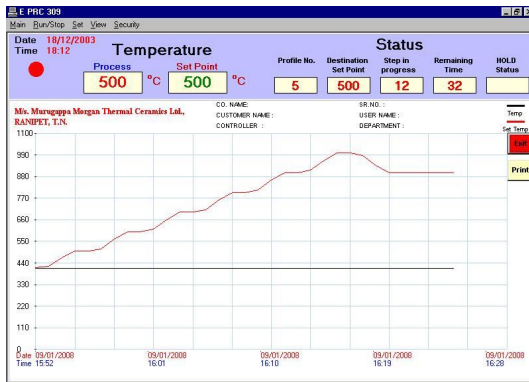
Model	A- Single Input	B- Two inputs	C- Control o/p (OUT1)	D- Relay-1 (OUT2)	E- Relay-2 (OUT3)	F- Serial Communication
PRC-300	A3	00	C1	D1	E3	00
PRC-967	A0	00	C4	D2	E3	00
PRC-309	A2	00	C4	D1	E3	F1
PRC-309-2	A2	A5	C4	D1	E3	00

Example	Ordering Code	Description
1	PRC-300-A3-00-C1-D1-E3-00	Model PRC-300 with R type thermocouple input, DC pulse output to drive external SSR with High Alarm and End of Profile Relay outputs.
2	PRC-967-A0-00-C4-D2-E3-00	Model PRC-967 with K,R,S,B type thermocouple input, dc pulse and 4-20mA current output with Low Alarm and End of Profile Relay outputs and RS232 interface.
3	PRC-309 -A2-A5-C4-D1-E3-F1	Model PRC-309 with K type thermocouple, with dc pulse and 4-20mA current output with high Alarm and End of Profile Relay outputs and RS485 interface.
4	PRC-309-2 -A2-A9-C2-D1-E2-F1	Model PRC-309 with two inputs K type thermocouple and 0-1200mV from oxygen probe, with dc pulse and 4-20mA current output with high Alarm and End of Profile Relay outputs and RS485 interface.

**VARIOUS CONTROL PANELS USING PRC-300, PRC-309, PRC-310:**



**EPRC-309 software** - designed to interface with our controller **PRC-309** to control the temperature of single heating zones. The software allows user to monitor the on line temp. on the computer screen, user can program the ramp and soak profile, feed the PID, Set Point and Program values or start and stop the profile through the computer keyboard, one can also view the real time values in graphical format which can be zoomed or scaled as per the requirement. Database can be searched with date and time or other user defined fields. Software can be customized to monitor more than one PRC-309 on a single screen, selection options are provided to the user.



**Testimonial: Since 1991, our controllers Model PRC-300, PRC-309 are controlling more than 2000 heating systems in various industries across the globe.**