

## MICROPROCESSOR BASED CONTROLLER FOR LOW TEMPERATURE (CASCADE) SYSTEM



**PID-2001**

1	PID-2001	Microprocessor based Temperature On/Off controller ( with 2 inputs and 2 outputs) with RTC, Printer port, RS-485/RS-232 Serial port and data storage for refrigeration system without heater (Scan Display)
2	PID-2002	Microprocessor based Temperature PID+ On/Off controller (2 inputs and 3 outputs) with RTC, Printer port, RS-485/RS-232 Serial port and data storage for refrigeration system with heater (Scan Display)

### DESCRIPTION:

Libratherm offers Microprocessor based Temperature Controller Model PID-2001 and Model PID-2002 for the sub zero temperature control of low temperature baths or deep freezers. In a freezer to attain the low temperature up to  $-25^{\circ}\text{C}$ , the refrigeration system using single compressor and condenser is sufficient, however to obtain the temperature of the order of  $-80^{\circ}\text{C}$ , two compressors in cascade configuration is used. The model featured here is designed to control the single or two such compressors with the required inter logic.

The controller model **PID-2001** accepts two Pt-100 sensors as the input to sense the temperature in the refrigeration system at two different points. The control output is in the form of DC pulse to drive solid state relay for controlling the on/off operations of the compressors. The special logic and programming parameters such as set points and 3 level of hysteresis limits are accessible to the user for proper control. The temperature of the 1<sup>st</sup> cooling system (C1) is monitored using the 1<sup>st</sup> sensor and temperature of the 2<sup>nd</sup> cooling system (C2) is monitored using the 2<sup>nd</sup> sensor. The intelligent interlocking of the outputs prevents the loading of both C1 and C2, thus ensures stable control at the lowest set temperature.

For more precise and accurate low temperature control, many manufacturers incorporates heater to operate at the low temperature, to feed the required amount of heating power. To control the heater the controller model **PID-2002** has been developed which is same in all respect to PID-2001, except with the additional 3<sup>rd</sup> output in the form of PID heat output. The C2 can be configured in AUTO, ON and OFF mode and the heat PID output is made available all the time. This logic ensures the stable control within the accuracy of  $\pm 0.1^{\circ}\text{C}$ .

In addition to this, the instrument has many other useful features such as Separate display to indicate Real time clock / calendar. In-built 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 in built printer port. The storage capacity depends on the logging time. MAX. 480 records can be stored which can be printed in OFF line mode.

The controllers are ready with the serial communication port RS485 (using MODBUS ASCII protocol) for interfacing to the computer for data logging and storage.

Specially designed window based **E-Chamber Software** does the on line data logging and to plot the online / offline graph on the PC and also allows user to enter the set points and control parameters through PC and the controller. (i.e. bi-directional communication). Two level Pass Word protected (operator & supervisory) for unauthorized alteration of the set parameters and stored data is also provided in the PC software.

### **FEATURES:**

- ❖ Microprocessor based design.
- ❖ Separate display for Temperature/Set point and Channel name and real time clock.
- ❖ Easy front panel keyboard programmable.
- ❖ Independent 2 or 3 control outputs for compressors and heater.
- ❖ PID or ON/OFF control action for Air heater and ON/OFF control action for 2 Compressors with programmable time delay.
- ❖ Direct dot matrix parallel / centronics printer output for EPSON printer model LX-300 and LX-300+ or Samsung – 42 column or Equivalent.
- ❖ RS-485 PC computer interface.

### **APPLICATION:**

- Ultra Low temperature Bath
- Ultra Low temperature deep freezer.

### **TECHNICAL SPECIFICATIONS: PID-2001 and PID-2002**

<b>No. of Inputs</b>	One for Single compressor system and Two for Cascade system
<b>Input</b>	RTD(pt-100)
<b>Range</b>	-90.0 to 40.0 °C
<b>Resolution</b>	0.1 °C
<b>Accuracy</b>	Better than $\pm 0.1\%$ for Temperature and $\pm 2\%$ for RH.
<b>Display</b>	2 digit 0.5" Red 7-segment LED display for C1 and C2 4 digit 0.5" Red 7-segment LED display for actual temperature. 4 digit 0.5" Red 7-segment LED display for set temperature. 6 digit 0.3" Red 7-segment LED display for RTC.
<b>Tuning</b>	Manual tuning of PID values – only for Heat output in PID-2002
<b>Control Action</b>	On/Off for Cool with programmable hysteresis (0.1 to 10.0 oC )
<b>Open Sensor</b>	Display shows Flt-1 or Flt-2 and outputs will be turned OFF.
<b>Settings</b>	Using front panel membrane keyboard to set the various values.
<b>Memory Backup</b>	Retention of PID and set values in the non-volatile memory in the event of power failure.
<b>Alarm Output</b>	Extra Relay output used as High Alarms rated for 5A @ 230VAC)

<b>Control Output</b>	0 to 10VDC pulses to drive external SSR for compressor 1, compressor 2 and Heater
<b>Printer interface</b>	Parallel centronix port for dot matrix printer (80 or 42 column – to be specified) .
<b>Data Logging</b>	Real Time with programmable log time and storage time. At the interval of 1 to 60 minute.
<b>Data Storage</b>	480 records (With real time date and time)
<b>Interface</b>	Serial (RS485) for PC interface with Window based software on Modbus ASCII Protocol. PC software is available on request.
<b>Supply</b>	230VAC $\pm$ 10% (10VA), 50/60Hz.
<b>Size</b>	192 x 96 x 200 mm.
<b>Panel cut out</b>	188 x 92 mm +/- 0.5 mm.
<b>Enclosure</b>	Polycarbonate front with ABS bezel and duly powder coated Metal enclosure.

### **ORDERING INFORMATION:**

MODEL	INPUT1 (A)	RANGE1 (°C) (B)	INPUT2 (C)	RANGE2 %RH (D)
PID-2001	Pt-100 (A1)	-90.0 to +40.0 (B1)	Pt-100 (C1)	-90.0 to +40.0(D1)
PID-2002		-25.0 to +40.0 (B2)		Other (D2)
		-45.0 to +45.0 (B3)		
		Other (B4)		

OUTPUT1 DC PULSE (E)	OUTPUT2 DC PULSE (F)	OUTPUT3 DC PULSE (G)	COMM. PORT (H)	SUPPLY (I)
For C1 -- (E1)	FOR C2 ---- (F1)	FOR HEATER (G1)	RS 485 (H1)	230VAC (I1)
	None --- (F2)	NONE (G2)	Printer (H2)	110VAC (I2)
		ONLY FOR PID-2002	Both (H3)	
			None (H4)	

### **EXAMPLE:**

MODEL	A	B	C	D	E	F	G	H	I
<b>PID-2001</b>	A 1	B 1	C 1	D 1	E1	F 1	G2	H 3	I 1

This is Temperature controller Model PID-2001 with 2 nos. Pt-100 sensor input for temperature having range (-90.0 to +40.0)°C with DC Pulse output for Compressor 1 and Compressor 2 with RS485 and Printer Interface and Operating on 230VAC supply.

For more information please contact :

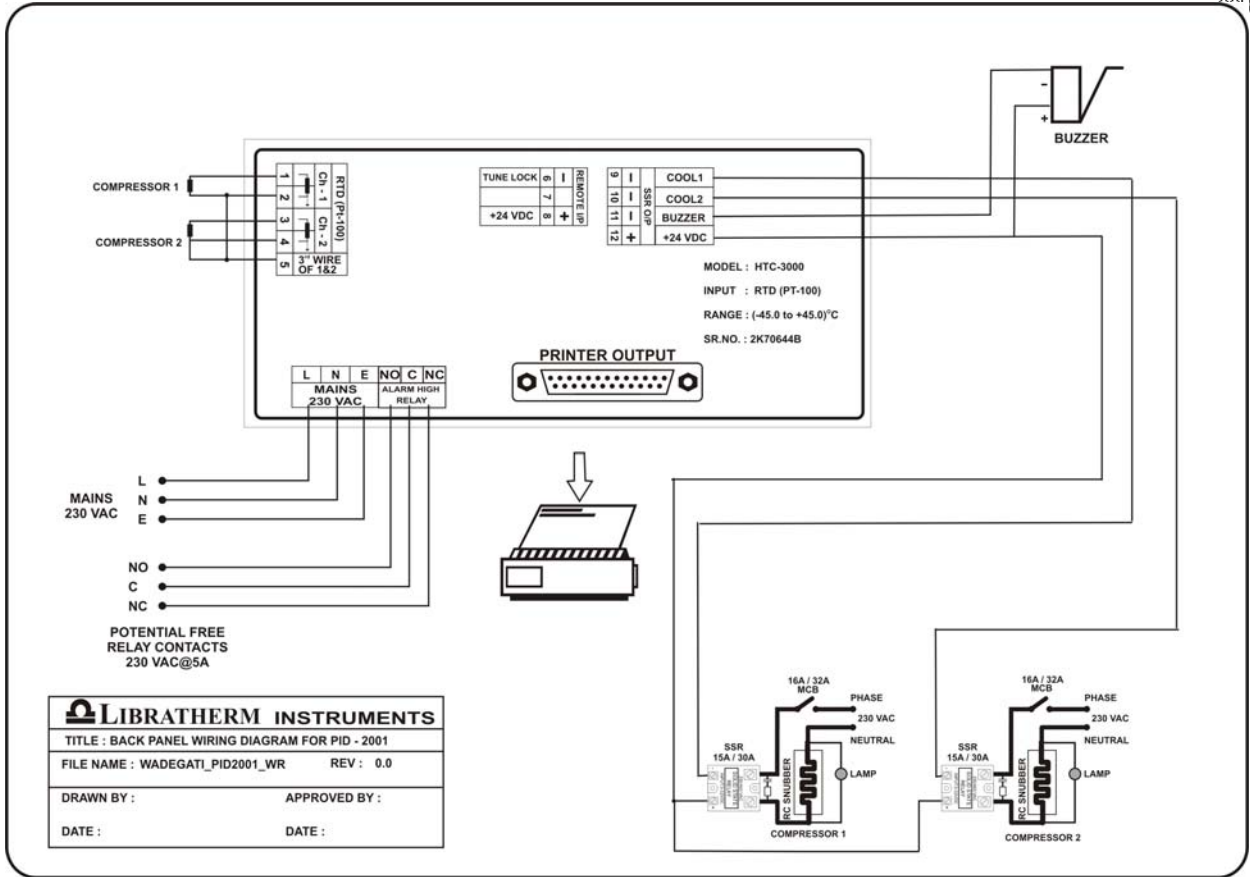
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**SOFTWARE SCREEN ONLY FOR REPRESENTATION :**

