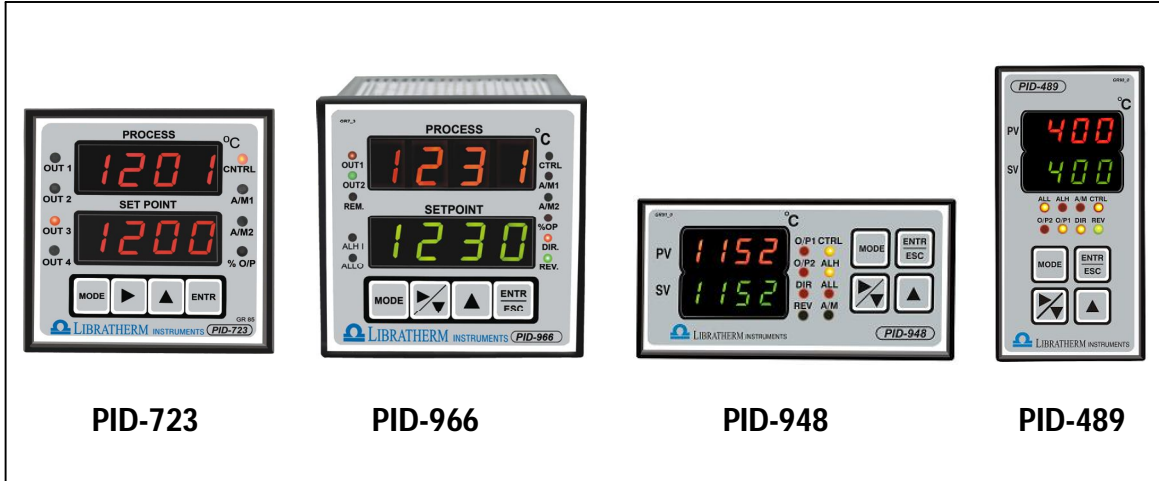


PID Controllers-Single and Two Loops (Microcontroller Based)

(Product Code 10.1 to 10.9)



Model Wise Description:

Sr. No	Model	Description	Size (mm.)
10.1	PID-723-U	PID Controller (Universal Input)	72 x 72 x 120
10.2	PID-966-U	PID Controller (Universal Input)	96 x 96 x 120
10.3	PID-948-U	PID Controller (Universal Input)	96 x 48 x 110
10.4	PID-489-U	PID Controller (Universal Input)	48 x 96 x 110
10.5	PID-723-F	PID Controller (Fixed Input)	72 x 72 x 120
10.6	PID-966-F	PID Controller (Fixed Input)	96 x 96 x 120
10.7	PID-948-F	PID Controller (Fixed Input)	96 x 48 x 110
10.8	PID-489-F	PID Controller (Fixed Input)	48 x 96 x 110
10.9	PID-966-T	PID Controller with (Two fixed input)	96 x 96 x 120

Description:

Libratherm offers Four new models of PID controllers ,Model PID-723,PID-966,PID-948 and PID-489. These are designed and developed using the latest microcontroller chip and programmed with the time tested and field proven PID algorithm. PID controllers are mainly used for the precise process control. Unlike On/Off type of oscillatory control, PID control action gives smooth and steady state control. These model offers, all the useful features which are required to control the complex system.

These models accept factory set single or dual fixed input or the user selectable universal input. The control action is user selectable as PID or On/Off for both direct and reverse or Heat and Cool action . Control outputs are given in the form of optically isolated DC pulse to drive external SSR, Triac or AC SSR to operate AC operated load, electro mechanical relay and/or linear analog output. The analog output levels can also be configured for (0-20)mA or (4-20)mA or (0-5) / (0-10) volt using the front panel key board,

In brief, PID-723, PID-948 and PID-489 provides 4 switching outputs and 2 analog outputs whereas PID-966 provides 6 switching and two analog outputs. Both Auto and manual tuning of PID values makes the controller versatile and user friendly. The model PID-723, PID-948 and PID-489 being small in size, can easily be accommodated in small size equipments. One Ramp/Soak function allows user to gradually increase the set value and hold the process value for desired soak time.

These models are only designed to accept two independent input sensor, which avoids the need for two controllers, where the space and cost is the constraint. This feature is useful for system where two sensors are used for controlling two independent loads, as in case of strip / blister packaging machines where two heaters are to be controlled and each heater has individual sensor

Libratherm also offers customized algorithm for special purpose applications, where user or OEM wants to have control and logic action to suit their application.

PID Controller with Universal / Fixed Input and Selectable Outputs:

Such controllers are used for single input with onsite facility to select the desired input type, but output can be selected as desired.

PID Controller with Two Inputs And Two Outputs

Such controllers are mainly used for single system having two same type of sensors and two independent control outputs. Or to use One input as indication only and other input for controlling.

Features:

- ❖ Microcontroller based design.
- ❖ Single loop PID function.
- ❖ One Ramp/Soak feature (user programmable).
- ❖ Available Control - Two logic (DC pulse) and Two analog (12 bit resolution).
- ❖ Auto/Manual tuning of PID parameters.
- ❖ Field proven Algorithm tested successfully for various process control applications.
- ❖ Auto/Manual bump less transfer.
- ❖ Two programmable alarms and / or event relay outputs.

Applications:

- ◆ Furnace / Oven Temperature control
- ◆ Pressure control
- ◆ Constant Temperature Bath
- ◆ Cold storage and Chilling plants
- ◆ Laboratory equipment.
- ◆ Plastic Injection, Extruder machines
- ◆ Material Testing equipments
- ◆ Auto Clave, BOD incubators etc...

Technical Specifications:

The following specifications will suit almost all PID control applications – however, for special PID algorithm for controlling modulating motorized valve refer to the model [PID-966-M](#).

Input -U (Universal)	RTD(Pt-100) and Thermocouple (type J,K,R,S,B), V and mA (ie Maximum 8 user selectable inputs using keyboard and DIP switch on the back panel) in Universal model. In two input model both the inputs are of same type. Other fixed inputs can also be provided as per the range selection table.
Input -F (Fixed)	Any one factory set input as per user's requirement. It is not possible to change the type of input on the field.
Input - T (Two)	Two fixed inputs of similar types – but factory set input as per user's requirement.
Range	Full +ve range of the selected input (please refer to the range selection table)
Resolution	1 °C for thermocouples and 0.1°C for Pt-100 for V and mA inputs the display resolution is subject to the required range. For V and mA input the position of the decimal point can be selected.
Sampling rate / Display rate	The input is read @40mS / the display is updated @1 second. The control loop is also executed @ 40 mS.
Indicating Accuracy	+/- 1 °C for Thermocouple throughout the range and +/- 0.1°C for Pt-100 for (4-20)mA or (0-10)V - absolute to the linear input signal
One Ramp / Soak (Optional1)	To Gradually increase the process value – Ramp rate : rt = 0.0 to 100.0°C/min or 0 to 100°C/min To Hold the controlled process value for required time, Soak time : St = 0 to 999 minutes.
Display (PID-723)	4 digit 0.3" Red 7-segment display for process variable. 4 digit 0.3" Red 7-segment display for set value and PID parameters
Display (PID-966)	4 digit 0.5" Red 7-segment display for process variable . 4 digit 0.5" Green 7-segment display for set value and PID parameters
Display (PID-948)	4 digit 0.2" Red 7-segment display for process variable. 4 digit 0.2" Green 7-segment display for set value and PID parameters
Display (PID-489)	4 digit 0.2" Red 7-segment display for process variable . 4 digit 0.2" Green 7-segment display for set value and PID parameters
Output Indication	Front Panel LED indications for Control Output, Alarms, Control and A/M status
Control Algorithm	PID or ON/OFF selectable (when specified for switching output). Direct action or Reverse action or both (to be specified in the ordering information) Reverse Action is considered as Heat output – where control output decreases as the error (SV-PV) is less positive and vice versa. Direct Action is considered as Cool output – where control output increases as the error (PV-SV) is more positive and vice versa.
Tuning	Auto/Manual tuning of PID values.

PID Values	Proportional Band (P)= 0.0 to 100.0% of Span, Integral (I)= 0.00 to 5.00 resets/minute, Derivative (D) = 0.00 to 5.00 minutes, Hysteresis = 0 to 50 counts, Cycle Time = 2 to 100 seconds.
Settings	Using front panel feather touch (metal dome) key board to set various parameters.
Remote Set point (Optional2)	External (4-20)mA input can be used to vary the set point in the range of manual mode. (Local or remote set point is user selectable - remote set point to be enabled for this feature) (facility only in PID-966).
Memory Backup	Retention of PID and Set values in the built in non-volatile memory - in case of power failure and automatic re-execution of control on power resumption.
Control Outputs (Switching)	Switching Outputs - DC pulse (0 to 10VDC@25mA) for external SSRs. Relay or Triac (AC SSR) (rated for 5A @230VAC) for external contactor. (Dual switching outputs available in model PID-966-T).
Control Outputs (Analog)	Analog Outputs (4-20)mA (RL max = 300 Ohms) or 0-5VDC (RL min = 10KOhms) (Dual Outputs available in model PID-966-T).
Retransmission Output (Analog)	4-20mA non-isolated, linearized and proportional to the selected input type and range. (Dual retransmission outputs can be provided when not used as control outputs for PID-966-T). RL max = 300 Ohms.
Alarm Outputs	2 extra Relay Outputs with programmable hysteresis- can be used as High or Low Alarms.
Serial Communication (Optional 3)	Optically isolated 2 wire RS485 on Modbus RTU protocol. (in Slave mode with programmable modbus address).
Loop Supply (Optional4)	Isolated 18 to 24VDC @ 50 mA to power external two wire loop transmitter (PID-966)
Supply	(90VAC-250VAC), 50/60 Hz
Size	72 x 72 x 120 mm. (PID-723) 96 x 96 x 120 mm (PID-966) 96 x 48 x 110 mm. (PID-948) 48 x 96 x 110 mm. (PID-489)
Panel Cutout / Terminals	68 x 68 mm. +/- 0.5 mm. (PID-723) - 18 back panel terminals 92 x 92 mm +/- 0.5 mm. (PID-966) - 26 back panel terminals 92 x 44 mm. +/- 0.5 mm. (PID-948) - 22 back panel terminals 44 x 92 mm +/- 0.5 mm. (PID-489) - 22 back panel terminals
Enclosure	ABS plastic with polycarbonate front graphic.

Note : Technical specifications are subject to change due to continuous product upgradation and the discretion of manufactures. For any special requirement contact manufacturers.

Optional Features	
1	To Gradually increase the process value – Ramp rate : rt = 0.0 to 100.0°C/min or 0 to 100°C/min To Hold the controlled process value for required time, Soak time : St = 0 to 999 minutes.
2	External (4-20)mA input can be used to vary the set point in the range of manual mode. (Local or remote set point is user selectable – remote set point to be enabled for this feature) (facility only in PID-966).
3	Optically isolated 2 wire RS485 on Modbus RTU protocol. (in Slave mode with programmable modbus address).
4	Isolated 18 to 24VDC @ 50 mA to power external two wire loop transmitter (PID-966)

Input and Range Selection Table:

Code	Input	Range
A1	Factory set to 8 universal inputs marked (*) below : A2,A3,A4,A5,A6,A13,A15,A17	Subject to input type
A2	J type : Fe/Con thermocouple (*)	0 to 760 °C
A3	K type : Cr/Al thermocouple (*)	0 to 1372 °C
A4	R type : Pt/PtRh13% thermocouple (*)	0 to 1768 °C
A5	S type : Pt/PtRh10% - thermocouple (*)	0 to 1768 °C
A6	B type : Pt30%Rh/Pt6%Rh thermocouple (*)	200 to 1820 °C
A7	T type : Cu/Con thermocouple	0 to 350 °C
A8	E type : NiCr/CuNi thermocouple	0 to 900 °C
A9	C type : W5%Re/W26%Re thermocouple	0 to 2300 °C
A10	D type : W3%Re/W25%Re thermocouple	0 to 2300 °C
A11	G type : W/W26%Re thermocouple	0 to 2000 °C
A12	N type : Ni-Cr-Si/Ni-Si-Mg	0 to 1300 °C
A13	Pt-100 (Alpha = 0.00385) DIN 43760 (*)	0.0 to 400.0 °C
A14	Pt-100 (Alpha = 0.00385) DIN 43760	-199.0 to 200.0 °C
A15	4-20mA (*)	0 to 3500 unit
A16	4-20mA	-1500 to +2000 unit
A17	0-10VDC (*)	0 to 3500 unit
A18	0 -10VDC	-1500 to +2000 unit

Ordering Information :

Model	A- Input	B- Output 1 (Heat)	C- Output 2 (Cool)	D- Retransmission	E- Alarm 1	F- Alarm 2
PID-723-U	A1- (Factory set to 8 inputs)	B1- (DC Pulse)	C1- (DC Pulse)	D1- (4-20mA x 1) For PV1 D2- (4-20mA x 2) For PV1 and PV2	E1- (High Alarm Relay)	F1- (High Alarm Relay)
PID-966-U		B2- (Triac)	C2- (Triac)			
PID-948-U	A2 to A18- (Single Fixed input)	B3- (4-20 mA)	C3- (4-20 mA)	00- (None)	E2- (Low Alarm Relay)	F2- (Low Alarm Relay)
PID-489-U		B4- (0-5)V	C4- (0-5)V			
PID-723-F	A2 to A18- (Two Fixed input both of the same type)	B5- (DC Pulse + 4-20 mA)	C5- (DC Pulse + 4-20 mA)	00- (None)	00- (None)	00- (None)
PID-966-F		B6- (DC Pulse + 0-5V)	C6- (DC Pulse + 0-5V)			
PID-948-F		B7- (DC pulse + Triac +4-20mA)	C7- (DC pulse + Triac +4-20mA)			
PID-489-F		B8- (DC pulse + Triac + 0-5V)	C8- (DC pulse + Triac + 0-5V)			
PID-966-T		00- (None)	00- (None)			

Optional Selection

G –One Ramp/Soak	H- Remote Set Point	I- Loop Supply	J- Serial Port
G1 – (Yes)	H1	I1	J1
00 – No	00	00	00

Example:

Model	A- Input	B- Output 1	C- Output 2	D- Retransmission	E- Alarm 1	F- Alarm 2	G- Remote Set Point	H- Serial Port
PID-723-U	A1	B1	00	D1	E1	F2	00	H1
PID-966-U	A1	B5	C4	D1	E1	00	G1	00
PID-489-F	A3	B2	00	D1	E1	F2	00	H1
PID-966-T	A13	B6	C6	00	E1	F1	00	00

Example	Ordering Code	Description
1	PID-723-U-A1-B1-00-D1-E1-F2-00-H1	Model PID-723 -U with Universal input(A1), DC pulse output for heating control, (4-20) mA output proportional to input, with High and Low Alarm relay outputs and RS485 interface.
2	PID-966-U-A1-B5-C2-D1-E1-00-G1-00	Model PID-966 -U with Universal input(A1), DC pulse and 4-20mA output for heating control, Triac output for cooling control, (4-20) mA output proportional to input, with High Alarm relay output and remote set point adjust facility.
3	PID-489-F-A3-B2-00-D1-E1-F2-00-H1	Model PID-489 -F with K type thermocouple input(A3), 4-20mA output for heating control, with High and Low Alarm relay outputs and RS485 interface.
4	PID-966-T-A13-B6-C6-00-E1-F2-00-00	Model PID-966 -T with 2 RTD input, DC pulse and 0-5V heating control output for each input, High Alarm relay output for 1 st input and Low Alarm relay output for 2 nd input

Any special feature or requirement of optional feature can be mentioned by the user in the Remark column.

REMARK :