Manuals+ — User Manuals Simplified.

i therm AI-5982 Digital Temperature Controller Instruction Manual

Contents

i therm AI-5982 Digital Temperature Controller

Product Specifications

1. **Display Type:**
   - Dual 4-Digit 7 segment LED
   - 4-Digit Bright White (PV)
   - 4-Digit Luminous Green (SV)

2. **Input Sensor Range:**
   - OP1: Main Control Output
   - OP2: Alarm Status
   - SOAK: Soak Timer
   - TC: J,K,R,S & RTD: Pt-100 (Refer below table for ranges)

3. **Relay Output:**
   - Contact Type: N/O, CM, N/C
   - Contact Rating: 5A @ 250VAC or 30 VDC
   - Life Expectancy: > 500,000 operations
   - Isolation: Inherent

4. **SSR Drive Output:**
   - Drive Capacity: 12V @ 30mA
   - Isolation: Non-Isolated

5. **Function:**
   - Output 1: Main Control output
   - Output 2: Programmable (Auxiliary control, Alarm, Soak timer)
   - Control Action: ON-OFF/T.P (user selectable)

- Control Mode: Heat/Cool (user selectable)
- Compliance: —-

6. **Environmental:**
   - Operating Range: —-
   - Storage Humidity: —-

7. **Power Supply:**
   - Supply Voltage: 90~270VAC, 50/60Hz
   - Consumption: 4W Maximum

8. **Physical:**
   - Housing: ABS Plastic
   - Model No.: AI-5982
   - Weight: 240gms.

Product Using Instructions

Safety Instructions

This controller is meant for temperature control applications.It is important to read the manual prior to installing or commissioning of the controller. All safety-related instructions appearing in this manual must be followed to ensure the safety of the operating personnel as well as the instrument.

General Instructions

- The controller must be configured correctly for intended operation. Incorrect configuration could result in damage to the equipment or the process under control or it may lead to personnel injury.
- The controller is generally part of a control panel, and in such a case, the terminals should not remain accessible to the user after installation.

Mechanical Instructions

- The controller in its installed state must not come in close proximity to any corrosive/combustible gases, caustic vapors, oils, steam, or any other process by-products.
- The controller in its installed state should not be exposed to carbon dust, salt air, direct sunlight, or radiant heat.
- Ambient temperature and relative humidity surrounding the controller must not exceed the maximum specified limit for proper operation of the controller.
- The controller in its installed state must be protected against excessive electrostatic or electromagnetic interferences. Ventilation holes provided on the chassis of the instrument are meant for thermal dissipation and should not be obstructed in the panel.

Electrical Instructions

- The controller must be wired as per the wiring diagram and it must comply with local electrical regulation.
- Care must be taken not to connect AC supplies to low voltage sensor input.
- A circuit breaker or mains switch with a fuse (275V/1A) must be installed between the power supply and supply terminals to protect the controller from any possible damage due to high voltage surges of extended duration.

- A circuit breaker and appropriate fuses must be used for electrical safety.

SPECIFICATIONS

1. **DISPLAY TYPE:** Dual 4- Digit 7 segment LED
   - 4 Digit Bright White (PV)
   - 4 Digit Luminous Green (SV)

Model no.	AI-5982
Display height (PV)	0.56"
Display height (SV)	0.56"

   - **STATUS LED'S**
     - **OP1:** Main Control Output
     - **OP2:** Alarm Status
     - **SOAK:** Soak Timer
2. INPUT
   - **Sensor:** TC:J,K,R,S & RTD: Pt-100
   - **Range:** Refer below table

Sensor Type	Range	Resolution	Accuracy
Fe-k(J) T/C	0 ~ 760oC	1 oC	
Cr-AL(K) T/C	-99 ~ 1300oC	1 oC	
(R) T/C	0 ~ 1700oC	1 oC	± 1 oC
(S) T/C	0 ~ 1700oC	1 oC	
Pt-100(RTD)	-100 ~ 450oC	1 oC	
Pt-100(RTD 0.1)	-99.9 ~ 450.0oC	0.1 oC	± 0.3 oC

   - **Sampling Time:** 125 msec.
   - **Resolution:** 1°C/0.1°C(Only for RTD)
   - **CJC for TC:** Built in automatic
   - **LWC for Pt-100:** Built in up to 18E max.
   - **Digital Filter:** 1 to 10 Sec.

3. RELAY OUTPUT

- **Contact Type:** N/O, CM, N/C
- **Contact Rating:** 5A @ 250VAC or 30 VDC
- **Life Expectancy:** > 5,00,000 operations
- **Isolation:** Inherent

4. SSR DRIVE OUTPUT

- **Drive Capacity:** 12V @ 30mA.
- **Isolation:** Non-Isolated.

5. FUNCTION

- **Output 1:** Main Control output
- **Output 2:** Programmable
   1. Auxiliary control
   2. Alarm
   3. Soak timer
- **Control Action:** ON-OFF/T.P (user selectable)
- **Control Mode:** Heat/Cool (user selectable)
- **Compliance:** —-

6. ENVIRONMENTAL

- **Operating Range:** 0 ~50°C, 5~90% Rh
- **Storage Humidity:** 95% Rh (Non-Condensing)

7. POWER SUPPLY

- **Supply Voltage:** 90~270VAC, 50/60Hz.
- **Consumption:** 4W Maximum.

8. PHYSICAL

- **Housing:** ABS Plastic.

Model No.	AI-5982
Weight (gms.)	240

SAFETY INSTRUCTION

This controller is meant for temperature control applications. It is important to read the manual prior to installing or commissioning of controller. All safety related instruction appearing in this manual must be followed to ensure safety of the operating personnel as well as the instrument.

GENERAL

- The controller must be configured correctly for intended operation. Incorrect configuration could result in damage to the equipment or the process under control or it may lead personnel injury.
- The controller is generally part of control panel and in such a case the terminals should not remain accessible to the user after installation.

MECHANICAL

The Controller in its installed state must not come in close proximity to any corrosive/combustible gases, caustic vapors, oils, steam or any other process by-products. The Controller in its installed state should not be exposed to carbon dust, salt air, direct sunlight or radiant heat.

Ambient temperature and relative humidity surrounding the controller must not exceed the maximum specified limit for proper operation of the controller. The controller in its installed state must be protected against excessive electrostatic or electromagnetic interferences. Ventilation holes provided on the chassis of the instrument are meant for thermal dissipation hence should not be obstructed in the panel.

ELECTRICAL

- The controller must be wired as per wiring diagram & it must comply with local electrical regulation.
- Care must be taken not to connect AC supplies to low voltage sensor input.
- Circuit breaker or mains s/w with fuse (275V/1A) must be installed between power supply and supply terminals to protect the controller from any possible damage due to high voltage surges of extended duration.
- Circuit breaker and appropriate fuses must be used for driving high voltage loads to protect the controller from any possible damage due to short circuit on loads.
- To minimize pickup of electrical noise, the wiring for low voltage DC and sensor input must be routed away from high current power cables. Where it is impractical to do this, use shielded ground at both ends.
- The controller should not be wired to a 3-Phase supply with unearthed star connection. Under fault condition such supply could rise above 264 VAC which will damage the controller.
- The Electrical noise generated by switching inductive loads might create momentary Fluctuation in display, alarm latch up, data loss or permanent damage to the instrument. To reduce this use snubber circuit across the load.
- It is essential to install a over Temp. Protection device to avoid any failure of heating system. Apart from spoiling the product, this could damage the process being controlled.

CAUTION: To prevent the risk of electrical shock, switch off the power before making/removing any connection or removing the controller from its enclosure.
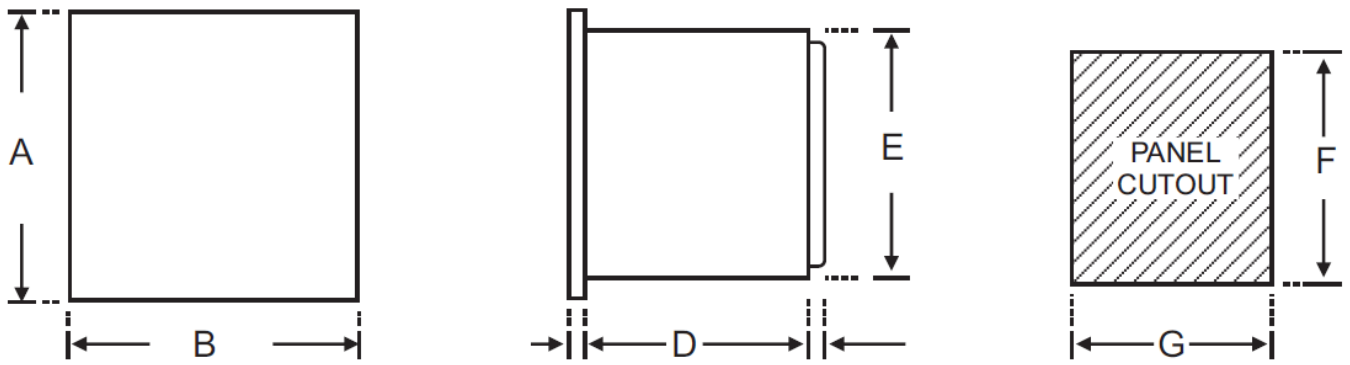
INSTALLATION

MECHANICAL INSTALLATION

- The label on the controller identifies the serial number, wiring connections and batch number.

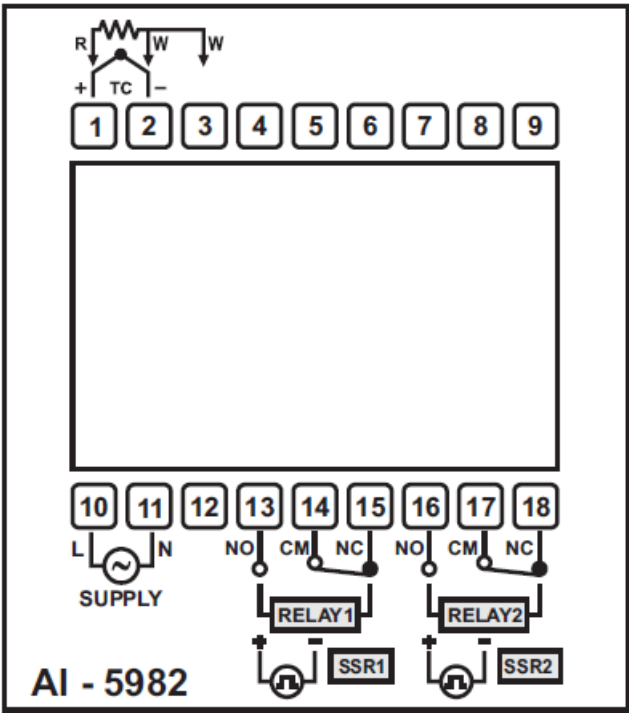### OVER ALL DIMENSIONS & PANEL CUT OUT (IN MM)

MODEL: AI – 5982

TABLE: 1

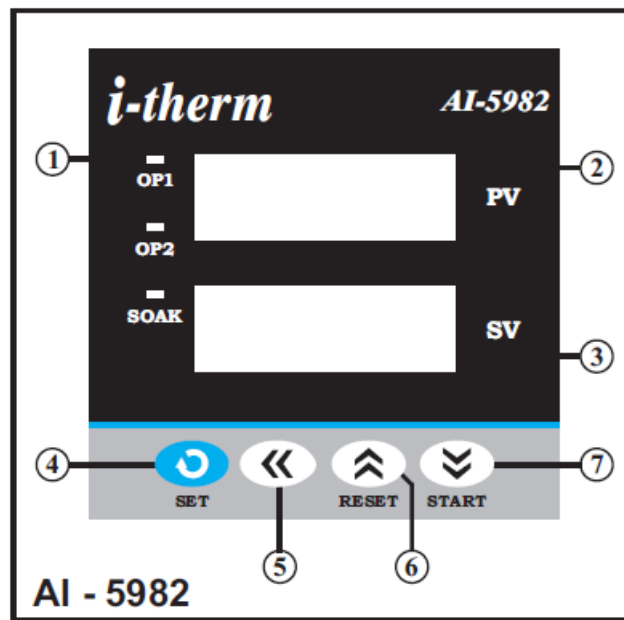| Dim Model	A	B	C	D	E	F	G	H
AI-5982	96	96	10	45	89	92	92	9

INSTALLATION GUIDELINES

1. Prepare the cut-out with proper dimension as shown in figure.
2. Remove clamp from controller.
3. Push the controller through panel cut-out and secure the controller in its place by tightening the side clamp.

ELECTRICAL INSTALLATION

The electrical connection diagram is shown on the controller enclosure as below.

FRONT PANEL LAYOUT

FRONT PANEL LAYOUT DESCRIPTION

Sr.	NAME	FUNCTION
1	**OP1 LED**	Glows when OP1 is ON & flashes when delay time (dly1) is in operation(if selected mode is ON-OFF)
	OP2 LED	Glows when OP2 is ON & flashes when alarm condition persists even after acknowledged. or delay time (dly2) is in operation(if selected mode is ON-OFF).
	SOAK LED	Glows when Soak mode is selected & flashes when Soak timer is in operation.
2	**UPPER DISPLAY**	It will display (1) Measured value of selected input or Error massages in run mode. (2) Parameters Value in program mode.
3	**LOWER DISPLAY**	It will display (1) SP (Main set point) / SP2 (Auxiliary/Alarm) set value / Set Soak time value/ balance or elapsed soak time in run mode. (2) Parameter code in program mode.
4	**SET KEY**	(1) For SP programming. (2) To access Control mode. (3) To access Configuration mode along with UP key. (4) To scroll the parameter & to store its value.
5	**SHIFT KEY**	(1) To increase/alter parameter value in program mode with Up / Dn Key. (2) Press for 3Sec in Programming this will help to go back to previous parameter.
6	**UP KEY**	(1) To increase/alter parameter value in program mode. (2) To Enter in configuration mode (with SET key) . (3) To acknowledge Alarm. (4) To Reset the SOAK timer
7	**DOWN KEY**	(1) To decrease / alter parameter value in program mode. (2) To start Soak timer.

PROGRAMMING

USER LIST: To access User list press SET key once.

PARAMETER	LOWER DISPLAY	UPPER DISPLAY	RANGE	DESCRIPTION	DEFAULT
CONTROL SET POINT	`5P 1`		LSPL ~HSPL	User can change SP1 value using UP/DOWN keys. Holding the key will change the value at a faster rate. Press SET key to store the desired value & move on to the next parameter.	0°C
SET POINT 2	`5P2`		LSPL ~HSPL	This parameter is prompted only, if output 2 is configured as (1) Either absolute auxiliary control or as an alarm (High/Low) mode. (2) Either deviation auxiliary control or as a deviation alarm mode. (3) As a band alarm (For all above SP2 has to be enable)	0°C
SOAK TIME	`5t.tñ`		0 min. to 999 min.	This parameter is prompted only, if output 2 is configured for soak timer application.	1 min.

CONTROL LIST: To enter in this mode, press SET & DOWN key simultaneously for 3sec. User can then set the following control parameters.

PARAMETER	LOWER DISPLAY	UPPER DISPLAY	RANGE	DESCRIPTION	DEFAULT
LOCK CODE	LOCH	0	1 ~ 9999	Set this parameter to 15 (Default LOCK CODE) to access Control List. User has a choice to set different Lock Code via USER LOCK CODE in Config. List.	0
PROPORTIONAL BAND	P.bnd	5.0	0.5 to 999.9°C	This parameter will be prompted only, if selected control action is PID. It sets bandwidth over which the output power is adjusted depending upon the error (SV-PV). The value of this parameter is automatically set by Auto tune function.	5.0°C
CYCLE TIME	CYCt	16.0	1 to 100.0 sec.	This parameter will be prompted only, if selected control action is PID. User can set this value based on process being controlled & type of output being selected. For Relay O/P, cycle time should be more than 12sec & for SSR O/P, cycle time should be less than 10sec.	16.0 sec.
CONTROL HYS.	HYS.1	2	1 to100°C	This parameter will be prompted only, if selected control action is ON-OFF. It sets the dead band between ON & OFF switching of the output. Larger value of hysteresis minimize the number of ON-OFF operation to the load. This increases the life of actuators like contactors but also produces large errors (between PV & SV)	2°C
DELAY 1	dLY1	0	0 to 500 sec.	This parameter will be prompted only, if selected control action is ON-OFF. It sets the main output restart time where o/p once turned off will turn ON only after restart time, regardless difference between PV & SP in Heat or Cool mode. If set to '0', o/p will be switched without delay. Delay will be applicable also in case of every power ON.	120 sec.
HYS. 2	HYS.2	2	1 to 100°C	This parameter will be prompted only, if selected control mode for output2 is auxiliary control or an alarm. The value of this parameter sets the dead band between ON & OFF switching of output load.	2°C
DELAY 2	dLY2	0	0 to 500 sec.	This parameter will be prompted only, if output 2 is configured as an auxiliary control output. In this mode, output once turned off will restart only after set time regardless of the difference between PV and SP2. The time delay is settable upto 500 seconds. If time delay is set to 0, there is no delay executed between output switching.	0 sec.
SOAK TIME DELAY	St.dL	10	0 to 100 sec.	This parameter will be prompted only, if selected control mode for output2 is Soak timer. Depending on end of soak strategy selected by user, the value of this parameter sets the activation time for OP2 when Soak timer is over. Setting this parameter to 0 will make OP2 continuously ON at the end of soak time till user starts the next cycle.	10 sec.
MANUAL RESET MODE	SPOF	nO	-25 to 25°C	This parameter will appear only, if selected C.A. is time proportional (For more details, refer User guide).	0°C

CONFIGURATION LIST

1. To enter in this mode, Press and hold SET & UP key simultaneously for 3 sec.

2. Press UP or DOWN key to scroll between parameter options.

3. Press SET key to store the current parameter & move on to the next parameter.

PARA METER	LOWER DISPLAY	UPPER DISPLAY	DESCRIPTION	DEFAULT
LOCK CODE	LOCY	0	Set this parameter to 15 (Default LOCK CODE) to access Config. List. User has a choice to set different Lock Code via USER LOCK CODE in Config. List.	0
INPUT TYPE	InPt	tC - J tC - H tC - r tC - S rtd rtd.1	This parameter value is set according to the type of sensor (Thermocouple or RTD input) connected to the Controller's Input Terminals. 	Sensor Type	Range	Resloution	Accuracy	 | Fe-k(J) T/C	0 ~ 760°C	1°C		 | Cr-AL(K) T/C	-99 ~ 1300°C	1°C		 | (R) T/C	0 ~ 1700°C	1°C	±1°C	 | (S) T/C	0 ~ 1700°C	1°C		 | Pt-100(RTD)	-100 ~ 450°C	1°C		 | Pt-100(RTD 0.1)	-99.9 ~ 450.0°C	0.1°C	± 0.3°C		tC-J
LOWER SET POINT LIMIT	LSPL	0	Sets the minimum limit for set point adjustment. It can be set from minimum specified range of selected sensor to HSPL value.	0°C
HIGHER SET POINT LIMIT	HSPL	400	Sets the maximum limit for set point adjustment. It can be set from LSPL value to maximum specified range of selected sensor.	400°C
PROCESS VALUE OFFSET	OFSt	0	Function of this parameter is to add/subtract a constant value to the measured PV to obtain the final PV for control applications. This parameter value can be altered (1) To compensate for known thermal gradient. (2) To match the display values with another recorder or indicator measuring the same PV.	0°C
INPUT FILTER	FLtr	1	The controller is equipped with an adaptive digital filter which is used to filter out any extraneous pulses on the PV. The filtered PV value is used for all PV dependent functions. If the PV signal is fluctuating due to noise, increase the filter time constant value.	4
CONTROL MODE FOR O/P 1	nodE	tP OnOF	User can select between TP or ON-OFF action algorithm to be adopted for output.	PID
CONTROL LOGIC FOR O/P 1	LoGC	HEAt COOL	This parameter will appear only, if selected control mode is ON-OFF. User can select heating logic in which OP1 will remain ON till PV < SP. (PV increases when output is ON). This parameter will appear only, if selected control mode is ON-OFF. User can select cooling logic in which OP1 will remain ON till PV > SP. (PV decreases when output is ON).	HEAT
OUTPUT 2 FUNCTION	OP2	AUCn ALrn tnr	This parameter allows the user to select output 2 as an 'Auxiliary' control. For options refer Table 3. This parameter allows the user to select output 2 as an 'Alarm' control. For options refer Table 4. This parameter allows the user to select output 2 as a 'Soak timer' mode.	Auxiliary

TABLE 3: Below listed options will appear only, if OP2 is selected as an Auxiliary control mode.

| PARA METER	LOWER DISPLAY	UPPER DISPLAY	DESCRIPTION	DEFAULT
INPUT TYPE	SP2	Abs	If selected, User can set SP2 value independently, irrespective of SP1.	Abs
		∨ ∧ dEun	In this mode, SP2 is always related with SP1. User can set SP2 value with deviation of ± 99°C w.r.t SP1.	
OUTPUT 2 LOGIC	OP2.L	HEAt	User can select Heat logic for control Output 2 in which OP2 will remain ON till PV < SP (PV increases when output is ON)	Heat
		∨ ∧ COOL	User can select Cool logic for control Output 2 in which OP2 will remain ON till PV > SP (PV decreases when output is ON)	
SET POINT 1	SP1	Enbl	If Enabled, User can view & edit the Set Point (SP1) in USER list.	Enable
		∨ ∧ dSbL	If Disabled, User cannot view or edit Set Point (SP1) in USER list.	
SET POINT 2	SP2	Enbl	If Enabled, User can view & edit the Set Point (SP2) in USER list.	Enable
		∨ ∧ dSbL	If Disabled, User cannot view or edit Set Point (SP2) in USER list.	
USER LOCK CODE	U.LOC	15	Default USER LOCK CODE is 15 to access Control & Configuration List. User has a choice to set its own USER LOCK CODE between 1 to 9999, this is to prevent unauthorized access of Control & Configuration List.	15

TABLE 4: Below listed parameters will appear only, if OUTPUT 2 is selected as ALARM mode. In ALARM mode, controller continuously compares PV with either SP (For Deviation or Band alarm) or an independent ALARM SP2 (For process high and process low Alarm). Alarm will occur when PV falls outside the set alarm limits. Also, OP2 will energize or de-energize under Alarm condition as per the Alarm logic(AL.LG) selected. HYS2 in control List decides when to switch OFF the alarm. Instrument supports four types of Alarm as described below :

PARA METER	LOWER DISPLAY	UPPER DISPLAY	DESCRIPTION	DEFAULT
ALARM TYPE	AL.tY	LOУ	Low Alarm : OP2 activates when PV < SP2.	DEVIATION
		∨ ∧ HIGh	High Alarm : OP2 activates when PV > SP2.	
		∨ ∧ dEun	Deviation Alarm : OP2 activates when PV exceeds SP1 ± set deviation value.	
		∨ ∧ bAnd	Band Alarm : OP2 activates when PV falls outside the band w.r.t SP1 either direction	

|				
ALARM LOGIC	$AL.LG$	dir ⌄ ⌃	If this parameter is set as 'Direct', Relay/SSR energizes under Alarm condition & remains de-energized otherwise. 'Direct' setting is generally used for Audio/Visual alarm output.	**DIRECT**
		rEv	If this parameter is set as 'Reverse', Relay/SSR de-energizes under Alarm condition & remains energized otherwise. 'Reverse' setting is generally used for tripping the process under alarm conditions.	
ALARM INHIBIT	$AL.IH$	YES ⌄ ⌃	If this parameter is set to 'YES' & Alarm condition persists, it will disable Alarm O/P at power ON.	**NO**
		nO	If this parameter is set to 'NO' & Alarm condition persists, it will enable Alarm O/P at power up.	
ALARM ACK.	$AL.AY$	$AUtO$ ⌄ ⌃	Once the Alarm is activated, User has following three options to de-activate it. When PV falls within the programmed limits, the alarm will be de-activated automatically.	**AUTO**
		$mAUL$ ⌄ ⌃	Once the alarm is activated, it remains activated until acknowledged manually by UP key.	
		$bOtH$	Once the alarm is activated, it can be de-activated either by pressing UP key or when PV falls within the alarm limits.	

USER GUIDE

ON-OFF ACTION

Fig: 3.1

Fig: 3.2
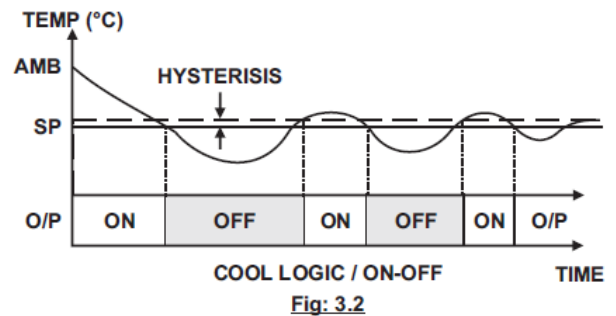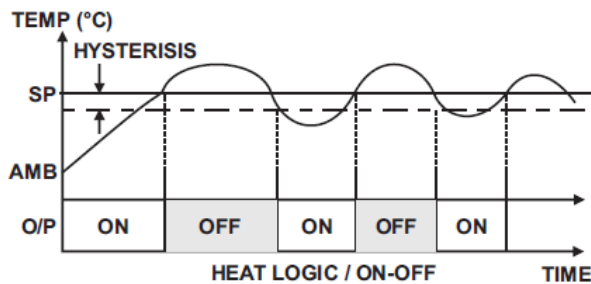
In this mode, output (Relay/SSR) remains ON, till actual temperature reaches to the set point. On reaching SP, output turns OFF & remains OFF, till actual temperature drops down (in heat logic) or raises (in cool logic) equal to hysterisis set by user. (As shown in Fig : 3.1 & 3.2)

TIME PROPORTIONAL ACTION
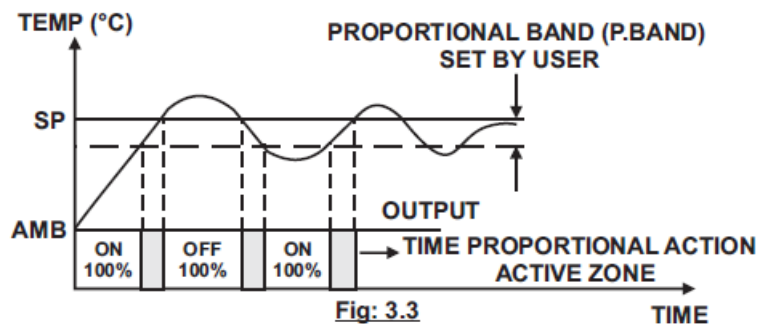
Fig: 3.3

In this mode, ON & OFF time of Output (Relay/SSR) varies proportionally in every cycle (cycle time settable by User) depending on the deviation of PV w.r.t SP. This action starts/continues only, when PV enters or is within the band. (As shown in Fig : 3.3)

MANUAL RESET (OFFSET ADJUSTMENT)

Fig: 3.4
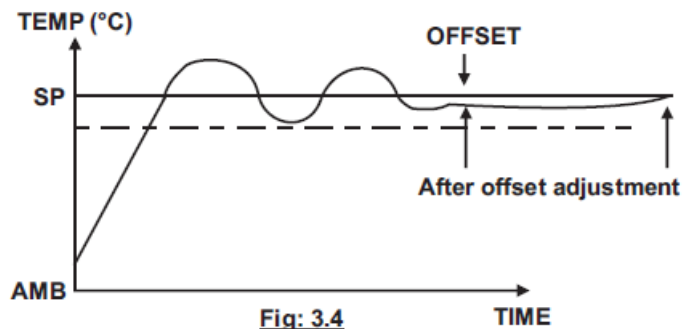
In some applications, after adopting Time Proportionating action, system may stabilize at particular temperature over a period of time which can be different than the set value. This steady state (error) offset can be eliminated by setting this value, equal and opposite to the existing offset. (As shown in Fig : 3.4)

ABBREVIATION

- **C.A.:** Control Action
- **CJC:** Cold Junction Compensation
- **CM:** Common terminal of relay
- **EMI:** Electro Magnetic Interference
- **LWC:** Lead Wire (Length) Compensation
- **NC:** Normally Close terminal of relay
- **NO:** Normally Open terminal of relay
- **OP1:** Output 1
- **OP2:** Output 2
- **PV:** Process Value (Actual temperature)
- **SP:** Set Point Value (Set temp.)
- **SSR:** Solid State Relay
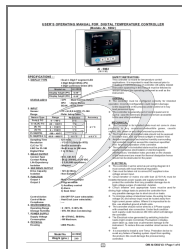- **T.P.:** Time Proportional
- **T/C:** Thermocouple

Contact

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- 338, New Sonal Link Service Industrial Premises Co-op Society Ltd, Building No.2, Link Road, Malad (W), Mumbai – 400064.
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- **E-mail:** sales@itherm.co.in
- **Website:** www.itherm.co.in

Scan

Documents / Resources

i therm AI-5982 Digital Temperature Controller [pdf] Instruction Manual
AI-5982 Digital Temperature Controller, AI-5982, Digital Temperature Controller, Temperature Controller, Controller

References

- *i* **Home - Itherm**