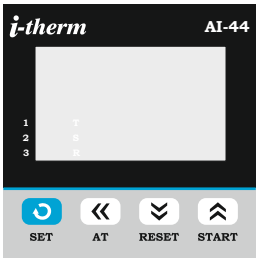
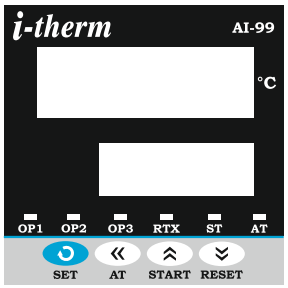
USER'S OPERATING MANUAL FOR PID DIGITAL TEMPERATURE CONTROLLER
(Model: AI- 44 / AI- 99)



AI-44
(48 X 48)



AI-99
(96 X 96)

SPECIFICATIONS : -

1. **DISPLAY TYPE** : 8 - Digit 7 segment LED

Model No.	AI-44	AI-99	Display Colour
Display Height (PV)	0.36"	0.80"	White
Display Height (SV)	0.24"	0.56"	Green

2. **STATUS LED'S** :
   OP1 (1) : Control Output Status
   OP2 (2) : Output 2 Status
   OP3 (3) : Output 3 Status
   RTX (R) : Re-Transmission Status
   ST (S) : Soak Time Status
   AT (T) : Tune Status

3. **INPUT**
   Sensor Input : TC-J,K,R,S,N,T,B & RTD (PT-100)
   Analog Input : 0 - 20mA, 4 - 20mA, 0 - 1VDC, 0 - 5VDC, 0 - 3.3VDC, 0 - 10VDC (Selectable)
   Range : -1999 to 9999 (Analog Input Only)
   Resolution : 0.001, 0.01, 0.1 & 1°C (Selectable for Analog Input only)
   Sampling Time : 125 msec.
   Resolution : 1°C
   CJC for TC : Built in automatic
   LWC for Pt-100 : Built in up to 18E max.
   Digital Filter : 1 to 10 Sec.

4. **RELAY OUTPUT**
   Contact type : N/O, COM
   Contact Rating : 5A @ 250VAC or 30 VDC
   Life expectancy : > 5,00,000 operations
   Isolation : Inherent

5. **SSR DRIVE OUTPUT**
   Drive Capacity : 12V @ 30mA.
   Isolation : Non-Isolated.

6. **FUNCTION**
   Output 1 : Main Control output (Factory Set)
   1) Relay 2) SSR
   3) mA (4~20 / 0~20)

   Output 2 : Programmable
   1) None 2) Auxiliary control
   3) Alarm

   Output 3 : 1)None 2) Auxiliary Control
   3) Alarm 4) Soak Timer
   5) Alarm-Soak
   Control Action : ON-OFF/PID (Select)
   Control Mode : Heat/Cool (Select)

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

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

9. **PHYSICAL**
   Housing : ABS Plastic

INSTALLATION GUIDELINES

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

SAFETY INSTRUCTION

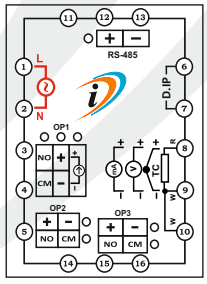
MECHANICAL

- Ambient temperature and relative humidity surrounding the Controller must not exceed the maximum specified limits.
- The Controller in its installed state must be protected against excessive electrostatic or electromagnetic interferences.

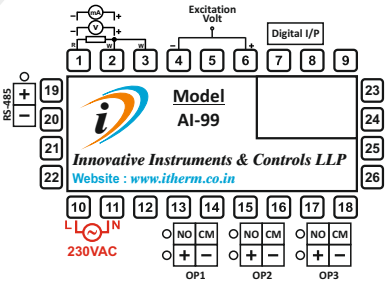
ELECTRICAL

- The Controller must be wired as per wiring diagram & it must comply with local electrical regulation.
- The Electrical noise generated by switching inductive loads might create momentary Fluctuation in display, latch up, data loss or permanent damage to the instrument. To reduce this use snubber circuit across the load.

TERMINAL CONNECTIONS :

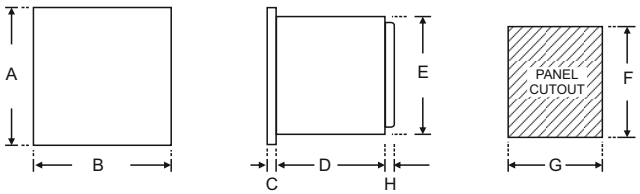


AI-44



AI-99

OVER ALL DIMENSIONS & PANEL CUT OUT (IN MM)



Dim / Model	A	B	C	D	E	F	G	H
AI - 44	50	50	3	85	45	45	45	9
AI - 99	96	96	10	65	89	92	92	9

PROGRAMMING

RUN MODE : To access the Run mode, press SHIFT key to change SP1.

Parameter	Lower Display	Upper Display	Range	Description	Default
Control Set Point	SP1	0	LSPL ~ HSPL	User can change the SP1 value using UP / DOWN and SHIFT keys. Holding the key will change the value at a faster rate. Press SET key to store the desired value	0°C

USER LIST : To access the user list, press & release SET key once.

Parameter	Lower Display	Upper Display	Range	Description	Default
Control Set Point	SP1	0	LSPL ~ HSPL	User can change the SP1 value using UP / DOWN and SHIFT keys. Holding the key will change the value at a faster rate. Press SET key to store the desired value.	0°C
Set Point 2	SP2	0	LSPL ~ HSPL -99 to 99°C	This parameter will be prompted, if Output 2 is configured as AUCn and SP2 is enabled 1) Either absolute auxiliary control mode. 2) Either deviation auxiliary control mode.	0°C
Set Point 3	SP3	0	LSPL ~ HSPL -99 to 99°C	This parameter will be prompted if Output 3 is configured as AUCn and SP3 is Enabled (1) Either absolute auxiliary control mode. (2) Either deviation auxiliary control mode.	0°C
Ramp Rate	rAtE	5.0	0.0 °C to 25.0 °C	This parameter will be available only if Enabled in Configuration List. User can set ramp rate/min for SP1 (Set Point) to minimize overshoot	Disable
Manual Power	P.nn	50	0 % to 100 %	This parameter will be prompted only if Manual Power is enabled from Control List. Manual Power means that the controller output power can be adjusted directly by the user.	50 %
OP2 Mode	OP2n	AUtO On OFF	----------	This parameter is prompted only if Control Logic for Output 1 is configured for Heat-Cool. OP 2 will be automatically activated/deactivated w.r.t SP1 & HYS. OP 2 will be pemanently activated (ON). OP 2 will be permanently de-activated (OFF).	Auto
Alarm 1 Set Point	A1SP	0	LSPL ~ HSPL -99 to +99°C 2 to 99°C	This parameter is prompted if AL.SP is enabled & output 2 is configured as (1) Alarm (High/Low) mode. (2) As a deviation alarm mode. (3) As a band alarm.	0°C
Alarm 2 Set Point	A2SP	0	LSPL ~ HSPL -99 to +99°C 2 to 99°C	This parameter is prompted if AL.SP is enabled & output 2 is configured as (1) Alarm (High/Low) mode. (2) As a deviation alarm mode. (3) As a band alarm.	0°C
Soak Time	St.tn	00.30	1 Sec to 9999 Hrs.	This parameter is prompted only if output 3 is configured as soak timer. Controller starts the execution of soak time as per the mode selected. Soak timer can be programmed using four different time base in Config. List.	1 min.
Minute Elapsed	tin	30	-------	This parameter is prompted only if Hour mode is selected in the Soak timer mode of OP3. (This is a View Only Parameter). During down counting of soak time, it will display the remaining time & during up counting of soak time, the elapsed time will be displayed.	-------

CONTROL LIST : To enter in this mode, press SET & DOWN keys simultaneously for 3 sec.

Parameter	Lower Display	Upper Display	Range	Description	Default
Lock Code	LOCK	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.	15

Parameter	Lower Display	Upper Display	Range	Description	Default
Proportional Band	Pb	5.0	0.5 to 99.9°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
Integral Time	Int	240	0 to 999 Sec.	This parameter will be prompted only if selected control action is PID. It sets the time taken by PID algorithm to remove steady state error. Value of this parameter is automatically set by Auto Tune function. If set to '0', this function will be disabled.	240
Derivative Time	dt	60	0 to 300 Sec.	This parameter will be prompted only if selected control action is PID. It defines how strongly the controller will react to the rate of change of PV. Value of this parameter is automatically set by Auto tune function. If set to '0', this function will be disabled.	60
Cycle Time	CYCt	16.0	0.5 to 99.9 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 12sec & for SSR O/P, cycle time should be less than 10sec.	16.0 Sec.
Manual Power	P.nn	YES / no		This parameter will be prompted, only if factory set control output is "mA". If "Yes" selected, Output power will be adjusted by user from User List. If "No" selected, Output power will be adjusted by instrument itself as per PID routine.	No
Output Power Limit	OUt.L	100	0 % to 100 %	This parameter will be prompted only if selected control action is PID. This parameter will decide the maximum output power in % applied to the load.	100 %
Soft Start Time	SS.tn	50	5 Sec. to 300 Sec.	This parameter will be prompted only if factory set control output is "mA". The soft start function suppresses the mA to become max. output. It places an upper limit on mA output for a specified amount of time after power on. This function is useful for effects such as suppressing the heater output during equipment startup & make load lightened. After the time has passed, the soft start function ends & normal PID control begins.	50 Sec.
Output Off	OP.OF	dSbL	1 to 10	This parameter will be prompted only if selected control action is PID. With this parameter, control output will be completely OFF, after the Set Point + Offset Value. If Disable, O/P will act depending upon the PID value after Set Point achieved.	Disable
Tune Offset	t.OFS	100	50 % to 100 %	This parameter will be prompted only if selected control action is PID. This parameter allows the user to carry out Auto Tuning function below the set point. (If Tune offset is 50 %, tuning will be carried out at 50 % of the set point and if 100 %, tuning will be carried out at 100 % of the set point).	100 %
Control Hys. 1	HY1	2	1 to 25°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 hysterisis minimizes the number of ON-OFF operation of load. This increases 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. Also, delay will be applicable in case of every power ON.	0 Sec.
Hys. 2	HY2	2	1 to 25°C	This parameter will be prompted only if selected control mode for output 2 is auxiliary control or an alarm. The value of this parameter sets the dead band between on and off switching of output load.	2°C
Gap 1	GAP1	0.0	-9.9 to 9.9°C	This parameter will be prompted only if Control Logic for Output 1 is configured for Heat-Cool. SP (Set Point) will be considered as (SP1 - Gap1) for heating.	0°C
Gap 2	GAP2	0.0	-9.9 to 9.9°C	This parameter will be prompted only if Control Logic for Output 1 is configured for Heat-Cool. SP (Set Point) will be considered as (SP1 + Gap2) for cooling.	0°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, O/P once turned OFF will restart only after set time regardless of the difference between PV and SP2. Time delay is settable upto 500 seconds. If time delay is set to 0, there is no delay between output switching.	0 Sec.
Hys. 3	HY3	2	1 to 25°C	This parameter will be prompted only if selected control mode for output 2 is auxiliary control or an alarm. The value of this parameter sets the dead band between on and off switching of output load.	2°C

Parameter	Lower Display	Upper Display	Range	Description	Default
Delay 2	dL 92	0	0 to 500 Sec.	This parameter will be prompted only if output 2 is configured as an Auxiliary control output. In this mode, O/P once turned OFF will restart only after set time regardless of the difference between PV and SP2. Time delay is settable up to 500 seconds. If time delay is set to 0, there is no delay between output switching.	0 Sec.
Soak Band	St.bd	0.0	0.0 to 99.9°C	This parameter defines the permissible deviation of PV from SP during soak time cycle. If PV falls outside the soak band during soak cycle, timer halts. Timer will start only when PV falls within the soak band. This parameter is ignored if set to '0'.	0.0
Soak Time Delay	St.dL	10	0 to 99 Sec.	This parameter will be prompted only if selected control mode for Output 2 is Soak timer. Depending on end of soak strategy, 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.

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.

Parameter	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 between 1 to 9999 via USER LOCK CODE in Config. List.	15
Input Types	InPt	tC-J	'TC-J' :- If selected, instrument will accept temperature input from thermocouple J type sensor at rear terminal. Below range it will display 'LLLL' message & above range it will display 'HHHH'.	TC-J
		tC-K	'TC-K' :- If selected, instrument will accept temperature input from thermocouple K type sensor at rear terminal. Below range it will display 'LLLL' message & above range it will display 'HHHH'.	
		tC-r	'TC-R' :- If selected, instrument will accept temperature input from thermocouple R type sensor at rear terminal. Below range it will display 'LLLL' message & above range it will display 'HHHH'.	
		tC-S	'TC-S' :- If selected, instrument will accept temperature input from thermocouple S type sensor at rear terminal. Below range it will display 'LLLL' message & above range it will display 'HHHH'.	
		tC-n	'TC-N' :- If selected, instrument will accept temperature input from thermocouple N type sensor at rear terminal. Below range it will display 'LLLL' message & above range it will display 'HHHH'.	
		tC-t	'TC-T' :- If selected, instrument will accept temperature input from thermocouple T type sensor at rear terminal. Below range it will display 'LLLL' message & above range it will display 'HHHH'.	
		tC-b	'TC-B' :- If selected, instrument will accept temperature input from thermocouple B type sensor at rear terminal. Below range it will display 'LLLL' message & above range it will display 'HHHH'.	
		rtd	'RTD' :- If selected, instrument will accept temperature input from PT-100 sensor at rear terminal. Below range it will display 'LLLL' message & above range it will display 'HHHH'.	
		rtd.1	'RTD.1' :- If selected, instrument will accept temperature input from PT-100 sensor at rear terminal. Below range it will display 'LLLL' message & above range it will display 'HHHH'.	
		0-1	'0 - 1' :- If selected, instrument will accept 0 - 1 VDC input at rear terminal. Below 0V it will display 'LLLL' message & above 1V it will display 'HHHH'.	
		0-3.3	'0 - 3.3' :- If selected, instrument will accept 0 - 3.3 VDC input at rear terminal. Below 0V it will display 'LLLL' message & above 3.3V it will display 'HHHH'.	
		0-5	'0 - 5' :- If selected, instrument will accept 0 - 5 VDC input at rear terminal. Below 0V it will display 'LLLL' message & above 5V it will display 'HHHH'.	
		0-10	'0 - 10' :- If selected, instrument will accept 0 - 10 VDC input at rear terminal. Below 0V it will display 'LLLL' message & above 10V it will display 'HHHH'.	
		0-20	'0 - 20' :- If selected, instrument will accept 0 - 20 mA input at rear terminal. Below 0 mA it will display 'LLLL' message & above 20 mA it will display 'HHHH'.	
		4-20	'4 - 20' :- If selected, instrument will accept 4 - 20 mA input at rear terminal. Below 3.8 mA it will display 'LLLL' message & above 20 mA it will display 'HHHH'. If input is less than 3.2 mA, it will display 'L.BRK' (Loop Break) message.	

Parameter	Lower Display	Upper Display	Description	Default
mA Output Type	oP1t	0-20 ⇕ 4-20	This parameter will be prompted only if factory set control output is “mA”. If “0~20” selected, Control output will be 0~20 mA. If “4~20” selected, Control output will be 4~20 mA.	4~20 mA
mA Function	mAFn	CtrL ⇕ rtS	User can select between PID or ON-OFF action algorithm to be adopted for output. If Factory set control output is “mA”, then control mode as PID selected & this parameter will be skipped. User can select between PID or ON-OFF action algorithm to be adopted for output. If Factory set control output is “mA”, then control mode as PID selected & this parameter will be skipped.	PID
RE-Tx Low Value	rELo	0	By this parameter user can define Low scale for Retransmission which can be in between ‘-1999 to rE.Hi’. For range limit as per resolution selected, Ref. Table No.2 (Page No. 9).	0
RE-Tx High Value	rEHi	1200	By this parameter user can define High scale for Retransmission which can be in between ‘rE.Lo to 9999’. For range limit as per resolution selected, Ref. Table No.2 (Page No. 9).	1200
mA Low Calibration	CLO	16.70	This parameter will be prompted only if factory set control output is “mA”. By this parameter user can adjust Lower calibration for selected mA type. (Adjust 0mA on meter if 0~20 selected or 4mA on meter if 4~20 selected).	16.70
mA High Calibration	CHO	85.50	This parameter will be prompted only if factory set control output is “mA”. By this parameter, user can adjust Higher calibration for selected mA type. (Adjust 20mA on meter with this parameter).	85.50
mA Default	dnA	YES ⇕ no	This parameter will be prompted only if factory set control output is “mA”. If “Yes” selected, User Calibration will be replaced with Factory Calibration. If “No” selected, no change in User Calibration.	No
Resolution	rESL	0 ⇕ 0.0 ⇕ 0.00 ⇕ 0.000	This parameter will **NOT** be prompted, when input type is selected as Thermocouple (TC- J, K, R & S). When input type selected is **RTD**, then only “0 & 0.0” resolution format will be available. By this parameter, user can select four format of resolution only for analog input, i.e. (“0.000, 0.00, 0.0, 0”). For range limit as per resolution selected, Ref. Table No.6 (Page No. 10).	0
Analog Input Low Value	Ai.Lo	0.	By this parameter, user can define Low scale for input signal which can be in between ‘-1999 to Ai.Hi’. For range limit as per resolution selected, Ref Table No.1 (Page No.5).	0
Analog Input High Value	Ai.Hi	9999.	By this parameter, user can define High scale for input signal which can be in between ‘Ai.Lo to 9999’. For range limit as per resolution selected, Ref Table No.1 (Page No.5).	9999
Lower SP Limit	LSPL	0	Sets the minimum limit for set point adjustment. It can be set from minimum specified range of sselected sensor to HSPL value.	0°C
Higher SP 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 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	4	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	nodE	Pid ⇕ onOF	User can select between PID or ON-OFF action algorithm to be adopted for output. If Factory set control output is “mA”, then Control mode as PID selected & this parameter will be skipped.	PID

Parameter	Lower Display	Upper Display	Description	Default
Control Logic for OP 1	OP1L	HEAt COOL HtCL	User can select heating logic in which OP1 will remain ON till PV < SP. (PV increases when output is ON). User can select cooling logic in which OP1 will remain ON till PV > SP. (PV decreases when output is ON). This parameter will be prompted only, if selected input is RTD or RTD.1 and is used for BOD application. Here OP1 acts as Heating control & OP2 as Cooling control.	Heat
Overshoot Control Point	OCP	dSbL	This parameter will be prompted only, if selected control action is PID. Setting this parameter on higher side will proportionally slow down the rate of rise of PV to minimize overshoot (this may cause delay to reach SP). Disabling or Setting this parameter on lower side will proportionally increase the rate of rise of PV (which may cause overshoot). Disable this option, if delay is not required to reach SP. (This may cause overshoot w.r.t. SP).	Disable
Ramp Rate	rAtE	EnbL dSbL	User can set the desired RAMP rate in USER List. The RATE parameter will not be prompted in USER list.	Disable
Auto Tune	tunE	EnbL dSbL	This parameter will be prompted only, if selected control action is PID. If Enabled, this parameter will be prompted, if user presses Shift key for 3sec. If Disabled, this parameter will not be prompted, if user presses Shift key for 3sec.	Enable
Set Point 1	SP1	EnbL dSbL	If Enabled, User can view & edit the Set Point (SP1) in USER List. If Disabled, User cannot view or edit Set Point (SP1) in USER list.	Enable
Output 2 Mode	OP2n	EnbL dSbL	This parameter will appear only, if Control logic is Heat-Cool. If Enabled, User can set different mode for OUTPUT 2 in USER list. If Disabled, User cannot set different mode for OUTPUT 2 in USER list.	Disable
Output 2 Control	OP2C	15.0	This parameter will appear only, if Control logic is Heat-Cool. OP2 will be OFF at Ambient + OP2C value irrespective of output 2 mode.	15.0
Output 2 Function	OP2	nonE AUCn ALrn	For this parameter, the OP2 will be continuously OFF. This parameter allows the user to select output 2 as an 'Auxiliary' control. For Options, Refer Table 2. This parameter allows the user to select output 2 as an 'Alarm' control. For Options, Refer Table 3.	Auxiliary
Output 3 Function	OP3	nonE AUCn ALrn SOAK AL.St	For this parameter, OP3 will be continuously OFF. This parameter allows the user to select output 3 as an 'Auxiliary' control. For Options, Refer Table 2. This parameter allows the user to select output 3 as an 'Alarm' control. For Options, Refer Table 3. This parameter allows the user to select output 3 as 'Soak' mode. For Options, Refer Table 4. This parameter allows the user to select output 3 to function as both 'Alarm' & 'Soak'. For Options, Refer Table 3 & 4.	Auxiliary

Parameter	Lower Display	Upper Display	Description	Default
Digital Input Function	dI P	nOnE ⌄ ⌃ LVL ⌄ ⌃ d00r	This parameter helps in selecting the functionality of Digital Input. When NONE is selected, Digital Input will be permanently de-activated. By selecting this parameter, Digital Input can be used as Water Level Indicator input. By selecting this parameter, Digital Input can be used to detect whether the door is open or closed.	**LWL**
Digital Input Timing	dt.mr	0	Digital Input will be detected after selected timing. The range of Digital Input timing will be from 0 to 99 sec.	**0 sec.**
Alarm Input Timing	At.mr	0	Alarm output will be generated after the completion of alarm time and detection of Digital Input. The range of Alarm Input timing will be from 0 to 99 sec.	**0 sec.**
Device ID	du.Id	1	Set device id for communication. Range:- 1 to 255.	**1**
Baud Rate	bAUd	9600 ⌄ ⌃ 1920 ⌄ ⌃ 3125 ⌄ ⌃ 3840 ⌄ ⌃ 7680	By this parameter user can select baud rate for communication purpose.	**9600**
Parity	PAr	n_81 ⌄ ⌃ n_82 ⌄ ⌃ o_81 ⌄ ⌃ o_82 ⌄ ⌃ E_81 ⌄ ⌃ E_82	By this parameter user can select parity for communication purpose.	**O_81**

Parameter	Lower Display	Upper Display	Description	Default
Lower Display Message	LdSP	tOGL ⌄ ⌃ SP1 ⌄ ⌃ tiME	By pressing DOWN key, Lower display will toggle between SP1- value, SP2-value, Alarm SP-value(AL.SP) & Timer-value (SOAK).	Toggle
			By this parameter, Lower display will only show SP1-value.	
			By this parameter, Lower display will only show the Timer value (SOAK TIME).	
User Lock Code	ULOC	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 2 : Below listed options will appear only if OP2 and/ or OP3 is selected as an Auxiliary control mode.

Parameter	Lower Display	Upper Display	Description	Default
OP2 and/or OP3 Mode	SP2 and/or SP3	AbS ⌄ ⌃ dEvn	This parameter will be prompted only, if Output 2 is selected as an Auxiliary control output. In this mode, User can set SP2 value independently. The instrument works as 2-Set point controller.	Abs
			This parameter will be prompted only, if Output 2 is selected as an Auxiliary control output. In this mode, User can set SP2 value which is always related to SP. User can set SP2 value with the deviation of ± 99°C wrt SP.	
OP2 and/or OP3 Logic	OP2L and/or OP3L	HEAt ⌄ ⌃ COOL	User can select heating logic in which OP2 will remain ON till PV < SP2. (PV increases when Output 2 is ON).	Heat
			User can select cooling logic in which OP2 will remain OFF till PV < SP2. (PV decreases when Output 2 is ON).	
Set Point 2 and/or Set Point 3	SP2 and/or SP3	EnbL ⌄ ⌃ dSbL	If Enabled, User can view & edit the Set Point (SP2) in USER list.	Enable
			If Disabled, User cannot view or edit Set Point (SP2) in USER list.	

TABLE 3 : Below listed parameters will appear only, if OUTPUT 2 and/or OUTPUT 3 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 and/or SP3 (for process high and process low Alarm).

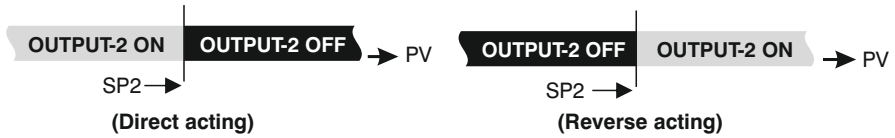
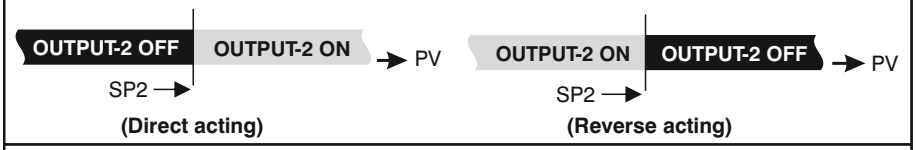
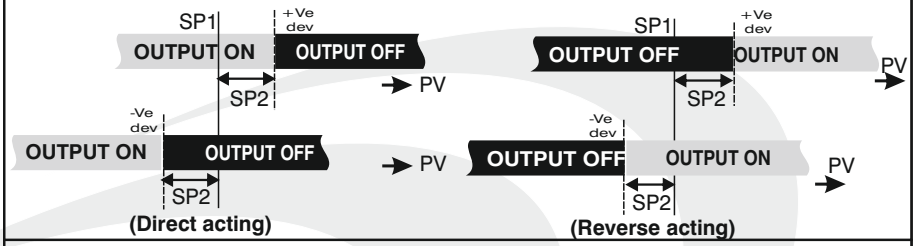
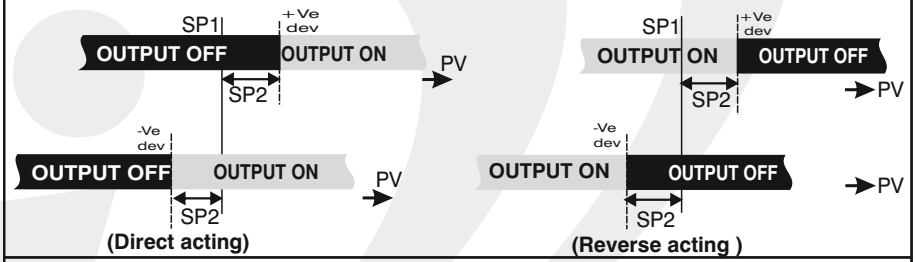
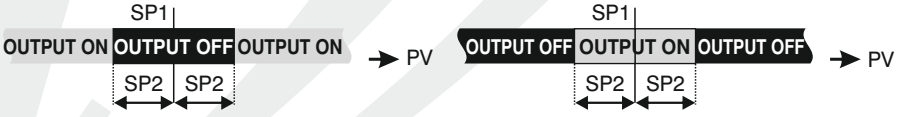
Parameter	Lower Display	Upper Display	Description	Default
Alarm Type 1 and/or Alarm Type 2	A1.tY	LOY	Low Alarm : OP2 activates when PV<SP2. 	High Dev.
	and/or	⌄ ⌃	High Alarm : OP2 activates when PV>SP2. 	
	A2.tY	HIGH		
		⌄ ⌃	Low Deviation Alarm : OP2 activates when PV is less than SP1 ± set deviation value. 	
	LadU			
		⌄ ⌃	High Deviation Alarm : OP2 activates when PV is greater than SP1 ± set deviation value. 	
	H.dU			
		⌄ ⌃	Band Alarm : OP2 activates when PV falls outside the band w.r.t SP1 in either direction. 	
	bAnd			
Alarm 1 and/ or Alarm 2 Logic	A1.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
	and/or	⌄ ⌃		
	A2.LG	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 condition.	
Alarm 1 and/or Alarm 2 Inhibit	A1.IH	YES	This parameter can be used to inhibit (suppress) the Alarm activation upon power-up conditions by setting the parameter value to "YES". From Power-up, the Alarm system remains disabled, until PV is found within the limits.	No
	and/or	⌄ ⌃		
	A2.IH	nO	If Alarm activation is desired even under Power-up condition, set this parameter value to 'NO'.	
Alarm 1 and/or Alarm 2 Ack.	A1.AY	AUtO	Once Alarm is activated, user has following three options to de-activate it. When PV falls within the programmed limits, Alarm will be de-activated automatically.	Auto
	and/or	⌄ ⌃		
		MAnU	Once Alarm is activated, it remains activated until manually acknowledged by UP key.	
	A2.AY	⌄ ⌃		
		bOtH	Once Alarm is activated, it can be de-activated either by pressing UP key or when PV falls within the alarm limits.	
Alarm 1 and/or Alarm 2 Set Point	A1.SP	EnbL	If Enabled, User can view & edit the Alarm Set Point in USER list.	Enable
	and/or	⌄ ⌃		
	A2.SP	dSbL	If Disabled, User cannot view or edit Alarm Set Point in USER list.	

TABLE 4 : Below listed options will appear only, if OP3 is selected as a soak timer.

Parameter	Lower Display	Upper Display	Description	Default
End of Soak Strategy	SP.ES	nonE	It defines the behaviour of the controller at the end of soak timer cycle. Options are as below. If selected, the controller maintains PV at SP indefinitely irrespective of start or end of soak timer.	BOTH
		H.OFF	The controller de-energizes OP1 as soon as the soak time is over. Here upper display will continue to show PV & lower display will show message “Start”. Next cycle will start only, when user will press START key for 3sec.	
		AL.On	The controller energizes OP2 for a time period programmed via (StdL) parameter at the end of soak time cycle. User can utilize OP2 for audio/visual indication.	
		both	The controller executes both, Heater OFF and Alarm ON function as described above.	
Time Base Soak Timer	SP.tb	nn.SS	User can select the timer base of soak time among the four options as shown. Minutes & Seconds (Range 99 minutes, 59 seconds).	MMMM
		nnnn	Minutes (Range 9999 minutes).	
		HH.nn	Hours & Minutes (Range 99 Hours, 59 minutes).	
		HHHH	Hours (Range 9999 Hours).	
Direction for Soak Time	St.dr	UP	If selected, soak timer will increment from 0 to set value. (Note:- User can alter the new time value which should be > elapsed time, even if saok timer is running. If user sets new time value < elapsed time, running timer will be terminated & End of Soak Strategy will be executed.	DN
		dn	If selected, soak timer will decrement from set value to 0. (Note:- User can alter the new time value even when soak timer is running. In this case, balance time of previous set value will be ignored & new cycle will be executed.	
Reset of Running Soak Time	SP.rS	YES	If set as ‘YES’, soak time value will not be stored at the time of power failure.	NO
		nO	If set as ‘NO’ at power ON, soak time will continue from stored value. (Note: Seconds will not be stored.)	
Timer Start Mode	SP.md	mod1	User can define 4 different modes to start the soak timer as follows :- In this mode, Timer will start after pressing START key for 3 sec, irrespective of PV.	MOD 2
		mod2	In this mode, after power ON, timer starts when PV >= SV. To continue with next cycle, user has to either switch Power on & off **OR** press START key for 3 sec when STRT message is displayed on the lower display.	
		mod3	In this mode, timer will start only after pressing START key for 3 sec & PV >= SV for any of the following conditions:- (1) At every Power ON. (2) Completion of current soak time cycle. (3) Power failure during soak time is in progess.	
		mod4	In this mode, timer will start only after pressing START key for 3 sec & PV >= SV for any of the following conditions:- (1) At every Power ON. (2) Completion of current soak time cycle. After executing start command, if cycle doesn’t complete due to power failure, cycle will continue whenever PV >= SV after restore of power. No need to press START key.	

AUTO TUNING MODE : To enter in this mode, press & hold SHIFT key for minimum 3 sec in the Run Mode.

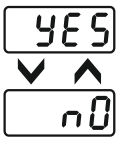
Parameter	Lower Display	Upper Display	Description	Default
Auto Tuning Mode			This function will be executed only, if selected control action is PID. Auto-tuning function is enabled by setting this parameter to 'YES'. The AT led continuously flashes till Auto tuning function is in progress. During Auto-tuning, controller learns the process characteristics by itself & calculates required P, I & D values. User can cancel or abort this feature by setting this parameter to 'NO'.	No

Table 5 :- Range of Different Sensor Types.

Sensor Type	Range	Resolution	Accuracy
Fe-k(J) T/C	0 ~ 760°C	1°C	±1°C
Cr-AL(K) T/C	-99 ~ 1300°C	1°C	
(R) T/C	0 ~ 1700°C	1°C	
(S) T/C	0 ~ 1700°C	1°C	
TC - N	-99 ~ 1300°C	1°C	
TC - T	-99 ~ 400°C	1°C	
TC - B	0 ~ 1800°C	1°C	
Pt-100 (RTD)	-100 ~ 450°C	1°C	
Pt-100 (RTD 0.1)	-100.0 ~ 450.0°C	0.1°C	±0.3°C

Table 6 :- Range as per Resolution.

Resolution	Analog Input Low Value	Analog Input High Value	Process Value Offset	Alarm 1 Band	Alarm 2 Band	Alarm 1 Hysterisis	Alarm 2 Hysterisis
0000	-1999 to 9999	-1999 to 9999	-25 to 25	-50 to 50	-50 to 50	1 to 25	1 to 25
000.0	-199.9 to 999.9	-199.9 to 999.9	-25.0 to 25.0	-50.0 to 50.0	-50.0 to 50.0	0.1 to 25.0	0.1 to 25.0
00.00	-19.99 to 99.99	-19.99 to 99.99	-15.00 to 25.00	-19.00 to 50.00	-19.00 to 50.00	0.01 to 25.00	0.01 to 25.00
0.000	-1.999 to 9.999	-1.999 to 9.999	-1.500 to 2.500	-1.900 to 5.000	-1.900 to 5.000	0.001 to 2.500	0.001 to 2.500

Error Message :-

Display Message	Selected Input	Description
"OPEN"	TC- J,K,R,S,N,T,B or RTD	Open Circuit of Control Sensor.
"HHHH"	0 ~ 20 / 4 ~ 20 / 0 ~ 10	If input is above range, it will display "HHHH" message.
"LLLL"	0 ~ 20 / 0 ~ 10	If input is below '0', it will display "LLLL" message.
"LLLL"	4 ~ 20	If input is below "3.8mA" and above "3.2mA", it will display "LLLL" message.
"L.BRK"	4 ~ 20	If input is less than "3.2mA", it will display "L.BRK" (Loop Break) message.
"C.E.R.R."	Any Input Selected	The device is out of calibration and need to be sent to factory for re-calibration.

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