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Creating Best Value

PID500-T / 500-U / 110-T / 330-T

PID Temperature Controller

OPERATING INSTRUCTIONS

Doc. name: OP INST PID500-T / 500-U / 110-T / 330-T   OP385-V01

Notes

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48 x 48   96 x 48   96 x 96

SALIENT FEATURES

- **Universal Input**
  17 user selectable types including signal inputs.
- **Selectable lower display**
  User selectable lower display options enable quick setting of different parameters such as Set points, Alarms, PID values, Tuning etc.
- **Zone PID**
  4 programmable control zones.
- **Outputs**
  In signal output models output is selectable as control output or retransmission output.
- **Special Modes**
  User selectable special modes
  - Heat-Cool PID
  - Auto/Manual
  - Single point ramp / soak.
  - Soft start.

Others

- Dual 4 digit display
- Digital filtering
- Sensor break indication
- Sensor error compensation
- Programmable parameter lockouts
- 85 to 270 VAC/DC supply
- Compliance-CE
- IP66 front panel protection

Optional Features

- Extra Alarm output
- Heater current monitoring
- Linear DC outputs (Factory set) (0 to 10V, 0 to 5V, 0/4 to 20mA)
- Remote set-point input
- Motorised input
- RS-485 MODBUS communication
- 12 VDC output to drive SSR.
- 24 VAC/DC supply voltage models

Date :

Model No : **Sr. No.:**

Claimed Accuracy : ± 0.25% of full scale ±1 digit
(After 20min warmup time)

Sources calibrated against :

Multimeter calibration report no :

The calibration of this unit has been verified at the following values :

SENSOR	CALIBRATION TEMP (°C) (0.1 resolution)	DISPLAY VALUE (°C)	SENSOR	CALIBRATION VALUE (0.1 resolution)	DISPLAY VALUE
K	35.0	35.0	Voltage (VDC)	0.0	0.0
	700.0	700.0		10.0	10.0
	1350	1350			
PT100	0.0	0.0	Current (mA)	0.0	0.0
	500.0	500.0		20.0	20.0
	800.0	800.0			

The thermocouple / RTD curves are linearised in this microprocessor based product, and hence the values interpolated between the readings shown above are also equally accurate, at every point in the curve.

Unit is accepted as accuracy is withing the specified limit of claimed accuracy and certificate is valid upto one year from the date of issue.

CHECKED BY :

Levels	Function Prompt	Value or Selection	Factory Setting
Special Function	HC	________	no
	ZonE	________	no
	nA In	________	rLY1/AOUt
	SSr	________	OFF
	SOFt	________	OFF
	HAnd	________	OFF
	rAnP	________	OFF
	rAtE	________	100
	SOAk	________	0
	OPEn	________	AUtO
	FA IL	________	0
	b IAS	________	0.0
	FtC	________	1
	rndG	________	1.0
	StNd	________	no
	rSEt	________	no
Communication	bAUd	________	9600
	Addr	________	1
	PAr I	________	nonE
	StOP	________	1

2. ORDERING CODE :

PID 500 | PID 110 | PID 330

U/T – A – B – XX

U	Universal Input
T	TC / RTD Input

A : Output 1	
0	Relay
1	18V DC SSR drive
2	4 - 20mA (Current)
3	0 - 10V (Voltage)
4	0 - 5V (Voltage) #
5	0 - 20mA (Current) #

B : Output 2	
0	Relay
1	** 12V DC SSR drive #

** For PID110 / PID330
18V DC SSR drive

* Second Analog input #	
Valve positioner type	
-P	Potentiometric f/b input
-C	4-20mA f/b input
-V	0-10V f/b input
Remote Set point type	
-C	4-20mA input
-V	0-10V input

00	Only Output 1 & Output 2 #
01	Output 3 (Relay)
02	Output 3 (12V DC SSR drive) #
03	Communication RS485 #
04	Output 3 (Relay) + Communication RS485
05	Output 3 (12V DC SSR drive) + Communication RS485 #
06	CT Input #
07	Output 3 (Relay) + CT Input #
08	Output 3 (12V DC SSR drive) + CT Input #
09	CT Input + Communication RS485 #
10	* Second Analog Input (valve positioner type) #
11	* Second Analog Input (valve positioner type) + Communication Rs485 #
12	* Second Analog Input (Remote set point type) #
13	* Second Analog Input (Remote set point type) + Communication RS485 #

: Applicable only for U Model

ORDERING EXAMPLE

Note : Input is user selectable.
Only Model name & output needs to be specified in the ordering code.

1. PID500 – U – 3 – 0 – 01

U	3	0	01
Universal Input	Output 1 (Voltage)	Output 2 (Relay)	Output 3 (Relay)

Specifications

SELEC

1. TECHNICAL SPECIFICATIONS

1. DISPLAY

Display	**PID500 - 48 x 48 -** Dual 4 digit 7- segment LED. Upper display : 10mm high Red (process value). Lower display : 7mm high Green (selectable). **PID110 - 48 x 96 -** Dual 4 digit 7- segment LED. Upper display : 10mm high Red (process value). Lower display : 7mm high Green (selectable). **PID330 - 96 x 96 -** Dual 4 digit 7- segment LED. Upper display : 14mm high Red (process value). Lower display : 10mm high Green (selectable).
LED Status Annunciators	Main output (1) Alarm output (2, 3) Manual output (M) Tune (T)

2. INPUT

\# : Applicable only for U Model

Input	**Thermocouple :** J,K,T,R,S,C,E,B,N,L,U,W,Platinel II. **RTD :** PT100. **Signal inputs :** -5 to 56mV, 0 to 10V DC#, 0 to 20mA DC# (Programmable scale type)
Sampling time	200 ms.
Resolution	1/0.1° for TC/RTD. 1/0.1/0.01/0.001 for Analog input. (Decimal point position)
Indication accuracy	Cold junction calibration accuracy in TC mode ± 5°C. For TC inputs : 0.25% of FS ±1° For R & S inputs : 0.5% of F.S ± 2° (20 min of warm up time for TC input) For RTD inputs : 0.1% of FS ±1°
Digital filtering	OFF, 1 to 99 sec.
Input Impedance (Ω)	TC / RTD : 400K Voltage : 330K Current : 100E

3. OUTPUT

3.1. Control Output

Relay contact output	Rating : 5A@250V AC or 30V DC. Life expectancy : 100000 cycles at maximum load rating.
SSR drive voltage output (optional)	12V DC.
Current output (Optional)	Range : 0 -20mA DC, 4-20mA DC (Factory set) Action : Control. Update rate : PID Update - Every Cycle time. Analog Output - 100msec. Maximum output load resistance : 500E.

Configuration Record Sheet

SELEC

Levels	Function Prompt	Value or Selection	Factory Setting
Auxiliary Output Modes	MOdE	________	ALrM
	SEt2	________	dEV
	SEt2	________	0
	Pb-C	________	0.0
	CYC.t	________	15.0
	HYSt	________	1.0
	HYS.b	________	0.0
	AL-1	________	dUHI
	LtCH	________	OFF
	HOLd	________	OFF
	ALrM	________	EN
	ANN	________	OFF
	A-LO	________	0
	A-HI	________	1000
	S.Err	________	HIGH
Alarm 2 Module	AL-2	________	dUHI
	LtCH	________	OFF
	HOLd	________	OFF
	ALrM	________	EN
	ANN	________	OFF
	SEt3	________	0
	HYSt	________	1.0
	HYS.b	________	0.0

Configuration Record Sheet

Levels	Function Prompt	Value or Selection	Factory [redacted]
Output Parameters	dAC	________	[redacted]
	CYC.t	________	USEr
	CYC.U	________	15.0
	ArY	________	AutO
	[redacted]	________	100.0
	nnL.r	________	0
Zone Settings	2-n0	________	1
	2SP1	________	0
	Pb-1	________	10
	It-1	________	120
	dt-1	________	30
	2SP2	________	0
	Pb-2	________	10
	It-2	________	120
	dt-2	________	30
	2SP3	________	0
	Pb-3	________	10
	It-3	________	120
	dt-3	________	30
	2SP4	________	0
	Pb-4	________	10
	[illegible]	________	[illegible]
	dt-4	________	30

[redacted]

Minimum output load resistance : 10K.

Resolution 14 Bit

3.2. Alarm Output

Relay contact output (Relay 2, Relay 3 (optional)	Rating : 5A@250V AC or 30V DC. Life expectancy : 100000 cycles at maximum load rating.

3.3. Retransmission output (optional)

Current output	Range : 0 / 4-20mA. Action : Retransmission Update rate : 100 ms Maximum output load resistance : 500E
Voltage output	Range : 0-5 / 10V. Action : Retransmission Update rate : 100msec Minimum output load resistance : 10K

4. FUNCTION

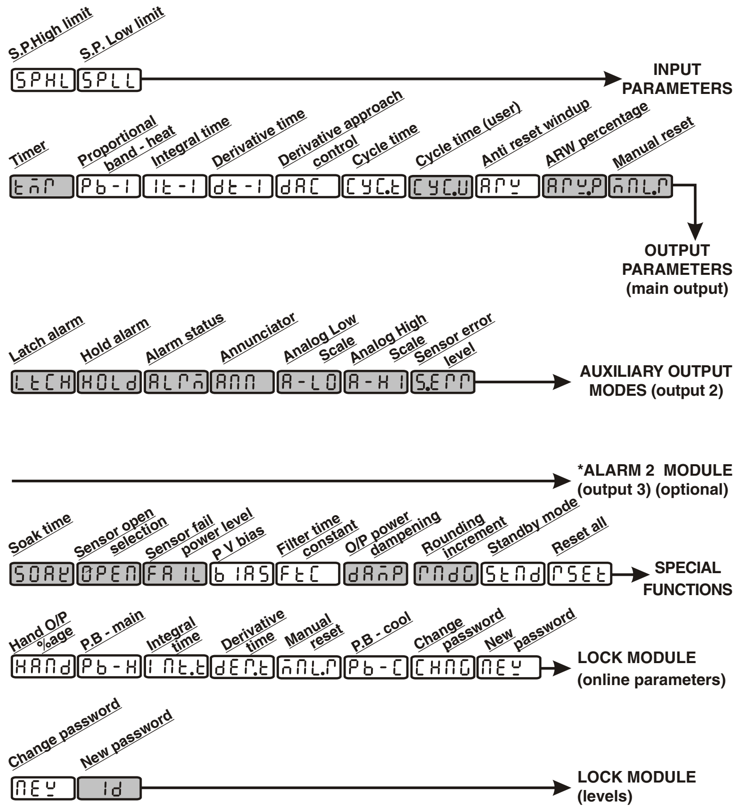
Main control	Control : PID or ON/OFF. Output : Time proportioning or Linear DC. Proportional band : 0 to 400° Integral time : 0 to 3600 sec Derivative time : 0 to 200 sec Cycle time : 0.1 to 100.0sec. Auto tune. Programmable % output.
Zone PID	4 programmable control zones.
Heat-cool PID mode	Control : PID or ON/OFF Output : Time proportioning. Proportional gain : 0 to 400 Cycle time : 0.1 to 100.0sec. Heat/Cool dead band overlap : Programmable
Alarms	Modes : Deviation high, Deviation low, Band, Sensor break, Full scale high, Full scale low. Operation : Absolute or Deviation mode Hysteresis : Programmable Hold / Standby mode : Programmable Annunciator : Programmable Reset action : Programmable - Automatic or latched Probe break action: Upscale

8. LEVEL 6 - PROGRAMMABLE PARAMETER LOCKOUT MODULE

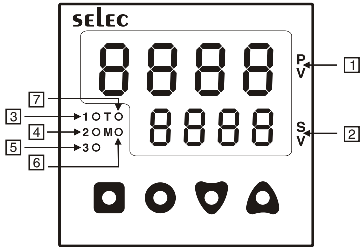
Display	Name & Description	Range	Display Condition	Default value
Id	User ID	0000 to 9999	—	0000
LOCK	Program access settings #	ONL / LEVL	—	LEVL

If LOCK selection is ONL, the following parameters will be prompted.

Display	Name & Description	Range	Display Condition	Default value
SET 1	Lock Set 1	UNLK / READ / LOCK	—	UNLK
SET 2	Lock Set 2	UNLK / READ / LOCK	—	UNLK
SET 3	Lock Set 3	UNLK / READ / LOCK	—	UNLK
TUNE	Lock tune parameter	UNLK / READ / LOCK	—	UNLK
HAND	Lock Hand parameter	UNLK / READ / LOCK	—	UNLK
Pb-H	Lock proportional band	UNLK / READ / LOCK	—	UNLK
INTT	Lock integral time	UNLK / READ / LOCK	—	UNLK
DERT	Lock derivative time	UNLK / READ / LOCK	—	UNLK
MNLR	Lock Manual reset parameter	UNLK / READ / LOCK	—	UNLK
Pb-C	Lock proportional band-cool	UNLK / READ / LOCK	—	UNLK



NOTE :- LEVEL 5 - Communications Module.
LEVEL 9 - Heater current monitor input.
LEVEL 10 - Motorised input / Remote set point input.
Detailed description of the above levels will be provided as an addendum with the respective models.



2. KEYS DESCRIPTION

FUNCTIONS	KEY PRESS
To enter or exit program mode	▲ + ▼ together for 3 seconds.
To change levels	▲ or ▼ till Level is displayed. ■+▲/▼ to increase or decrease the level number.
To view function on the same level and to display the current option.	▲ or ▼ key once to view the next / previous function.
To increase or decrease the value of a particular function.	■ +▲to increase and ■ + ▼ to decrease the function value.
To view and change parameters online.	● key to view the parameter and ●+ ▲ / ▼ to scroll through the parameters. Press ■+▲ / ▼ to change parameter value.

NOTE : The unit will auto exit program mode after 60sec. of inactivity.

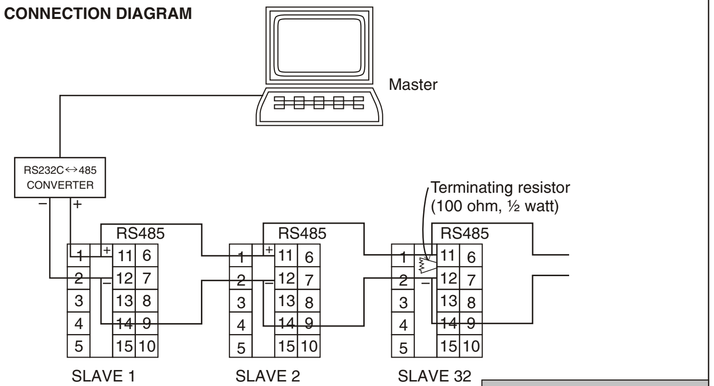
INDICATIONS AND DISPLAY

1 Process-value (PV)	Display the process temperature value.
2 Set-value (SV)	Displays the value of the lower display option selected. By default display is set1 value.
3 Relay 1 (1)	Indicates the status of Main output (relay 1).
4 Relay 2 (2)	Indicates the status of Alarm output (relay 2).
5 Relay 3 (3)	Indicates the status of Alarm output (relay 3).
6 M	Indication for Fixed Manual output / Hand output.
7 T	Indication for Tuning in progress.

8. LEVEL 5 - COMMUNICATION PARAMETERS (OPTIONAL)

Display	Name & Description	Range	Display Condition	Default value
bAUd	Baud Rate	300/600/1200 2400/4800 9600	——	9600
Addr	Communication station No.	1 to 99	——	1
PAri	Parity	nonE/EuEn Odd/nArK SPCE	——	nonE
StOP	Stop bit	1/2	——	1

CONNECTION DIAGRAM



RS485-RS232 Converter
Part no.: AC-RS485-RS232-01

Note : 1. Maximum 32 slave controllers can be connected to the master.
2. The total cable length should not exceed 500 meters.
3. Use shielded twisted -pair cables for RS485 connections.
4. Use terminators having a resistance of 100ohm (½ watt).

- **SENSOR OPEN CONDITION :** The sensor open condition is selectable between Auto and Manual. If the sensor open condition is set to Auto, then all the relays remain off at over range or TC reverse condition. If the selection is Manual then **sensor fail power** level can be programmed as per requirement.

- **PV BIAS : (DISPLAY OFFSET) :** This function is used to adjust the PV value in cases where it is necessary for PV value to agree with another recorder or indicator or when the sensor cannot be mounted in correct location.

- **FILTER TIME CONSTANT :** The filter is an adaptive digital filter that discriminates between measurement noise and actual process changes. If the input single is increasing too greatly due to measurement noise, increase the filter value. If accurate control is desired, increase the filter time constant where as if the fastest controller response is required the filter time constant.

- **Rounding INCREMENT :** This feature can be used to round off the display to a higher value than " 1 " in cases where the process input and in turn the display is fluctuating. Rounding selections other than 1 cause the process value to round to the nearest rounding increment selected. For example, a rounding increment value of 5 cause 122 to round to 120 and 123 to round to 125. This parameter is not applicable when the resolution is 0.1(for TC/RTD). Set point values, Set point limits, Alarm values, Input Scaling values and Analog Scaling values are not affected by rounding increment is for controller's display only and does not affect (improve or degrade) the control accuracy of the unit.

- **STANDBY MODE :**
  This feature is useful during machine wiring. If standby mode is selected as YES, the following conditions exist :
  a. All displays are OFF.
  b. All outputs are OFF i. e R1, R2, R3 LEDs are OFF.
  c. M LED is ON.
  d. Analog output is limited to the lower range.
  e. All front keys are disabled.
  f. Access to configuration enabled.
  The STND status is preserved on Power OFF.

- **OUTPUT POWER DAMPENING :** This parameter entered as a time constant seconds, dampens (filters) the calculated output power. Increasing the value increases the dampening effect. Dampening times longer than, say, one-fiftieth of the controller's integral time may cause controller. This parameter is valid for analog output models.

PROGRAMMING OF LEVELS

3. LEVEL 0 - INPUT PARAMETERS

Display	Name & Description	Range	Display Condition	Default value
INPt	**Input type** Select input type as Thermocouples : J, K, T, R, S, C, E, B, N, L, U, W. Platinel II. RTD : PT100 Signal Inputs : Linear mV (-5 to 56mV), Voltage (0 to 10V),*1 Current (4 to 20mA).*1 Refer table on page 6 for input ranges.	J / K / t / r / S / C / E / b / n / L / U / W / PtnL P100 / 56mV 10V / 20mA	——	J
rESL	Resolution	TC */RTD : 1 / 0.1 Analog input : 1 / 0.1 / 0.01 / 0.001	Not prompted for R, S, and B type thermocouple.	1
tEnP	Temperature unit	°C / °F	TC / RTD inputs.	°C
dSC.L	**Display value scaling point1** *1 Feed the value of the display required at the lower value of analog input	-1999 to Display value scaling point 2	Analog input.	0
ISC.L	**Input value scaling point 1** Feed the lower value of the analog input signal.	0.0 mA / -5.0mV / 0.0 V to Input value scaling point 2	Analog input.	As per input type selected.
dSC.H	**Display value scaling point 2** *1 Feed the value of display required at the higher value of analog input	Display value scaling point 1 to 9999	Analog input.	9999

NOTE : 1. * Fixed 1°C resolution for R, S, B type thermocouple.
2. *1 Applicable only for **PID500-U**

Display	Name & Description	Range	Display Condition	Default value
ISC.H	Input value scaling point 2 Feed the higher value of the analog input signal.	Input value scaling point 1 to 20.00 mA / 56 mV / 10.00 V	Analog input.	As per input type selected.
rSCL	Reverse scaling Display scaling points can be reversed.	nO / YES	Analog input.	nO
SPHL	Set point high limit #1	Set point low limit to max. sensor range value. Set point low limit to 9999 for analog input.	——	750
SPLL	Set point low limit #1	Min. range of sensor to Set point high limit. -1999 to Set point high limit for analog input.	——	-200

Note : 1. Whenever resolution is changed from 1 to 0.1 SPLL and SPHL is limited to -199 and 999 respectively.

2. # 1 - Display is with fixed 1° resolution for TC / RTD and as per decimal point selected for analog input.

PARAMETER EXPLANATIONS :

- **TEMPERATURE UNIT :** The temperature unit is selectable between C° and F°. When temperature unit is changed, the temperature ranges will also be changed according to the present selection of unit. If changed, be sure to check all parameters.
- **RESOLUTION :** The resolution is selectable between 1 and 0.1 for TC and RTD inputs whereas it is selectable between 1, 0.1, 0.01, 0.001 for analog inputs. If changed, be sure to check all parameters.
- **SET POINT LIMIT VALUES :** The controller has programmable high and low set point limit values to restrict the setting range of the set point. Set the limit values so that the temperature set point value cannot be set outside the safe operating the area of the process.

Display	Name & Description	Range	Display Condition	Default value
rndG	Rounding increment	0.1 to 10.0 for TC / RTD Display as per decimal point selected for analog input.	TC / RTD with resolution = 1°C or Analog input.	1.0
StNd	Standby mode	nO / YES	——	nO
rSEt	Reset all	nO / YES	——	nO

PARAMETER EXPLANATIONS

- **MAIN OUTPUT :** The main control output is selectable between Relay1 / Analog output (available across terminals 4 and 5) and Relay2 (available across terminals 2 and 3). If main output is selected as Relay 2, all the control parameters will be applicable to the output connected to Relay 2 but the set point applicable will be Set 1 (main set point). For analog retransmission, the main output must be set to Relay 2 and the analog output (across 4 and 5) will be used for retransmission.
- **SOFT START TIME :** Soft start time can be programmed in situations where full output is not required at power ON. The time duration for the output to rise from 0% to 100% is programmed as soft start time.
- **HAND OUTPUT PERCENTAGE :** This parameter can be used when a fixed percentage of output is desired. For example: If 4-20mA analog output is being used and the desired output is 12mA, the hand percentage can be programmed as 50%. This will ensure that the analog output available is fixed 12 mA i.e. 50%. In case of relay output models, the relay ON time and OFF time will be according to the programmed Hand output percentage i.e. For 50% hand o/p percentage and cycle time 15sec, relay will be ON for 7.5sec and OFF for 7.5 sec.
- **RAMP - SOAK :** The set point ramp feature can reduce thermal shock to the process, reduce temperature overshoot on start-up or set point changes, or ramp the process at a controlled rate. The soak feature can be used to hold the process at a preset temperature for a preset time.

Ramp modes :

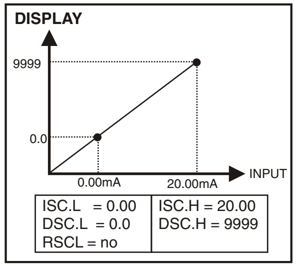
Ramp OFF : Controller will be simple PID / ON-OFF controller with P, I, D settings / hysteresis setting by user or default.

Ramp HOLD : Suspends the ramp at the last value.

Ramp ON : Initiates the ramp. Ramp rate and soak time settings as programmed by the user or default.

Display	Name & Description	Range	Display Condition	Default value
MAIn	Main Output	(rLY1/AOUt) rLY2	——	rLY1/AOUt
SSr	SSR Output	nO/YES	SSR output model	nO
SOFt	Soft start time	OFF 000 to 999 minutes.	PID control	OFF
HAnd	Hand output percentage	OFF, O/P power low limit to O/P power high limit.	PID control	OFF
rAMP	Ramp mode	OFF/HOLd/On	——	OFF
rAtE	Ramp rate	0001 to 9999 degree / hour.	Ramp mode = ON / HOLD.	100
SOAK	Soak time	0 to 1440 minutes	Ramp mode = ON / HOLD.	0
OPEn	Sensor open condition	AUtO/MAnL	PID control	AUtO
FAIL	Sensor fail power level	0 to 100 % ; -100 to 100 % in case of heat - cool mode.	Sensor open condition = MANL.	0
bIAS	PV bias (Display Offset)	-999 to +999 for TC (RTD) & -999 to +999 for AIN models decimal point as per selected.	——	0.0
FtC	Filter time constant	OFF, 1 to 99 seconds	——	1
dAMP	Output power dampening	OFF, 1 to 99 seconds	Analog output model.	1

PARAMETER EXPLANATIONS : (contd...)



- **SCALING FOR ANALOG INPUT :** To scale the controller, two scaling point has a coordinate pair of Display Values and Input Values. It is recommended that the two scaling points be at the low and high ends of the input single being measured. Process value scaling will be liner between and continue past the entered points to the limits of the input range. (Factory settings example will display 0.0 at 0mA input and display 9999 at 20.00mA input)

Reverse acting indication can be accomplished by setting **reverse scaling** parameter as YES. In this case **referring the above eg.** for 0.00mA input the display will show 9999 and 20.00mA input the display will show 0.0

NOTE : This change will not be visible in the programming menu.

4. LEVEL 1 - OUTPUT PARAMETERS

Display	Name & Description	Range	Display Condition	Default value
SEt	Set Mode	ALL/ZOnE	Zone PID = YES in level 4.	ALL

Display	Name & Description	Range	Display Condition	Default value
tUnE	Auto tune	OFF/On	PID control	OFF
tUnE	Tune percentage	P.AU , 75 to 100	Tune = ON	P.AU
MAIn	Main Output Mode	rE/Fd	Heat-cool = No.	rE
P-LO	Output power lower limit	0% to o/p power high limit ; -100% to o/p power upper limit (in heat cool mode)	PID control	0 (-100 for heat - cool mode)

Display	Name & Description	Range	Display Condition	Default value
P-HI	Output power upper limit	O/P power low limit to 100 %	PID control	100
HYSt	ON-OFF control hysteresis	0.1 to 99.9	ON-OFF control*	1.0
HYS.b	Hysteresis bias	TC / RTD: -9.9 to 9.9° Analog input: -9.9 to 99 as per decimal point selected.	ON-OFF control*	0.0
tnr	Timer	0.0 to 99.9 minutes	Main = Fd and control is ON-OFF.*	0.0
Pb-1	Proportional band- heat	0 to 400.0	——	10
It-1	Integral time	0 to 3600	PID control	120
dt-1	Derivative time	0 to 200	PID control	30
dAC	Derivative approach control	0.5 to 5.0 (x band)	PID control	1.0
CYC.t	Cycle time	USEr/ USP.F / A 15.0	PID control	USEr
CYC.U	Cycle time-user	0.1 to 100.0	Cycle time = USEr	15.0
Arw	Anti-reset windup	AUtO / MAnL	PID control	AUtO
ArwP	Anti-reset windup %	2.0 to 100.0 %	ARW = MAnL	100.0

NOTE : * For operating in ON-OFF mode make Proportional band = 0

6. LEVEL 3 - ALARM 2 MODULE (OPTIONAL)

Display	Name & Description	Range	Display Condition	Default value
AL-2	Alarm2 mode	OFF/dUHI/dULO/bAnd/FSHI/FSLO/S.brk.	Alarm 2 should be available.	dUHI
LtCH	Alarm latch	OFF/On	These parameters are not prompted if Alarm 2 mode is OFF.	OFF
HOLd	Hold Alarm	OFF/On		OFF
ALrn	Relay status for Alarm2	En/dEn		En
Ann	Alarm Annunciator	OFF/On		OFF
SEt3	Set 3 Value	SPLL to SPHL	These parameters are not prompted if Alarm 2 mode is OFF / brk.	0
HYSt	Alarm Hysteresis	0.1 to 99.9°C for TC / RTD ; 1 to 99°C for analog input.		1.0
HYS.b	Hysteresis bias	- 9.9 to 9.9°C (for TC/RTD); - 99 to 99 for AIN models decimal point as per selected		0.0

PARAMETER EXPLANATIONS : For parameter explanations refer Level 2.

7. LEVEL 4 - SPECIAL FUNCTIONS

Display	Name & Description	Range	Display Condition	Default value
HC	Heat-cool mode The controller can be operated in heat-cool mode if this selection is YES.	nO/YES	——	nO
ZONE	Zone PID	nO/YES	——	nO

NOTE : In **HC mode** only the following parameter will be prompted :-
1. Set 2 value - this parameter will be prompted as db (dead band)
2. Proportional band - cool (Pb-C)
3. Cycle time - cool (cyc.t)

In case of analog retransmission only the following parameters will be prompted :
1. A-LO : Analog low scaling.
2. A-HI : Analog high scaling.
3. S.ERR : Sensor error level.

Display is with fixed 1° resolution for TC/RTD and as per decimal point selected for analog input.

PARAMETER EXPLANATIONS :

- **SET 2 MODE :**
  AlrM : Set2 can be programmed as alarm.
  NonE : If set2 is not required it can be programmed as none.
  Fd : Set2 programmed in cooling mode.(output ON when above the setpoint).
  rE : Set2 programmed in heating mode.(output ON when below the setpoint)

- **SET 2 TYPE :**
  AbS : Absolute alarm is a self-existent alarm independent of the main set point.
  DEV : The alarm is activated at an error on the main set point.

- **ALARM MODES :** (Refer **USER GUIDE** for detailed explanation).

- **ALARM LATCH :** When Latch is ON, the alarm once activated remains activated even when the error is removed. To deactivate the alarm, it has to be acknowledged by selecting AL-NO from the front online options and pressing ◘ + △.

- **HOLD ALARM :** When HOLD is ON, in any alarm mode, it prevents an alarm signal on power-up. The alarm is enabled only if the process temperature is within the alarm range.

- **ALARM ANNUNCIATOR :** When alarm annunciator is ON, during alarm condition, visual annunciation is given by the upper display altering between AL-NO and process temperature where NO is the alarm number. The annunciator may be disabled by selecting function ANN as OFF.

- **SENSOR ERROR LEVEL :** This parameter determines the analog retransmission output level in case of sensor failure. For eg : In case of 4-20mA retransmission output, if the sensor error level is set to High, 20mA will be available at the output at all times incase of input sensor failure.

Display	Name & Description	Range	Display Condition	Default value
MnLr	Manual Reset	-99.9 to 99.9 (for 0.1° resolution) 99 to 99°C (for 1°) -999 to 999 (for analog input)	Proportional band > 0 and Integral time = 0.	0

If Set Mode = All and Zone PID = YES, The parameters except the shaded ones (i.e. Pb-1, It-1, dt-1) will be prompted.

If Set Mode = Zone and Zone PID = YES, the following parameters will be prompted.

Display	Name & Description	Range	Display Condition	Default value
Z-nO	Zone number	1 to 4	Zone PID = YES (in level4)	1
Z.SP.n	Zone set point	SPLL to SPHL	——	0
Pb-n*	Proportional band	0 to 400.0°	——	10
It-n*	Integral time	0 to 9999	Pb - n > 0	120
dt-n*	Derivative time	0 to 9999	Pb - n > 0	30

NOTE : * For Proportional band, Integral time and Derivative time n = 1 to 4

PARAMETER EXPLANATIONS :

- **AUTO TUNING :** Auto tuning is a function whereby the controller learns the process characteristics by itself and automatically sets the required P,I and D values. The new P,I,D parameters will be stored in non-volatile memory automatically. TUNE ON is indicated by 'T' LED blinking. (For detailed explanations of PID parameters refer USER GUIDE).

PARAMETER EXPLANATIONS : (contd...)

- **OUTPUT POWER LIMITS :** These parameters are used to limit the minimum and maximum controller output power. The output power lower limit will ensure that a minimum percentage of output (as per requirement) is available in case any process disturbances or setpoint changes occur. The output power high limit ensures that in case any process disturbance or set point changes occur, the maximum value of output is limited to a value as per requirement.

- **TIMER :** TIMER is main output restart time. In this main output once turned OFF will turn ON only after set time even if the temperature has increased and is more than the set temperature. This is needed to prevent the compressor from restarting in a short time (less than the set time).

- **CYCLE TIME :** There are 3 selectable modes for programming cycle time :
  USEr : User can program the cycle time. The mode will be altered to AutO when put to autotune.
  Usr.F : User can fix the cycle time. This has the highest priority.
  AutO : This is recommended. The cycle time value is calculated automatically during autotune.

- **ANTIRESET WINDUP :** The anti-reset windup (ARW) inhibits the integral action until the PV is within the proportional band thus reducing overshoot on start-up.
  If the selection is -

1. AutO : The value will be calculated automatically during autotune (Recommended).
2. ManL: The value can be fed manually by the user.

5. LEVEL 2 - AUXILIARY OUTPUT MODES

Display	Name & Description	Range	Display Condition	Default value
nOdE	Set 2 Mode *	ALrm/nONE/Fd/rEV	Not for Heat-cool mode.	ALrm
SEt2	Set 2 Type	AbS/dEV	Set 2 mode = Fd / rEV.	dEV
SEt2	Set 2 Value	SPLL to SPHL	Not prompted if Set 2 mode = alarm & alarm mode = S. Brk.	0
Pb-C	Proportional band-Cool	0.0 to 400.0	Heat-cool mode	0.0
CYC.t	Cycle time-Cool	0.1 to 100.0 Sec.	Pb-C>0	15.0

NOTE : * - If set 2 mode = none, no other parameters will be prompted.

Display	Name & Description	Range	Display Condition	Default value
HYSt	Hysteresis	0.1 to 99.9°C	1. Set 2 mode = Fd / rEV / ALrM (not sensor break); 2. Heat - cool mode (Pb-C=0)	1.0
HYS.b	Hysteresis bias	TC / RTD : - 9.9 to 9.9°C Analog input : - 9.9 to 9.9 as per decimal point selected.	1. Set 2 mode = Fd / rEV / ALrM (not sensor break); 2. Heat - cool mode (Pb-C=0)	0.0
AL-1	Alarm1 mode	OFF/dUHI/dULO/bANd/FSHI/FSLO/S.brK	Set2 mode = ALrM	dUHI
LtCH	Alarm latch	OFF/ON	These parameters are not prompted if Alarm1 mode is OFF.	OFF
HOLd	Hold Alarm	OFF/ON		OFF
ALrm	Relay status for Alarm1	EN/dEN		EN
Ann	Alarm Annunciator	OFF/ON		OFF
A-LO	Analog low scaling	-1999 to 9999	For Analog retransmission if Main output = Relay 2 in Level 4	0
A-HI	Analog high scaling	-1999 to 9999	For Analog output if Main output = Relay2	1000
S.Err	Sensor error level Incase of sensor failure the output can be set to high or low value of range.	HIGH/LOW	For Analog Output if Main output = Relay2	HIGH