MULTISPAN

PID CONTROLLER
PID 2303-3C-M1

PV = Process value

SV = Set value

TECHNICAL SPECIFICATION

INPUT SPECIFICATION:

	Input	Range
Input Types	J	0 to 400°C
	K	0 to 500°C
	3 CT	0.0 to 30.0 A
Resolution	J,K = 1°C	
Indication Accuracy	±1% of FSD ± 1°C (FSD:- full scale deflection)	

DISPLAY AND KEYS:

Display	Upper: 3 digit, 7 seg 0.70" white LED Middle: 3 digit, 7 seg, 0.39" green LED Lower: 3 digit, 7 seg, 0.33" red LED
Keys	SET, INC, DEC, ENT

DIMENSION:

Size (mm)	72 (H) x 72 (W) x 85 (D) mm
Panel Cutout	68 (H) x 68 (W) mm

CONTROL METHOD:

Heating	1) PID control with Auto-Tuning 2) ON-OFF control
Cooling	1) BL.TP (Blower Time Proportion) 2) ON-OFF control
Alarm	Heater break alarm, Cold start, High, Absolute low, Inband, Absolute outband, OFF, Outband, Low

OUTPUT SPECIFICATION:

Relay Output	
Relays	3 Nos
Relay Type	1st Relay 1C/O (NO-C-NC) , 2nd & 3rd Relay (NO-C)
Rating	5A,230V AC/28V DC
SSR Drive Output	
Output Signal	24V DC, 30mA DC (On-Off condition)
	Relay 1 parallel to SSR
MODBUS	
RS-485 Modbus Communication	

POWER SUPPLY:

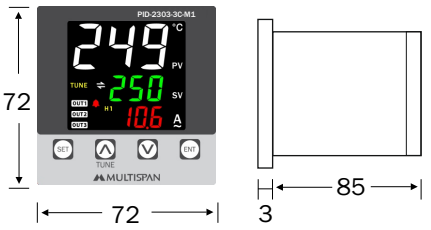
Supply Voltage	100 to 270V AC, 50-60Hz
Power Consuption (VA Rating)	Approx 6VA @ 230V AC

ENVIRONMENT CONDITION:

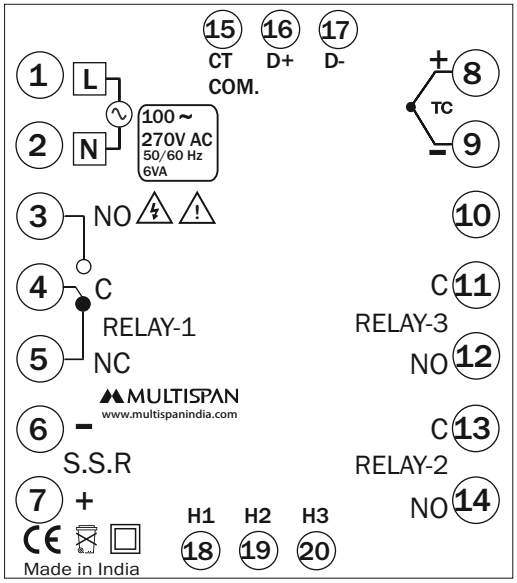
Operating Temp.	0°C to 55°C
Relative Humidity	UP to 95% RH (non-condensing)
Protection Level	IP-65 (Front side) As per IS/IEC 60529 : 2001

MECHANICAL INSTALLATION

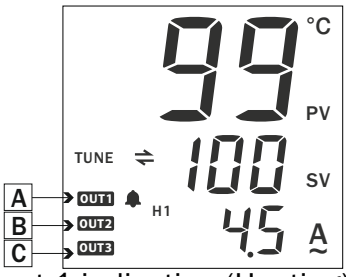
Outline Dimension (mm)	Panel Cutout Dimension (mm)



TERMINAL CONNECTION



STATUS LED DESCRIPTION



A - Control output 1 indication (Heating)
B - Control output 2 indication (Cooling / Alarm)
C - Alarm output indication

KEY OPERATION

FUNCTION	PRESS KEY
OPERATOR MODE	
To enter in parameter setting	Press SET for 4 sec
For start/stop PID auto tuning	Press ∧ for 6 sec
To go in factory setting mode	∧ + ∨ Press 3 sec
PARAMETER SETTING MODE	
To set parameter value	SET
To increment parameter value.	∧
To decrement parameter value.	∨
Set parameter to be save & exit.	ENT

SAFETY PRECAUTION

All safety related codifications, symbols and instructions that appear in this operating manual or on the equipment must be strictly followed to ensure the safety of the operating personnel as well as the instrument.

If all the equipment is not handled in a manner specified by the manufacturer, it might impair the protection provided by the equipment.

Read complete instructions prior to installation and operation of the unit.

WARNING : Risk of electric shock.

WARNING GUIDELINES

WARNING : Risk of electric shock.

1. To prevent the risk of electric shock power, supply to the equipment must be kept OFF while doing the wiring arrangement. Do not touch the terminals while power is being supplied.
2. To reduce electro magnetic interference, use wire with adequate rating and twists of the same of equal size shall be made with shortest connection.
3. Cable used for connection to power source, must have a cross section of 1mm or greater. These wires should have insulations capacity made of at least 1.5kV.
4. When extending the thermocouple lead wires, always use thermocouple compensation wires for wiring for the RTD type, use a wiring material with a small lead resistance (5Ω max per line) and no resistance differentials among three wires should be present.
5. A better anti-noise effect can be expected by using standard power supply cable for the instrument.

INSTALLATION GUIDELINES

1. This equipment, being built-in-type, normally becomes a part of main control panel and in such case the terminals do not remain accessible to the end user after installation and internal wiring.
2. Do not allow pieces of metal, wire clippings, or fine metallic fillings from installation to enter the product or else it may lead to a safety hazard that may in turn endanger life or cause electrical shock to the operator.
3. Circuit breaker or mains switch must be installed between power source and supply terminal to facilitate power 'ON' or 'OFF' function. However this mains switch or circuit breaker must be installed at convenient place normally accessible to the operator.
4. Use and store the instrument within the specified ambient temperature and humidity ranges as mentioned in this manual.

MECHANICAL INSTALLATION GUIDELINES

1. Prepare the panel cutout with proper dimensions as shown above.
2. Fit the unit into the panel with the help of clamp given.
3. The equipment in its installed state must not come in close proximity to any heating source, caustic vapors, oil steam, or other unwanted process byproducts.
4. Use the specified size of crimp terminal (M3.5 screws) to wire the terminal block. Tightening the screws on the terminal block using the tightening torque of the range of 1.2 N.m.
5. Do not connect anything to unused terminals.

MAINTENANCE

1. The equipment should be cleaned regularly to avoid blockage of ventilating parts.
2. Clean the equipment with a clean soft cloth. Do not use isopropyl alcohol or any other cleaning agent.
3. Fusible resistor must not be replaced by operator.

ERROR DISPLAY

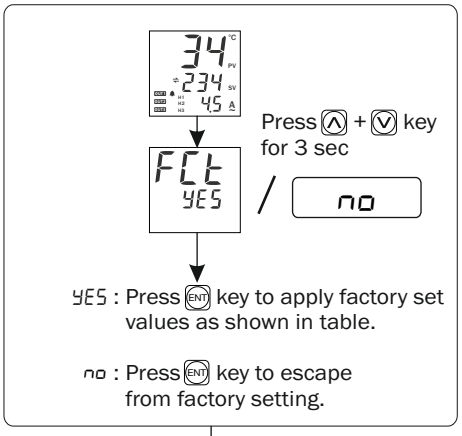
When an error has occurred the display indicates error codes as given below.

ERROR	MEANING
OPn	Sensor is not connected or Over range condition or sensor break
SrE	Sensor connection is reversed

CORRECTIVE ACTION:

Check the sensor and the input wiring. If problem still exists, replace the sensor. And still if problem is not solved yet by the user, then please contact company person

FACTORY SETTING



FACTORY SETTING		
SR.	PARAMETER	VALUES
1	PB	20.0°C
2	IT	300
3	DT	75
4	CT	15 Sec
5	MR	0°C
6	C-PB	4.0
7	C-ON	1°C
8	C-OF	48
9	Hysteresis1	3°C
10	Hysteresis 2	1°C
11	Hysteresis 3	3°C
12	Alarm Time R2	5 Sec
13	Alarm Time R3	5 Sec
13	Offset	0°C

PARAMETER MESSAGE DESCRIPTION

Parameter	Description
InP	Input
J	J
K	K
r1n	Relay 1 Mode
HEt	Heating
PId	PID Action
OnF	ON-OFF Action
HY1	Hysterisis 1
r2n	Relay 2 Mode
COL	Cooling
b.tP	Blower TP Action
HY2	Hysterisis 2
r3n	Relay 3 Mode
HY3	Hysterisis 3
ALn	Alarm
HbA	Heater Break Alarm
CS	Cold Start Alarm
HI 9	High Alarm
AbL	Absolute Low Alarm
LO'	Low
Otb	Outband
Inb	In Band Alarm
Ab0	Absolute Outband Alarm
tIn	Time
HbA	Heater Break Alarm Set Point
Hbl	Heater Break Indication Set Point
H	Heater
On	ON
OFF	OFF
Pb	Proportional Band for PID Action
It	Integral Time for PID Action
dt	Derivative Time for PID Action
Ct	Cycle Time for PID Action
nr	Manual Reset for PID Action
C.Pb	Cooling Proportional Band
C.On	Cooling ON
C.OF	Cooling OFF
PAr	Parameter
PAS	Password
rLt	Relative
Ind	Individual
St1	Set 1
St2	Set 2
St3	Set 3
St2LO'	Set 2 Low
St3LO'	Set 3 Low
St2HI 9H	Set 2 High
St3HI 9H	Set 3 High
OFS	Offset
OPn	Output Mode
btH/rLY/SSr	Both/Relay/SSR

WORKING

R1-Heating

1) Control Mode PID: Relay turning ON/OFF according to heat requirement of the machine.
2) Control Mode ON/OFF: Relay turns ON (and remains ON) when PV < SV. Relay turns OFF when PV > SV. After this there may be overshoot depending on the thermal inertia of the machine. When the PV < SV Minus HYS, Relay turns ON and heating is resumed.

R2-Cooling

1) Cooling Time proportional Control action: Relay turns ON/OFF as per et Cycle timeand difference between PV and cooling SV.
2) Cooling ON/OFF control action: Relay is initially OFF. When PV > SV, Relay turns ON and when PV < SV Minus HYS relay turns OFF.

Auto Tuning:-

→ The Auto-tuning function automatically computes and sets the Proportional band (Pb) , Integral time (It), Derivative time (dt), and cycle time as per process characteristics.

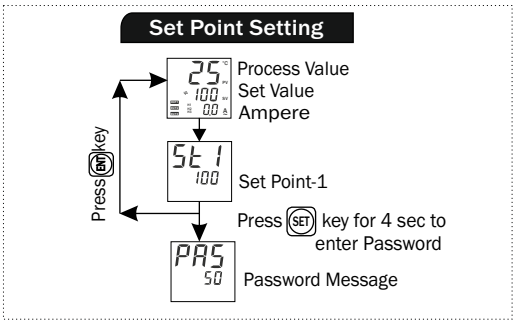
→ Tuning LED will turn “ON” during Auto-Tuning

→ If the power goes off before auto-tuning is completed, auto-tuning will be restarted at next power ON.

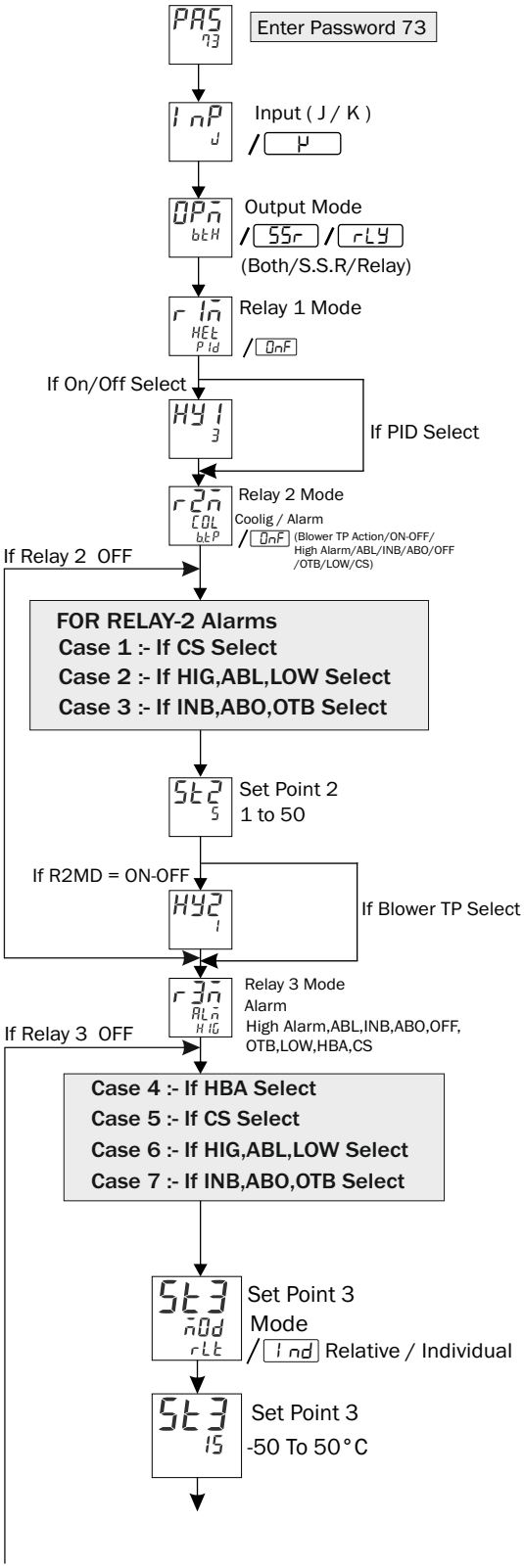
PARAMETER RANGE

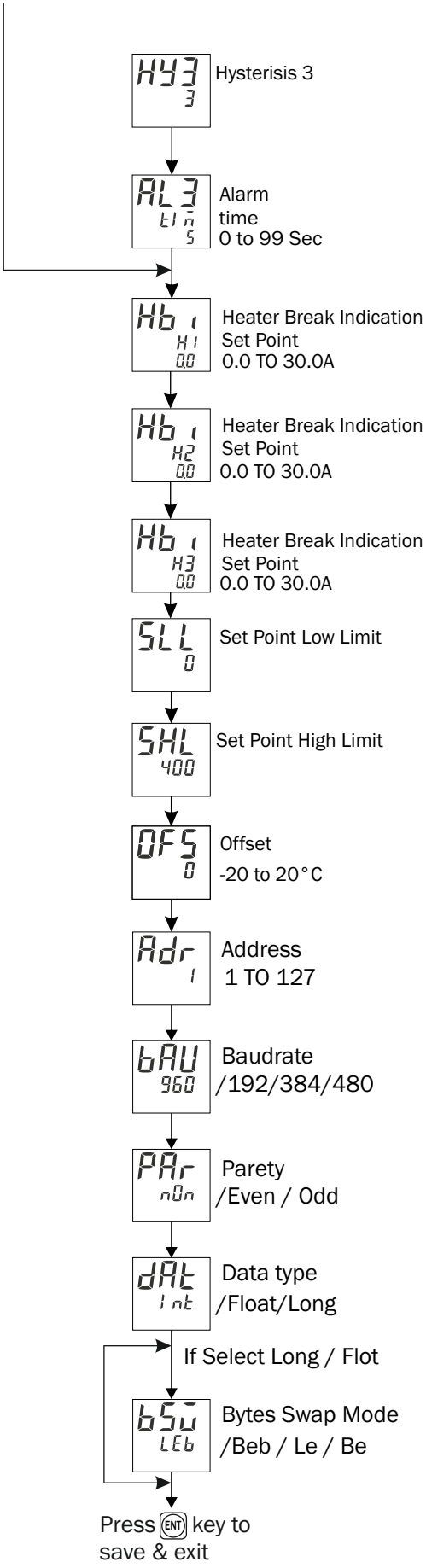
Parameter	Range For J, K		
PB	0.0°C to 999.9°C		
IT	0 to 9999		
DT	0 to 9999		
CT	4 sec to 99 sec		
MR	-9 to +9		
C.PB	2.0°C to 25.0°C		
C.ON	1°C to 20°C		
C.OF	5 to 200		
Alarm Time R2	0 Sec to 99 Sec		
Alarm Time R3	0 Sec to 99 Sec		
Hysteresis-1	1°C To 100°C		
Hysteresis-2	1°C to 50°C		
Hysteresis-3	1°C to 100°C		
Set 2	1°C to 50°C		
Offset	-20°C to 20°C		
HBAL/HBI H	0.0 to 60.0A		
Set 2	R2MD = CS	S2MD = RLT	-50 to 0
		S2MD = IND	0 to set 100
	R2MD = HIG/ LOW/ABL	S2MD = RLT	-50 to +50
		S2MD = IND	SLL to SHL
Set 2 Low	SLL To SET2 HIGH		
Set 2 High	SET2 LOW To SHL		
Set 3	R3MD = CS	S3MD = RLT	-50 to 0
		S3MD = IND	0 to set 100
	R3MD = HIG/ LOW/ABL	S3MD = RLT	-50 to +50
		S3MD = IND	SLL to SHL
Set 3 Low	SLL To SET3 HIGH		
Set 3 High	SET3 LOW To SHL		

Set Point Setting



Basic configuration





FOR RELAY-2 & 3 Alarms

Case 1,5 :- If CS Select

Relay 2 Mode
Alarm

Set Point 2
Mode
/ Ind Relative / Individual

Set Point 2
0 To -50°C

Hysterisis 2

FOR RELAY-2 & 3 Alarms

Case 2,6 :- If HIG / ABL/LOW; Select

Relay 2 Mode
Alarm
/ AbL / LOW

Set Point 2
Mode
/ Ind Relative / Individual

Set Point 2
-50 To 50°C

Hysterisis 2

Alarm
time
0 TO 99 Sec

FOR RELAY-3 Alarms

Case 4 :- If HBA Select

Relay 3 Mode
Alarm

Heater Break Indication
Set Point
0.0 TO 30.0A

Heater Break Indication
Set Point
0.0 TO 30.0A

Heater Break Indication
Set Point
0.0 TO 30.0A

FOR RELAY- 2 & 3 Alarms

Case 3 & 7 :- INB, ABO,OTB

Set Point 2
Low

Set Point 2
High

Alarm
time
0 TO 99 Sec

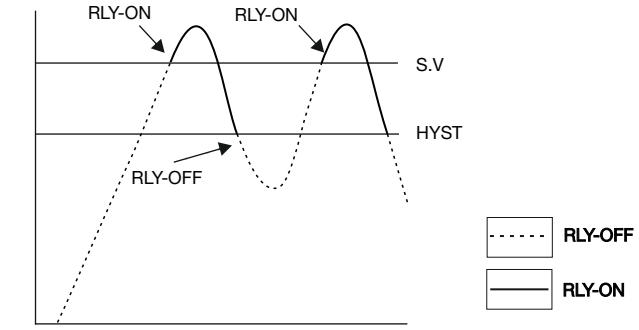
ALARM OPERATION

Alarms

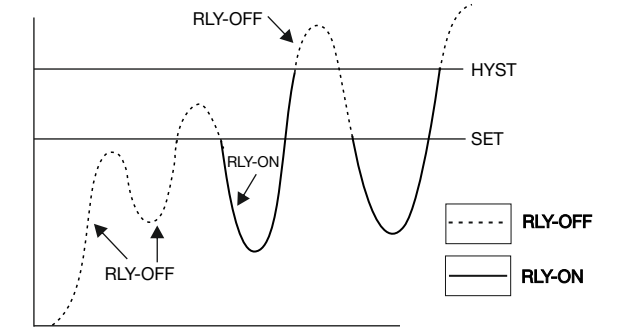
1) Heater Break alarm: - If the current of the Heater < AMP SV (unhealthy condition) then Relay turns ON and Upper Display will show **hbr**, middle display will blink showing **h**. To manually turn off Relay, press ENT key 4 sec. Display will continue showing **hbr** till the fault is rectified.

2) Cold start (CS) alarm: Relay is initially OFF. When PV > Alarm SV, Relay turns ON. When PV < Alarm SV MINUS HYS, Relay turns OFF.

ALARM:

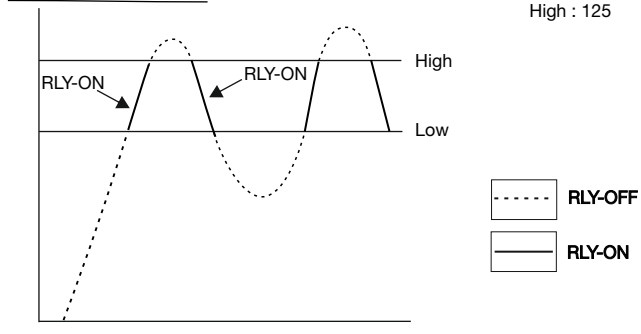


ABSOLUTE LOW ALARM



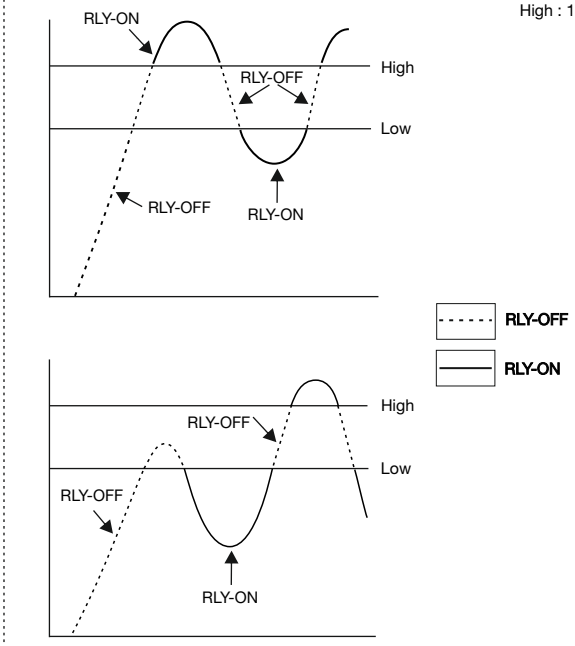
INBAND ALARM

Low : 75
High : 125

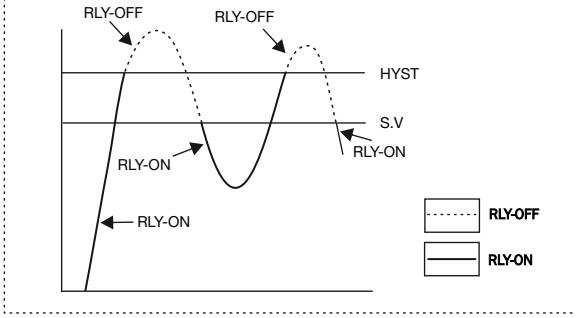


ABSOLUTE OUTBAND ALARM

Low : 75
High : 125

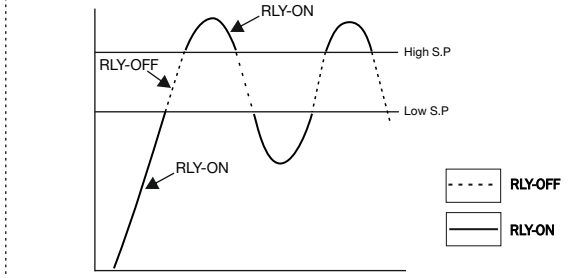


LOW ALARM:



OUTBAND ALARM

Low : 75
High : 125



MODBUS

Slave Address :	1 to 127
Baudrate :	4800,9600,19200,38400 bps
Parity :	None,Even,Odd
Datatype :	Sign integer, Float
Read Function Register :	0x03 and 0x04
Write Function Register :	0x06 and 0x10

Note :- When Parameter 1111 = no available

Sr.No	Access Type	Parameter	Register Data Type Integer	Register Data Type Float
1	R	Process Value Initial Value : 32101 Sensor Open : 32102 Sensor Reverse : 32103	0	0
2	R	H1 Current	1	2
3	R	H2 Current	2	4
4	R	H3 Current	3	6
5	R	Total Current	4	8
6	R	H1,H2 & H3 Status Selection: Value Normal: 0 Break: 1	5	10
7	R		6	12
8	R		7	14
9	R	R1,R2 & R3 Status Selection: Value OFF: 0 ON: 1	8	16
10	R		9	18
11	R		10	20
12	R	PID Percentage	11	22
13	R/W	Auto Tune Selection: Value OFF: 0 ON: 1	12	24
14	R/W	Heater Selection: Value OFF: 0 ON: 1	13	26
15	R/W	Set 1	14	28
16	R/W	Input Selection: Value J: 0 K: 1	15	30
17	R/W	Relay1 Mode (Heating) Selection: Value PID: 0 ON-OFF: 1	16	32
18	R/W	HYS 1 1 to 100	17	34
19	R/W	Relay2 Mode (Cooling) Selection: Value ON-OFF: 0 Blower TP: 1 High Alarm: 2 In-Band Alarm: 3 Absolute Outband Alarm: 4 OFF: 5 CS Alarm: 6 Outband Alarm: 7 Low Alarm: 8 Absolute Low Alarm: 9	18	36
20	R/W	Set 2	19	38
21	R/W	HYS 2	20	40
22	R/W	Relay3 Mode (Alarming) Selection: Value HIGH: 0 ABL: 1 INB: 2 ABO: 3 OFF: 4 OTB: 5 LOW: 6 HBA: 7 CS: 8	21	42
23	R/W	Set 3 Mode Selection: Value Individual: 0 Relative: 1	22	44
24	R/W	Set 3	23	46
25	R/W	Set 3 Low	24	48
26	R/W	Set 3 High	25	50
27	R/W	HYS 3	26	52
28	R/W	HBAL/HBI H1	27	54
29	R/W	HBAL/HBI H2	28	56
30	R/W	HBAL/HBI H3	29	58
31	R/W	Alarm Time	30	60
32	R/W	SLL	31	62
33	R/W	SHL	32	64
34	R/W	Offset	33	66
35	R/W	PB	34	68
36	R/W	IT	35	70
37	R/W	DT	36	72
38	R/W	CT	37	74
39	R/W	MR	38	76
40	R/W	C.PB	39	78
41	R/W	C.ON	40	80
42	R/W	C.OFF	41	82
43	R/W	Address	42	84

<table>
<tr><th rowspan="3">Sr.No</th><th rowspan="3">Access Type</th><th rowspan="3">Parameter</th><th colspan="2">Register</th></tr>
<tr><th colspan="2">Data Type</th></tr>
<tr><th>Integer</th><th>Float</th></tr>
<tr><td>44</td><td>R/W</td><td>Baudrate
<table><tr><th>Selection</th><th>Value</th></tr><tr><td>4800</td><td>0</td></tr><tr><td>9600</td><td>1</td></tr><tr><td>19200</td><td>2</td></tr><tr><td>38400</td><td>3</td></tr></table></td><td>43</td><td>86</td></tr>
<tr><td>45</td><td>R/W</td><td>Parity
<table><tr><th>Selection</th><th>Value</th></tr><tr><td>NONE</td><td>0</td></tr><tr><td>EVEN</td><td>1</td></tr><tr><td>ODD</td><td>2</td></tr></table></td><td>44</td><td>88</td></tr>
<tr><td>46</td><td>R/W</td><td>Data Type
<table><tr><th>Selection</th><th>Value</th></tr><tr><td>Integer</td><td>0</td></tr><tr><td>Long</td><td>1</td></tr><tr><td>Float</td><td>2</td></tr></table></td><td>45</td><td>90</td></tr>
<tr><td>47</td><td>R/W</td><td>Output Selection
<table><tr><th>Selection</th><th>Value</th></tr><tr><td>Both</td><td>0</td></tr><tr><td>Relay</td><td>1</td></tr><tr><td>SSR</td><td>2</td></tr></table></td><td>46</td><td>92</td></tr>
<tr><td>48</td><td>R/W</td><td>Bytes Swap Mode
(Only select for Float & Long)
<table><tr><th>Selection</th><th>Value</th></tr><tr><td>Little endian</td><td>0</td></tr><tr><td>Big endian</td><td>1</td></tr><tr><td>Little-endian byte Swap</td><td>2</td></tr><tr><td>Big-endian byte Swap</td><td>3</td></tr></table></td><td>47</td><td>94</td></tr>
<tr><td>49</td><td>R/W</td><td>Set 2 Mode
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<tr><td>51</td><td>R/W</td><td>Set 2 High</td><td>50</td><td>100</td></tr>
<tr><td>52</td><td>R/W</td><td>Set 2 Alarm Time</td><td>51</td><td>102</td></tr>
<tr><td>53</td><td>NA</td><td>NA</td><td>52</td><td>104</td></tr>
<tr><td>54</td><td>R/W</td><td>Fectory Reset</td><td>53</td><td>106</td></tr>
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