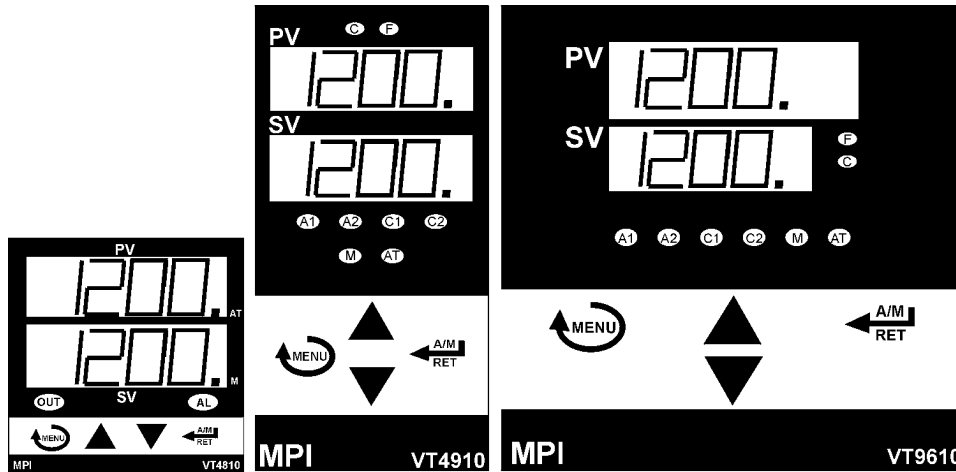


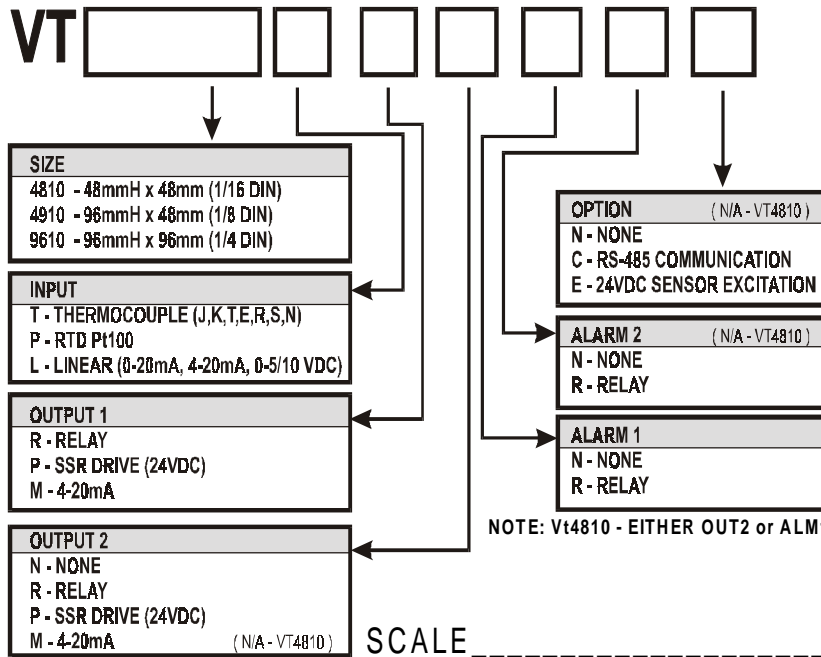


TEMPERATURE CONTROLS VT10 SERIES



STANDARD
DUAL DISPLAY
PID AUTOTUNE
RAMP-TO-SETPOINT
ULc, UL, CE (4810)
AUTO / MANUAL
15 SECURITY OPTIONS
UNIVERSAL INPUT

OPTIONS
DUAL OUTPUT
ALARMS - 15 TYPES
24VDC EXCITATION
RS485 COMMUNICATIONS



SPECIFICATIONS

1. INPUT

- *Thermocouple J, K, T, E, B, R, S, N (IPTS68/DIN 43710)
- *RTD Pt100 ohms RTD (DIN 43760/BS 1904 or JIS)
- *Linear Voltage (current) -10 to 60 mV configurable with input attenuation
- *Range User configurable
- *Accuracy +/-2C for T/C, +/-0.2C for RTD, +/-0.05% for Linear input.
- *Cold Junction Compensation 0.1% ambient typical.
- *Input Impedance 10M ohms for T/C, 100K ohms for Linear Voltage, 2.7 Ohms for 0 (4)- 20 mA/
- *Excitation Current for RTD 0.2mA Max.
- *Sample Rate 250ms

2. CONTROL

- *Proportional Band 0.0-100.0%
- *Rest (Integral) 0-3600 Sec.
- *Rate (Derivative) 0-3600 Sec.
- *Anti Rest Windup Inhibit integral action outside Proportion Band
- *Ramp Rate 0.0-100.0C / minute.
- *Dwell minutes.
- *On-Off With adjustable hysteresis
- *Cycle Time 0-99 seconds.
- *Control Action Configurable for Direct (cooling) or Reverse (Heating)

3. OUTPUT

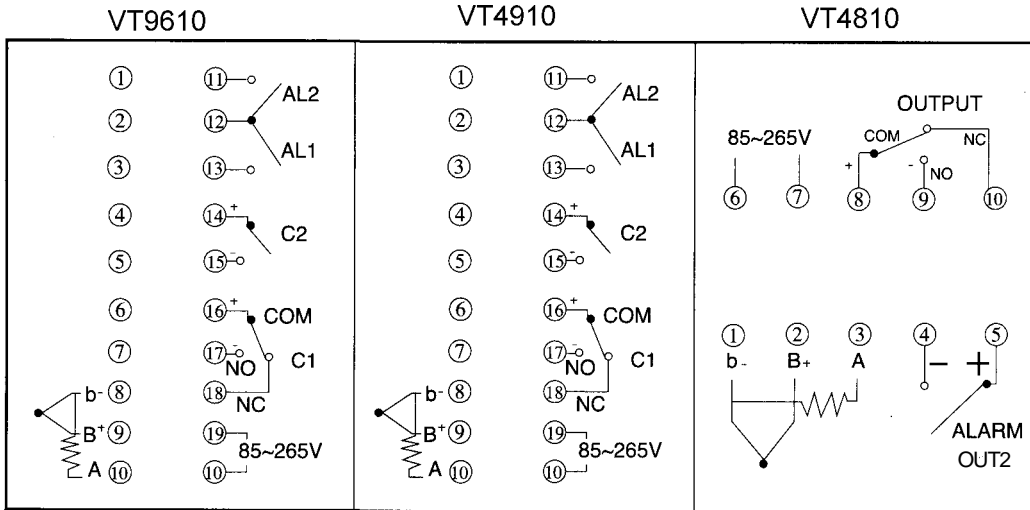
- *Relay 5A/240VAC resistive.
- *Pulsed Voltage Isolated 24 VDC 100mA Max.
- *Current Isolated 0 (4) - 20 mA Max load 500 ohms.
- *Alarm Relay output, (SPST) 10A/240VAC resistive.

4. POWER

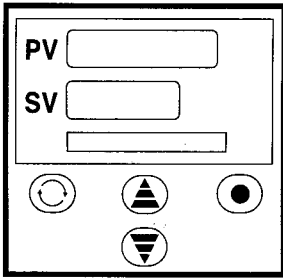
- *Rating 85 - 265 VAC 50/60Hz 5VA max

5. ENVIRONMENTAL

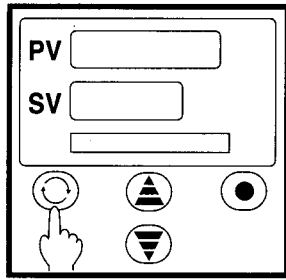
- *Operating Temp -10 - 50C
- *Humidity - 90%
- *Insulation 20M ohms minimum @ 500VDC
- *EMC Emission EN500081-1:1992, EN55022:1994
- *EMC Immunity EN 50082-1:1992, IEC 801-3, IEC 801-4:1988
- *Weight VT4810 180g, VT4910 240g, VT9610 240g



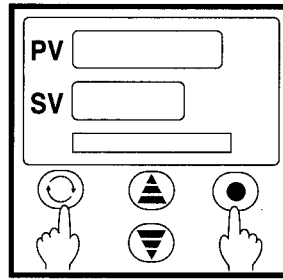
■ Setting procedure



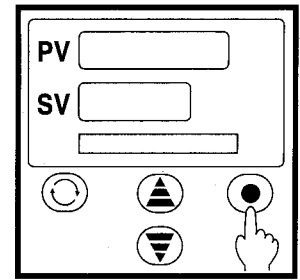
Press or key to change the setting value.



Press the key each one time to enter the each next parameter.

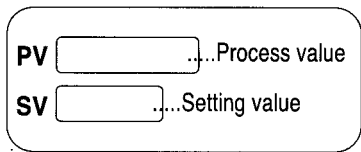


Press the and keys for more than 5 sec. to enter the next parameter stage.
(1st stage → 2nd stage → 3rd.....)



Press the key to back the setting point during any state.

■ How to inspect the output rating



H10.9

Display for the output rate of Heating



C 0.0

Display for output rate of Cooling (2nd output control)

■ How to enter Manual



5 sec. → Enter the Manual Function →



5 sec. → Stop the Manual Function

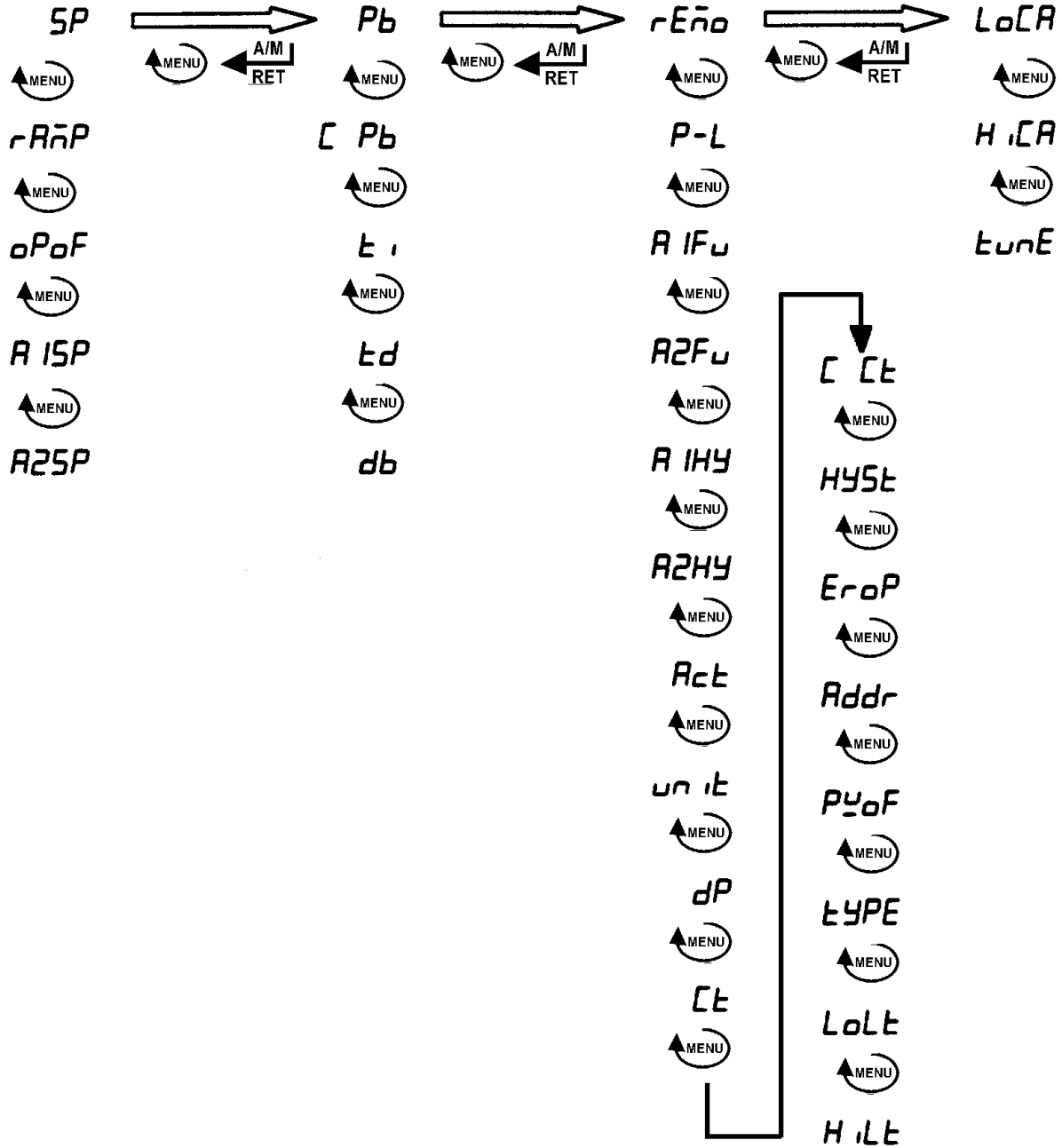


5 sec. → PID Auto-tune function →



5 sec. → Off the Auto-tune function

Parameters flowchart



SYMBOL	DESCRIPTION	SETTING RANGE	INITIAL VALUE
LEVEL 1			
rAmP	Setpoint Ramp	0.0 ~ 100.0 oC/minute	0
oPoF	Output Offset (Manual Reset)	0.0 ~ 100.0%	0
A1SP	Alarm 1 Setpoint	Full Scale	10
timE	Alarm Delay Time (Only if A1Fu is set to Timer)	0-9999 minutes	
A2SP	Alarm 2 Setpoint	Full Scale	10
LEVEL 2			
Pb	Proportional Band - Output 1 (0 for on/off control)	0.0 ~ 100.0% of Input Scale	10
C Pb	Proportional Band - Output 2 (multiplier of Pb) (Option - Second Output)	0.0 ~ 10.0	1
ti	Integral Time	0 ~ 3600 seconds	240
td	Derivative Time	0 ~ 3600 seconds	60
db	Deadband for Heat/Cool (multiplier of Pb) (Option - Second Output)	-10.0 ~ 10.0	0
LEVEL 3			
rEmo	Remote Mode	0 ~ 1 (0 = Local ,1=Remote)	0
P-L	Parameter Lock	0 ~ 15 (see Table.3)	0
A1Fu	Alarm 1 Function	0 ~ 15 (see Table.3)	0
A2Fu	Alarm 2 Function	0 ~ 7 (see Table.3)	0
A1HY	Alarm 1 Hysteresis	0.0 ~ 25.5% span	0
A2HY	Alarm 2 Hysteresis	0.0 ~ 25.5% span	0
Act	Control Action	0 ~ 1 (0=Cooling-Direct ,1=Heating-Reverse)	1
unit	Display Units	0 ~ 2 (0=oF ,1=oC, 2=Engineering Units)	1
dP	Decimal Position	0 ~ 1 (input TYPE 10 0~3)	0
Ct	Cycle Time - Output 1	0 ~ 100 seconds	15(relay) 1(volt pulse) 0(4-20Ma)
C Ct	Cycle Time - Output 2	0 ~ 100 seconds NOTE(Relay output) Larger value = Longer relay life & Slower control response	15(relay) 1(volt pulse) 0(4-20Ma)
HYST	Hysteresis (Only for ON/OFF CONTROL ie.Pb=0)	0.0 ~ 25.5% span	0.1
EroP	Error Protection	0 ~ 15 (see Table.3)	2
Addr	Communication Address	0 ~ 31	0
PYoF	Process Value Offset	-100 ~ +100	0
tYPE	Sensor Input Type	0 ~ 10 (see Table.3)	1
LoLt	Low Limit Set value	Full Scale	0
HiLt	High Limit Set value	Full Scale	800
LEVEL 4			
LoCA	Low Point Calibration	Full Scale (only for TYPE 10 Input)	
HiCA	High Point Calibration	Full Scale (only for TYPE 10 Input)	
tunE	Autotuning Function	0 ~ 5 (see Table.3)	0

■ Table 2 - Alarm functions

<i>RF_U</i>	<i>R2F_U</i>	Alarm mode	Description
0	4	Deviation Alarm (Hi-limit) Alarm output ON, when $PV > (SV + A1SP)$	
1	5	Deviation Alarm (Low-limit) Alarm output ON, when $PV < (SV - A1SP)$	
2	6	Process Alarm (Hi-limit) Alarm output ON, when $PV > A1SP$	
3	7	Process Alarm (Low-limit) Alarm output ON, when $PV < A1SP$	
8	-	Timer function Timer On when $PV = SV$, Alarm output On when timer off	
9	-	Timer function Alarm output On when power ON, alarm off when timer off	
10	-	Timer function Alarm output ON during the timer ON	
11	-	Timer function Alarm output ON when power ON, alarm off during timer ON	
12	14	Band Alarm Alarm output On when $PV < (SP - A1SP)$ or $PV > (SV + A1SP)$	
13	15	Band alarm Alarm output ON during $-0A1SP \sim +A1SP$	

※ **Note:** When the code 8 ~ 11 be selected, the symbol *RF_U* will be changed by *L_{NE}*

<i>dP</i>	Decimal places
0	No Decimal point
1	1 Decimal point
2	2 Decimal points (Input type 10 only)
3	3 Decimal points (Input type 10 only)

<i>ζ+</i>	Cycle time
15/20	Relay output mode
0	Linear output mode
1	0/24V DC output mode

■ Table 3 - Parameter Lock: This function be used for hiding some parameters that wouldn't be used.

<i>P-L</i>	<i>rAnP</i>	<i>dPof</i>	<i>A1SP</i> <i>L_{NE}</i>	<i>R2SP</i>	2nd State	3rd stage	4th stage
0			●	●	●	●	●
1	●		●	●	●	●	●
2		●	●	●	●	●	●
3	●	●	●	●	●	●	●
4			●	●	●	●	☆
5	●		●	●	●	●	☆
6		●	●	●	●	●	☆
7	●	●	●	●	●	●	☆
8			●	●	●	○	☆
9	●		●	●	●	○	☆
10		●	●	●	●	○	☆
11	●	●	●	●	●	○	☆
12			●	●	○	○	☆
13	●		●	●	○	○	☆
14		●	●	●	○	○	☆
15	●	●	●	●	○	○	☆

● : Parameter could be setted.

○ : Parameter couldn't be entered.

☆ : Parameter could be entered, but can't be setted.

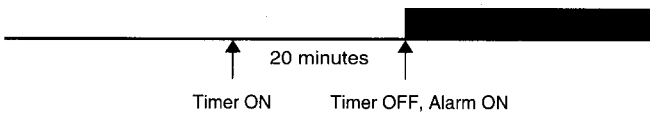
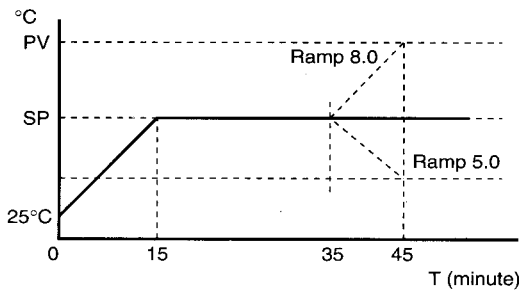
■ Table 4 - Error Protection: The output states of Output 1 and Alarm 1 can be predetermined to avoid any unnormal and trouble conditions.

<i>EroP</i>	Output 1	Output 2	Alarm 1	Alarm 2	<i>EroP</i>	Output 1	Output 2	Alarm 1	Alarm 2
0	OFF	OFF	OFF	OFF	8	OFF	ON	OFF	OFF
1	ON	OFF	OFF	OFF	9	ON	ON	OFF	OFF
2	OFF	OFF	ON	OFF	10	OFF	ON	ON	OFF
3	ON	OFF	ON	OFF	11	ON	ON	ON	OFF
4	OFF	OFF	OFF	ON	12	OFF	ON	OFF	ON
5	ON	OFF	OFF	ON	13	ON	ON	OFF	ON
6	OFF	OFF	ON	ON	14	OFF	ON	ON	ON
7	ON	OFF	ON	ON	15	ON	ON	ON	ON

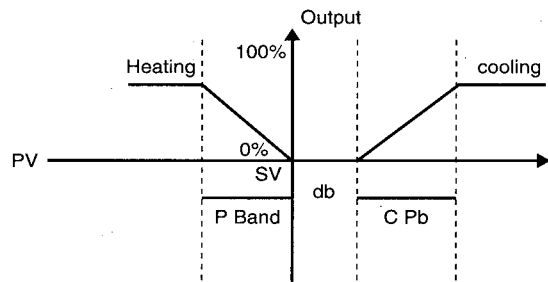
TYPE	Input Typep	Display range(°C)	Display range(°F)
0	J	-50°C ~ 1000°C	-58°F ~ 1830°F
1	K	-50°C ~ 1370°C	-58°F ~ 2498°F
2	T	-270°C ~ 400°C	-454°F ~ 752°F
3	E	-50°C ~ 750°C	-58°F ~ 1382°F
4	B	0°C ~ 1800°C	32°F ~ 3272°F
5	R	0°C ~ 1750°C	32°F ~ 3182°F
6	S	0°C ~ 1750°C	32°F ~ 3182°F
7	N	-50°C ~ 1300°C	-58°F ~ 2372°F
8	PT(DIN)	-200°C ~ 500°C	-392°F ~ 932°F
9	PT(JIS)	-200°C ~ 500°C	-392°F ~ 932°F
10	Linear	-1999 ~ 9999	-1999 ~ 9999

tune	Auto-tune
0	Tune at under Setpoint-10% of span by manual operating
1	Tune at Setpoint by manual operating.
2	One shot tune on power up at under Setpoint-10% of span. If need to change this tune function, pls reset tune parameter to 0.
3	One shot tune on power up at Setpoint If need to change this function pls reset tune parameter to 1 after operation.
4	Always tune on power up at under Setpoint-10% of span.
5	Always tune on power up at Setpoint.

rAnP - Ramp setpoint



C Pb - Proportional band of output 2



When Output 2 be ordered, the **C Pb** could auto-tune to have a proper value.
 P BAND = Pb% × (HILT-LOLT)
 C P BAND = C Pb% × Pb
 DEAD BAND = Db% × P BAND

Error message and Solution

Display Symbol	Description	Solution
AdEr	A/D Converter damage	Call the repairing personnel
oPEr	Input error/Sensor break	Check the Input type or wiring
PV flashing	Input signal over Hi/Low limit	1. Adjust the proper Hi/low limit 2. Check the Input signal
ALEr	Auto-tune error	Adjust the pb, ti, td value by Manual
CSEr	CPU damage or be interfered	remove the interference or replace the CPU

AUTOTUNE

The autotune program is applied during

- * Initial set-up
- * The setpoint is changed substantially from the previous autotune
- * The control result is unsatisfactory

The autotune procedures:

- * To ensure that all parameters are configured correctly.
- * Set the setpoint to the normal operating process value and use normal load condition.
- * Press and hold the SCROLL key for at least 4 seconds. The "AT" LED and/or the rightmost decimal point on the PV display is flashing during execution of autotune program.

Autotune teaches the controller the main characteristics of the process. It learns by cycling the output on and off. The results are measured and used to calculate optimum PID values which are automatically entered into nonvolatile memory.

After two oscillatory cycles of ON/OFF control. The controller performs PID control to verify the result and finally a oPoF value is obtained and entered in the memory. To stop the autotune program. Press and hold SCROLL key again for 4 seconds. The "AT" LED and the right-most decimal point on the PV display turn off.

AUTO/MANUAL CONTROL MODES

AUTOMATIC CONTROL

In auto mode, the controller automatically adjusts the output variable in accordance with the PID algorithm to reach and maintain the desired setpoint. Automode is the normal of operation. It can be P, PI, PD, PID or ON/OFF control.

MANUAL CONTROL

Manual control is usually used for testing purposes and allows the user to drive the outputs manually between 0.0 to 100%. To access the manual mode, press and hold the RETURN key for 4 seconds until either the "MA" LED or the right-most decimal point on the SV display begins flashing. The controller's output percent will now appear on the SV display.

For controllers with two outputs. The SV display will toggle between output 1 and 2. To manually adjust the controller's outputs, use the UP and DOWN keys. To return to AUTO mode from MANUAL mode, press and hold the RETURN key for 4 seconds again until the "MA" LED and decimal point turn off. The setpoint appears on the SV display.

RAMP AND DWELL

The controller can be configured to act either as a fixed setpoint controller or as a single ramp controller on power up. This function enables the user to set a predetermined ramp rate to allow the process to gradually reach setpoint temperature thus producing a "soft start" function. A dwell timer is incorporated within the controller and the alarm 1 can be configured by setting R1Fu= 8 or 9 to provide either a dwell function or a soak function to be used in conjunction with the ramp function.

RAMP FUNCTION

If ramp function is selected, the process will increase or decrease at a predetermined rate during initial power up, or with setpoint changes. The ramp rate is determined by rRnP parameter, which can be set in the range 0.0 to 100.0C/minute. The ramp function is disabled when the rRnP parameter is set to zero.

DWELL & SOAK FUNCTION

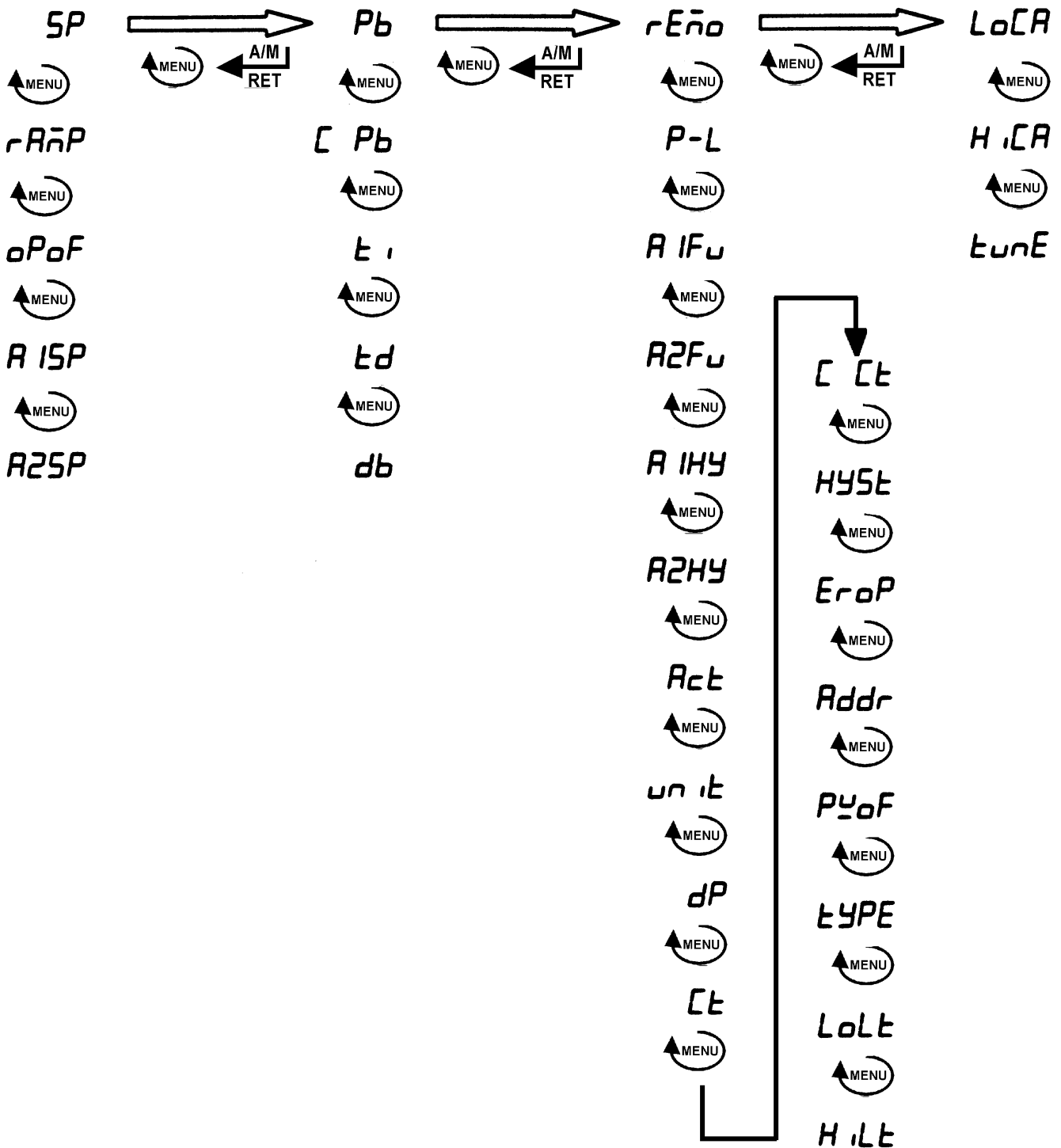
The dwell & soak function is enabled by configuring the alarm 1 to act as a timer. If R1Fu is set to 8, the alarm 1 relay will now operate as a timer contact with the contact being opened at power up and closed after the elapsed time set at parameter. If R1Fu is set to 9 a reverse action of alarm 1 will perform.

CALIBRATION WARNING!!

NEVER ENTER THIS PROCEDURE UNLESS YOU HAVE APPROPRIATE CALIBRATION EQUIPMENT. THIS PROCEDURE SHOULD BE PERFORMED BY A TRAINED TECHNICIAN.

1. Press both scroll and return key simultaneously for 5 seconds, then release. Repeat above operation until LoCR appear on the PV display.
2. Remove the sensor from the controller's input terminals and connect a Thermocouple or RTD simulation signal to the controller's input terminals. For a process DC input, use a 4 to 20 mA or 1 to 5 VDC signal, depending on the input type of controller.
3. Apply the low input signal to the controller which corresponds to the range you are using i.e., for thermocouple input, 0C would be applied to the controller.
4. Use up and down key to adjust the SV display to match the input signal you have applied to the controller.
5. Press and hold the return key for at least 5 seconds and the parameter on the PV display will change from LoCR to H,CA. The calibration value is now written into the controller's nonvolatile memory.
6. Apply the high input signal to the controller which corresponds to the range you are using.
7. Use up and down key to adjust the SV display to match the input signal you have applied to the controller.
8. Press and hold the return key for at least 5 seconds and the parameter on the PV display will change from H, CA to SP. The low calibration value is now written into the controller's non-volatile memory.
9. Input a signal midway between the low and high calibration signals previously applied and verify that the display matches the input signal. Repeat the above procedure as necessary.

Parameters flowchart



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