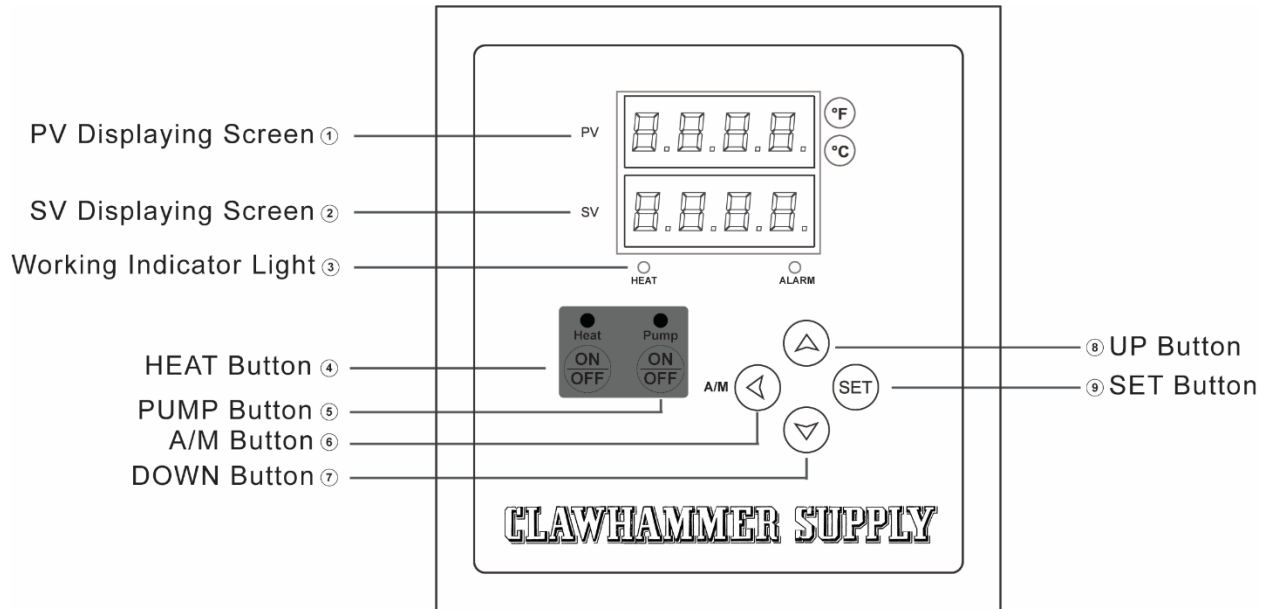
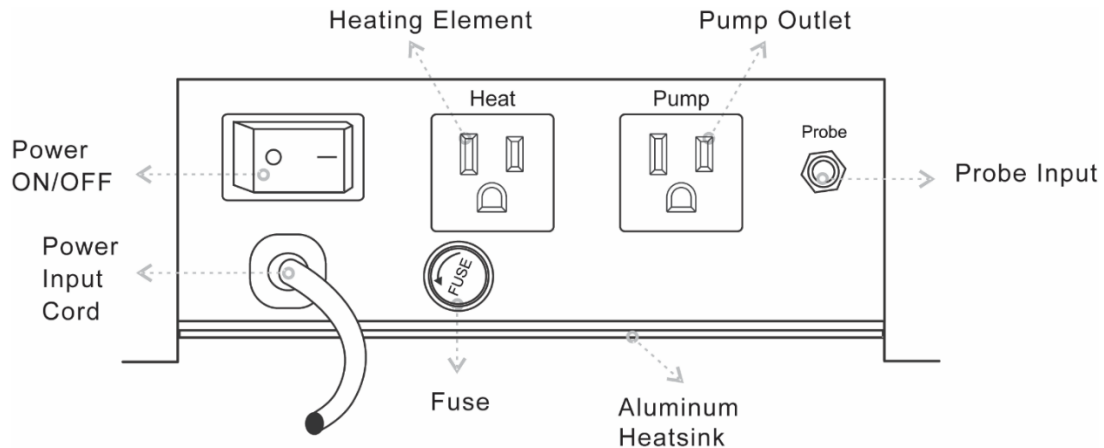


Control Panel Overview:



- 1) PV Displaying Screen: Displays the current temperature the probe is measuring.
- 2) SV Displaying Screen: Displays the set value.
- 3) Indicator Lights
 - a. Heat: Heat Output indicator
 - b. Alarm: Alarm output indicator
- 4) Heat Button: Turns the heating element ON/OFF
- 5) Pump Button: Turns the pump ON/OFF
- 6) A/M Button: Switches the controller from set value to manual mode.
- 7) Down Button: Pressing the down button will decrease the value.
- 8) Up Button: Pressing the up button will increase the value.
- 9) SET Button: Hold and press this SET button for 3s or more will enter the parameters settings mode.



Note: Keep the bottom of the heatsink dry and ventilated.

Operation Instructions

Change the Set Value (SV)

Press ▲ or ▼ button then release

press ▲ or ▼ button to change the value

press SET button to save the changed value

Automatic Mode/Manual Mode

Press A/M button to change between automatic and manual mode. When in manual mode there will be "A" in front of the SV displaying value.

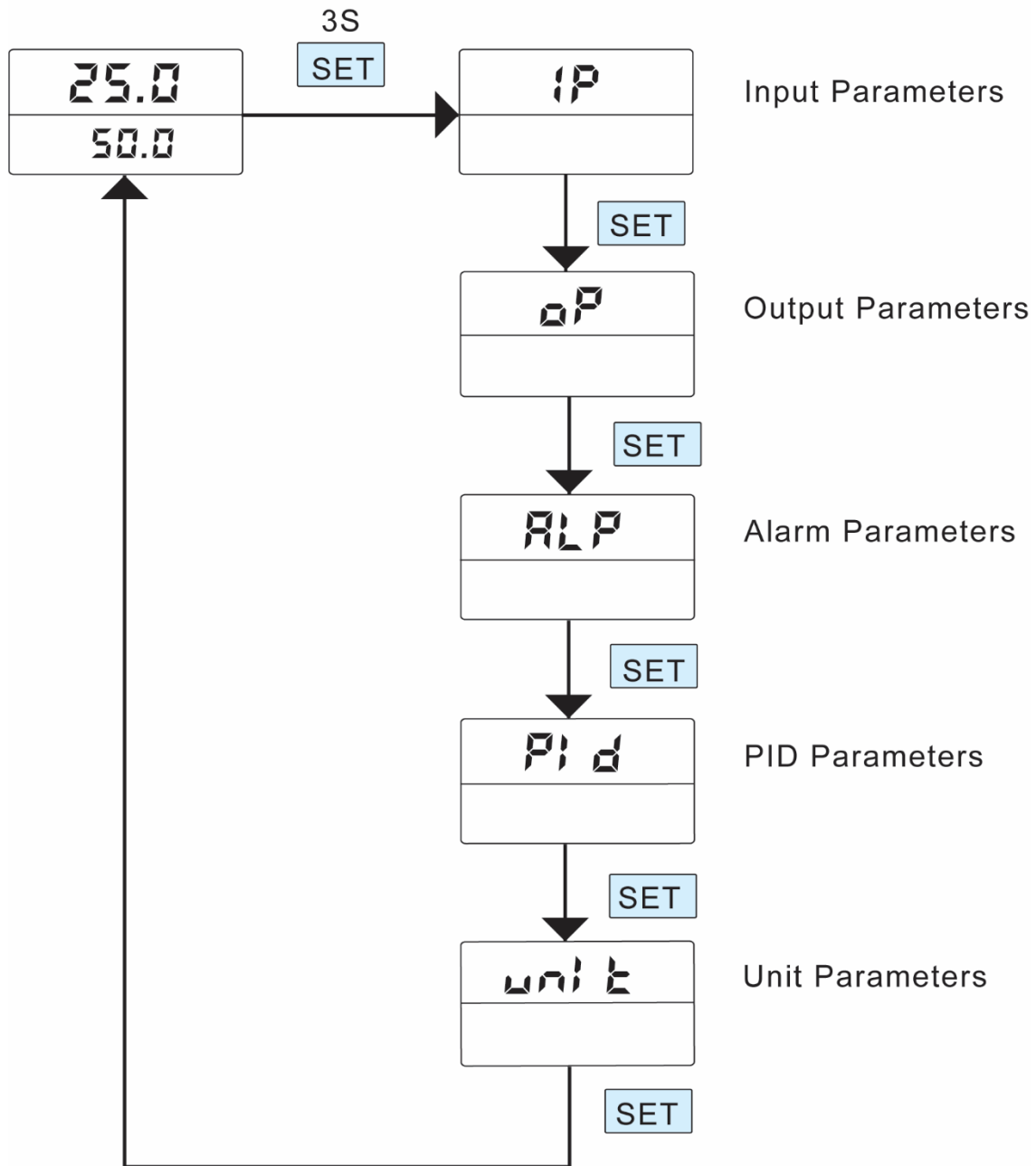
Press the SET button for 3 seconds to enter the settings menu, press the shift button to enter into the selected submenu.

Parameter Settings

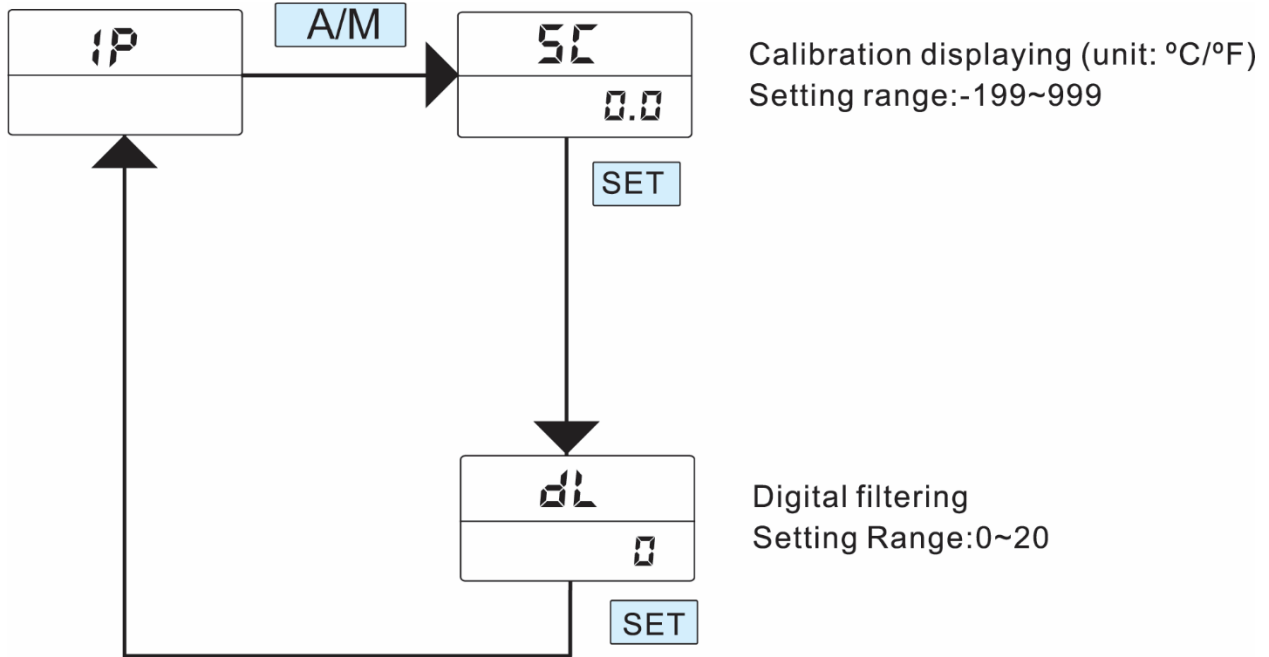
Main Menu Parameter	Function Setting	Description	Setting Range	Default	Note
IP	Sn	Input Type	K, S, Wre, T, E, J, B, N, Cu50, Pt100	Pt100	5.2
	SC	Sensor Calibration	-199~999 °C or °F	0	
	dL	Digital filtering	0~20	0	
OP	Ctrl	Control mode	PID: PID control AT: Self-tuning r: Reset to factory defaults ON/OFF: On-Off control	PID	5.3
	H-C	Control system	HERT: heating COOL: cooling	H	
	run	Operation Mode	DM: Manual inhibit Auto: Automatic MRNU: Manual	DM	
ALP	Mode	Alarm Mode	0: Power on alarm prevent 1: power on with alarm	0	5.4
	HIAL	High limit alarm	-1999~9999 °C or °F	9999	
	LoAL	Low limit alarm	-1999~9999 °C or °F	-1999	
	dHAL	Positive deviation alarm	0~9999 °C or °F	9999	
	dLAL	Negative deviation alarm	0~9999 °C or °F	9999	
	dF	Hysteresis	0~200 °C or °F	0.3	
PId	Ctrl	Control Period	1~120 seconds	4	5.5
	P	Proportional band	0~9999 %	50	
	I	Integral time	1~9999	30	
	d	Derivative time	1~9999	8	
unit	C-F	Temperature Unit	C: °C F: °F	C	5.6

Setup Flow Chart

Main Menu Operation Flow Chart



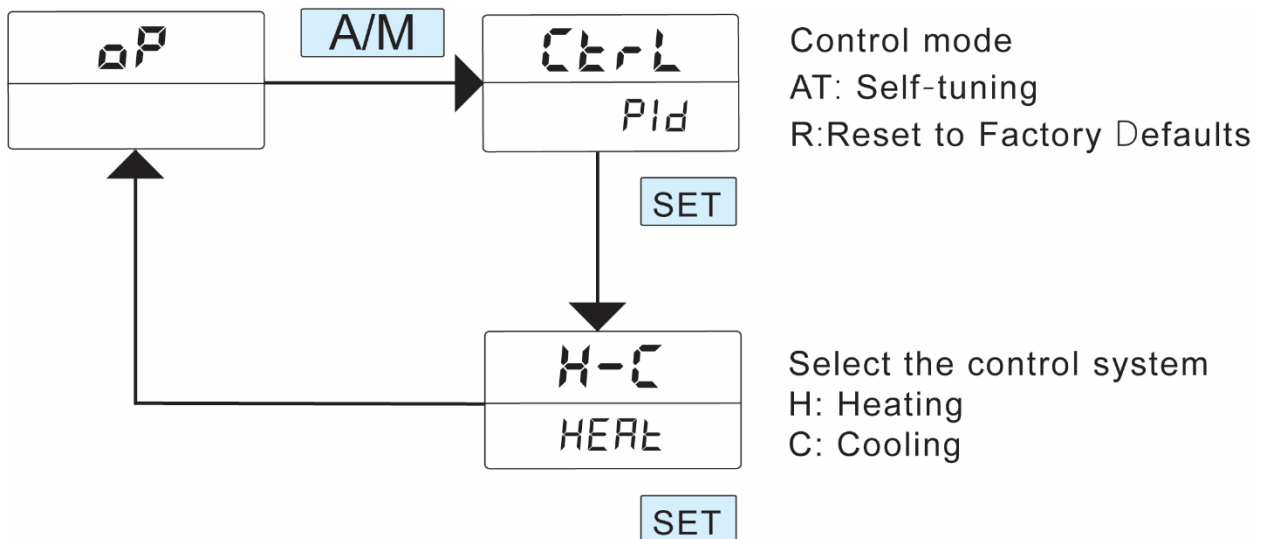
Input Parameters



Digital Filtering DL

The controller has built-in digital filtering. The larger the dL set value the more stable the measurement but also a slower response time..

Output Parameters



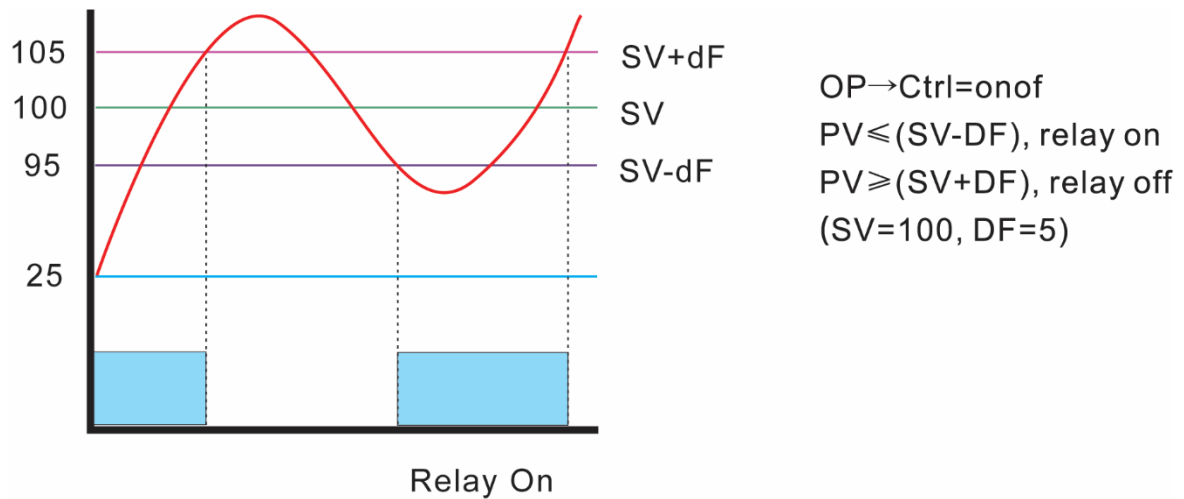
Control Mode Ctrl

PID: default control mode.

AT: Auto-Tune

R : Reset to Factory Defaults.

Control Operation Selection HEAT: Heating, the factory default with heating settings.



Control Operation Selection

HEAT: Heating, the factory default with heating settings.

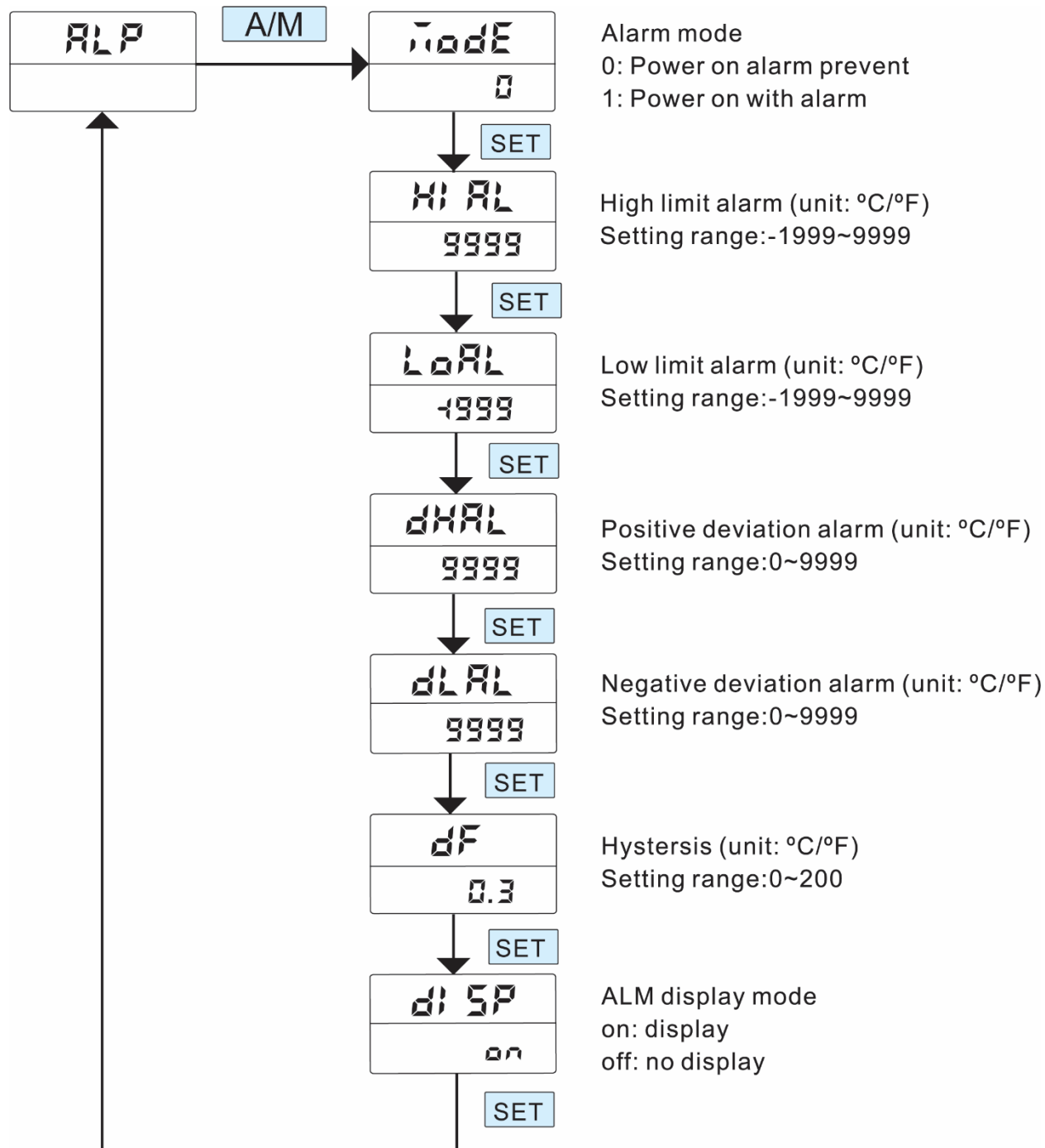
COOL: Cooling, in cooling element control

Operation Modes

AUTO: Set value mode

MANU: Manual mode

Alarm Parameters



Alarm Mode

Node: Set to 0 = Alarm off. Set to 1 =Alarm On.

HiAL : High limit alarm, will be activated when measuring value higher than HiAL value, formula: $PV > HiAL + DF$ (Hysteresis value).

LOAL : Low limit alarm, will be activated when measuring value lower than LOAL value, formula: $PV < LOAL - DF(\text{Hysteresis value})$.

DHAL : Positive deviation alarm, alarm will be activated when measuring value higher than DHAL value, formula: $PV > DHAL + DF(\text{Hysteresis value})$.

DLAL : Negative deviation alarm, alarm will be activated when measuring value higher than DLAL value, formula: $PV > DLAL - DF(\text{Hysteresis value})$.

DF: Hysteresis, also called temperature hysteresis, setting range 0-200. Hysteresis does not use a set point it uses a range for process control action.

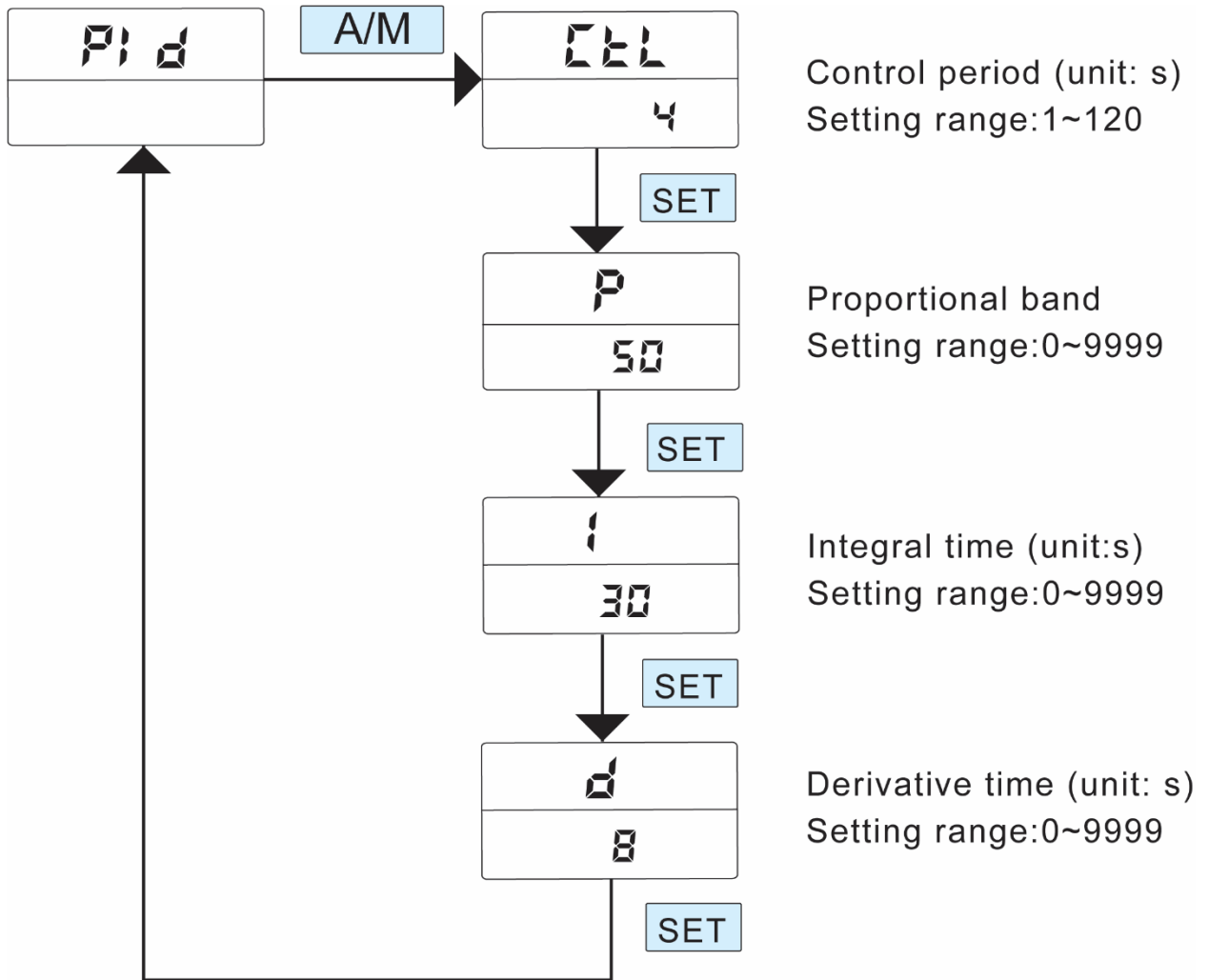
DISP: Alarm Display

ON: The alarm light will flash in the PV display.

OFF: The alarm light won't flash in the PV display.

PID Algorithm

PID involves three separate constant parameters: the proportional, the integral and derivative values, called P, I, and D. Think of the algorithm as measuring present errors, accumulation of past errors, and prediction of future errors based on the current rate of change. The weighted sum of these three measurements is used to adjust the process as necessary to reach and sustain a set value (SV).



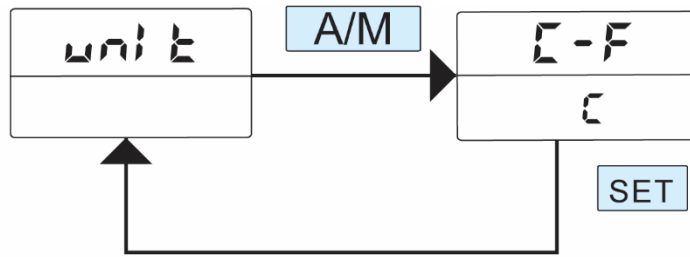
Ctl: Control period: The settings range is from 0.5-120 seconds. The controller accuracy will be higher with a lower number. It is set to 4 seconds by default which should work well in most applications.

P: Proportional band: The response speed and accuracy of the system will be improved by increasing P, but this increase can easily allow the system to overshoot the set value. If the value is set too low this will reduce the accuracy, response speed, and delay the adjustment time.

I: Integral time: The larger I value, the faster the steady-state errors can be eliminated. If the value is set too large it can cause the integral saturation phenomena at initial stage of the response process. If the value is set too low, it will affect the adjustment accuracy of the system.

D: Derivative time: Its main function is to forecast the deviation change. If the value is set to high it can delay the adjustment time and even degrade the anti-interference performance of the system.

Unit Parameters Settings



Temperature Unit
C: °C F: °F

C-F: temperature unit: C for Celsius (°C); F for Fahrenheit (°F).

Adjust Set Point Temperature

- Press the Up arrow button. This will cause the red light to flash indicating the numbers can be changed.
- Use the arrow left button to move the cursor to the number you want to change.
- Use the arrow up or down button to change the value
- Press the set button to apply the new temperature

Manual Mode

- Hold down the A/M button
- An upside-down A button will appear in the SV field.
- Press the set button to apply the settings
- To adjust the % of power follow the same steps as changing the set point temperature value.
- Press the Up arrow button. This will cause the red light to flash indicating the numbers can be changed.
- Use the arrow left button to move the cursor to the number that needs changed.
- Use the arrow up or down button to change the value
- Press the set button to apply the new settings

Heat & Pump Buttons

- Heat button: Will turn on/off the heating element
- Pump Button: Will turn on/off the pump

Auto-Tune Process

- Fill the kettle with the same amount of water used in a typical brew day. A typical 5.5 gallon batch will be filled with 7.5-8 gallon of water.
- Turn the heating element and pump on
- Change the set value to 150
- Once the kettle is at 140 - start the auto-tune process
- Hold the set button for 3 seconds to enter the settings menu
- Press the set button once to change the sub menu to the oP option
- Press the A/M button to select the oP option

- Once inside the oP menu it will display PID
- Press the UP button which will display the next option which is At.
- Press the set button to select At (auto-tune option)
- Continue to press the set button to exit the submenu.
- The screen will now flash At -- the auto-tune process will take anywhere from 5 minutes to an hour or so. The process is finished when the At no longer flashes on the screen of the controller.

Factory Reset Pid Settings

- Hold the set button for 3 seconds to enter the settings menu
- Press the set button once to change the sub menu to the oP option
- Press the A/M button to select the oP option
- Once entered into the oP menu it will display PID
- Press the UP button twice which will display r
- Press the set button to select the r(PID reset)
- Continue to press the set button to exit the submenu

Fahrenheit to Celsius

- Hold the set button for 3 seconds to enter the settings menu
- Press the set button and scroll though until you see unit
- Press the A/M to select the unit menu
- Press the up button to change from F to C
- Press set to select C
- Press the set button again to exit the settings menu

Alarm Settings

- Hold the set button for 3 seconds to enter the settings menu
- Press the set button a few times until the ALP submenu is displayed
- Select the ALP menu by pressing the A/M button
- The first option displayed is node. Change node to 1 (that turns on the audible alarm)
- Press set one to continue to HI AL
- HI AL: If mashing at 150 set the value to 149.9. (Pro tip- if the HI AL is set to 150 it won't alarm until it reaches 150.1)
- Press set to confirm alarm value set
- Press and hold set to exit the settings menu
- One the alarm sounds you can just hit the set button to stop the alarm.

Temperature Offset

- Insert the temperature probe into the thermowell
- Bring the kettle up to a boil with water.
- Adjust the offset to display the temperature of boiling water at current elevation. The boiling point of water is 212 degrees Fahrenheit at sea level. (elevation chart below.)
- Hold the set button for 3 seconds for main menu
- Select the first option 1P

- Press the A/M button to select the 1P option
- SC 0.0 will display on the screen (zero offset)
- The controller can adjust the offset in either direction-- negative or positive.
- Change the SC to -20 that will adjust the offset 20 deg (if it was reading 130 it will now read 110)
- Change the SC to +20 that will adjust the offset 20 deg (if it was reading 130 it will now read 150)
- Once the offset has been changed press and hold the set button to save and exit
- The correct boiling point will now be displayed on the PV screen.

Altitude	Boiling point of water
(ft)	(°F)
-250	212.5
Sea Level 0	212
500	211
1000	210.1
1500	209.1
2000	208.1
2500	207.2
3000	206.2
3500	205.3
4000	204.3
4500	203.4
5000	202.4
5500	201.5
6000	200.6
6500	199.6
7000	198.7

Faults and Errors:

Faults	Reasons	Handling methods
PV and SV screen not work	Wrong input voltage	Check whether the input voltage is in accordance with the specification of the instrument
	Power cable is not well connected	Check whether the power cable is bad or wrongly connected
	Instrument fault or blowout	Contact the manufacturer or change the fuse with the same specification
OrAL displaying	Sensor fault	Change the sensor
	Wrong input sensor type selected	Select the correct input sensor type code
	Wrong sensor connection	Connect the sensor wire correctly
Wrong measured value	Wrong input sensor type selected	Select the correct input sensor type code
	Wrong sensor connection	Connect the sensor wire correctly
No control output	Wrong alarm setting	Refer to the instruction to select the correct alarm mode
	Fault of controller	Contact the manufacturer
No alarm output	Wrong wiring of the output	Connect the output wire correctly