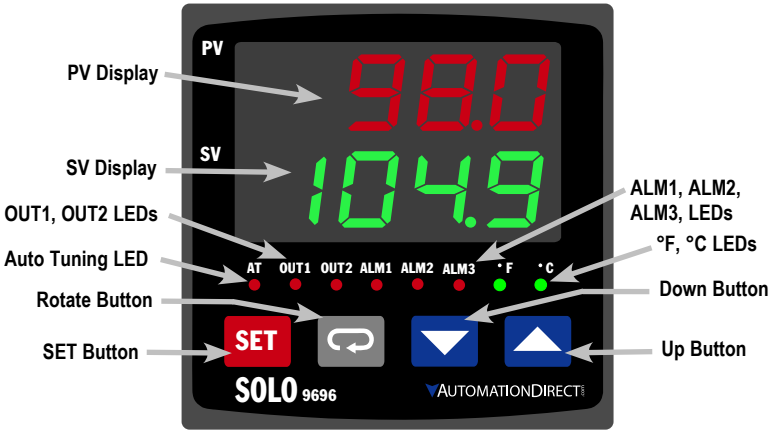
Keypad Operation and Setup Parameters

Chapter 3

In this Chapter...

Display, LED and Keypad

The SOLO temperature controller has a two color seven segment LED display, four types of LED status indicators and four function buttons.



PV Display

The Process Value Display. Displays the value from the input source or the parameter source.

SV Display

The Set Value Display. Displays the set point of the process, the parameter operation read value, manipulated variable, or the set value of the parameter.

AT LED Indicator

Auto Tuning LED flashes when the Auto Tuning operation is ON.

OUT1, OUT2 LED Indicators

Output 1 and Output 2 LED indicators light when the output is ON.

°F, °C LED Indicators

Temperature unit LED. °C: Celsius, °F: Fahrenheit

ALM1, ALM2, ALM3 LED Indicators

Alarm output LED indicators light when appropriate alarm is activated. ALM2 and ALM3 indicators are available on series SL4896 and SL9696 only.

Keypad Operation

Function Buttons

SET Button

Press the SET button to select the desired function mode and confirm the setting value.

Rotate Button

Press the Rotate button to select parameters within the function mode.

Down Button

Press the Down button to decrease values displayed on the SV display. Hold down this button to speed up the decrement.

Up Button

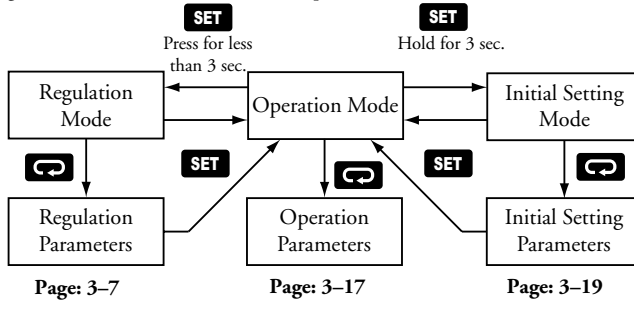
Press the Up button to increase values displayed on the SV display. Hold down this button to speed up the increment.

Initial Power up

When power is first applied to the temperature controller, the module information splash screen appears. This screen shows the firmware version on the PV display and the two output types for that particular model on the SV display. After three seconds, the controller will automatically proceed to the Operation mode main screen.

Keypad Operation

The temperature controller has three function modes: Initial Setting mode, Operation mode and Regulation mode. Press and hold the SET button for three seconds to go into the Initial Setting mode. Press the SET button for less than three seconds to access the Regulation mode. Press the Rotate button while inside any of the three function modes to scroll through the individual parameters for each function mode. Use the Up and Down buttons to change the individual parameter values. Pressing the SET button saves the parameter values. Press the SET button again to return the controller to the Operation mode main screen.



Setup Parameter Listing

Regulation Mode Parameters

Press the SET button to access these parameters.

Regulation Mode Parameter Availablity																		
			Controller Type							Control Mode				Heating / Cooling			
ID #	Display	Parameter Name	RR(E)	VR(E)	VV(E)	CR(E)	CV(E)	LR(E)	LV(E)	PID	ON /OFF	Manual	Ramp / Soak	Heating	Cooling	Heating / Cooling	Cooling / Heating
P1-1	AT	Auto Tuning	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓
P1-2	PIdn	PID Parameter Group	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓	✓
P1-3	Sun	Target SV	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓	✓
P1-4	Pn	Proportion Band	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓	✓
P1-5	In	Integral Time	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓	✓
P1-6	dn	Derivative Time	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓	✓
P1-7	PdoF	PD Control Offset	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓	✓
P1-8	IoFn	Integral Offset	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓
P1-9	HtS	Heating Hysteresis	✓	✓	✓	✓	✓	✓	✓	-	✓	-	-	✓	-	✓	✓
P1-10	CtS	Cooling Hysteresis	✓	✓	✓	✓	✓	✓	✓	-	✓	-	-	-	✓	✓	✓
P1-11	HtPd	Output 1 Heating Period	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	-	✓	-
P1-12	CLPd	Output 1 Cooling Period	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	-	✓	-	✓
P1-13	HCPd	Output 2 Period	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	-	-	✓	✓
P1-14	CoEF	Proportion Band Coefficient	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓	-	-	✓	✓
P1-15	dEAd	Dead Band	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	-	-	✓	✓
P1-16	tPoF	PV Offset	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P1-17	CrHI	Analog High Adjustment	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P1-18	CrLo	Analog Low Adjustment	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Operation Mode Parameters

Press the ↩ button to access these parameters.

Operation Mode Parameter Availablity																	
			Controller Type							Control Mode				Heating / Cooling			
ID #	Display	Parameter Name	RR(E)	VR(E)	VV(E)	CR(E)	CV(E)	LR(E)	LV(E)	PID	ON /OFF	Manual	Ramp / Soak	Heating	Cooling	Heating / Cooling	Cooling / Heating
P2-1	r-S	Run / Stop	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P2-2	Ptrn	Starting Ramp / Soak Pattern	✓	✓	✓	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	✓
P2-3	SP	Decimal Point Position	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P2-4	AL1H	Alarm 1 High Limit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P2-5	AL1L	Alarm 1 Low Limit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P2-6	AL2H	Alarm 2 High Limit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P2-7	AL2L	Alarm 2 Low Limit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P2-8	AL3H	Alarm 3 High Limit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-
P2-9	AL3L	Alarm 3 Low Limit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-
P2-10	Loc	Lock Mode	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P2-11	out1	Output 1 Level	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓
P2-12	out2	Output 2 Level	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	-	-	✓	✓

Initial Setting Parameters

Press the SET button for more than three seconds to access these parameters.

Initial Setting Mode Parameter Availablity																		
			Controller Type							Control Mode				Heating / Cooling			
ID #	Display	Parameter Name	RR(E)	VR(E)	VV(E)	CR(E)	CV(E)	LR(E)	LV(E)	PID	ON /OFF	Manual	Ramp / Soak	Heating	Cooling	Heating / Cooling	Cooling / Heating
P3-1	InPt	Input Type	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-2	tPUn	Temperature Unit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-3	tP-H	Input Range High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-4	tP-L	Input Range Low	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-5	Ctrl	Control Mode	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-6	PAtn	Ramp / Soak Pattern*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-7	S-HC	Heating / Cooling	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-8	AL1	Alarm 1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-9	AL2	Alarm 2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-10	AL3	Alarm 3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-11	SALA	System Alarm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-12	CoSH	On-Line Configuration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-13	C-SL	Modbus Protocol	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-14	C-no	Network Address	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-15	bPS	Baud Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-16	LEn	Bit Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-17	PrtY	Parity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P3-18	StoP	Stop Bit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Once a Ramp / Soak pattern (P3-6) is selected, the following parameters are available.																	
P3-19	SPmn	Ramp / Soak SV	✓	✓	✓	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	✓
P3-20	tmmn	Ramp / Soak Time	✓	✓	✓	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	✓
P3-21	PSnn	Last Step Number	✓	✓	✓	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	✓
P3-22	CYCn	Additional Cycles	✓	✓	✓	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	✓
P3-23	LinN	Next Pattern Number	✓	✓	✓	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	✓

Regulation Mode Parameters

Press the SET button to access these parameters.

AtE **Auto Tuning** **ID Number P1-1**

Range: On - Auto Tuning activated
Off - Auto Tuning deactivated

When this parameter is set to On, the controller begins auto tuning. After auto tuning is complete, the parameter is set to Off automatically. If this parameter is set to Off during the auto tuning process, the controller stops the auto tuning process immediately and does not change any PID parameter.

PtdN **PID Parameter Group** **ID Number P1-2**

This parameter name will be displayed as one of the following.

Ptd0	PID Parameter Group 0
Ptd1	PID Parameter Group 1
Ptd2	PID Parameter Group 2
Ptd3	PID Parameter Group 3
Ptd4	PID Parameter Group Auto Select
Ptd	PID Parameter Group for Event 2 Input

Range: PID0 to PID4

The SOLO controller can store up to 4 PID parameter groups (Ptd0 - Ptd3) for regular operation. The PID Parameter Group parameter sets which PID group (Ptd0 - Ptd3) to use for control. The SV display shows the Target SV assigned to the PID group. (For more information about the Target SV, refer to P1-3 Target SV)

When Ptd4 is selected as the PID parameter group, the controller automatically chooses the one PID parameter group (Ptd0 - Ptd3) that has a Target SV that is the nearest to the SV set by the operator and uses that group for control.

Ptd is a special PID parameter group for the SL4896 and SL9696 series controllers Event inputs. This is the PID group that the controller uses when the Event 2 input is on. To configure the PID parameter for this parameter group, the Event 2 input must be active.

SvN **Target SV** **ID Number P1-3**

This parameter name will be displayed as one of the following. Only the Target SV for the selected PID Parameter Group (Ptd0, P1-2) will be displayed when accessing this parameter.

SV0	Target SV of PID Parameter Group 0
SV1	Target SV of PID Parameter Group 1
SV2	Target SV of PID Parameter Group 2
SV3	Target SV of PID Parameter Group 3
SV	Target SV of PID Parameter Group for Event 2 Input

Range: -99.9 to 999.9

(For more information about the parameter groups, refer to P1-2 PID Parameter Group.)

The Target SV is the setting value that each parameter group works toward. When the Target SV is the closest to the SV of the PID groups, this value is used to select which tuning parameters are used by the controller. The controller can store up to four PID parameter groups (PID0, - PID3) for regular operation. One of the PID parameter groups can be selected manually, or the controller selects the PID parameter group that has a Target SV that is the nearest to the SV set by the operator. If there are two or more PID parameter groups that have SV values equally close to the current PV, the controller uses the lowest number parameter group (eg. If parameter groups 0 - 3 have the same Target SV, the controller uses the parameter group 0).

The parameter SV is the Target SV of the PID parameter group for Event 2 input. This parameter is only displayed when the Event 2 input is on. The Event 2 input is only available on the SL4896 and SL9696 series controllers.

Pn Proportion Band — ID Number P1-4

This parameter name will be displayed as one of the following. Only the Proportion Band for the selected PID Parameter Group (PID0, P1-2) will be displayed when accessing this parameter.

P0	Proportion Band of PID Parameter Group 0
P1	Proportion Band of PID Parameter Group 1
P2	Proportion Band of PID Parameter Group 2
P3	Proportion Band of PID Parameter Group 3
P	Proportion Band of PID Parameter Group for Event 2 Input

Range: 0.1 to 999.9

(For more information about the parameter groups, refer to P1-2 PID Parameter Group.)

The Proportion Band is a parameter group used for PID control. The controller can store up to four PID parameter groups (PID0, - PID3) for regular operation. One of the PID parameter groups can be selected manually, or the controller selects the PID parameter group that has a Target SV that is the nearest to the SV set by the operator.

The parameter P is the Proportion Band of the PID parameter group for Event 2 input. This parameter is only displayed when the Event 2 input is on. The Event 2 input is only available on the SL4896 and SL9696 series controllers.

In Integral Time — ID Number P1-5

This parameter name will be displayed as one of the following. Only the Integral Time for the selected PID Parameter Group (Pid0, P1-2) will be displayed when accessing this parameter.

- I0 Integral Time of PID Parameter Group 0
- I1 Integral Time of PID Parameter Group 1
- I2 Integral Time of PID Parameter Group 2
- I3 Integral Time of PID Parameter Group 3
- I Integral Time of PID Parameter Group for Event 2 Input

Range: 0 to 9999 (Sec)

(For more information about the parameter groups, refer to P1-2 PID Parameter Group.)

The Integral Time is a parameter group used for PID control. The controller can store up to four PID parameter groups (Pid0, - Pid3) for regular operation. One of the PID parameter groups can be selected manually, or the controller selects the PID parameter group that has a Target SV that is the nearest to the SV set by the operator.

The parameter I is the Integral Time of the PID parameter group for Event 2 input. This parameter is only displayed when the Event 2 input is on. The Event 2 input is only available on the SL4896 and SL9696 series controllers.

dn Derivative Time — ID Number P1-6

This parameter name will be displayed as one of the following. Only the Derivative Time for the selected PID Parameter Group (Pid0, P1-2) will be displayed when accessing this parameter.

- d0 Derivative Time of PID Parameter Group 0
- d1 Derivative Time of PID Parameter Group 1
- d2 Derivative Time of PID Parameter Group 2
- d3 Derivative Time of PID Parameter Group 3
- d Derivative Time of PID Parameter Group for Event 2 Input

Range: 0 to 9999 (Sec)

(For more information about the parameter groups, refer to P1-2 PID Parameter Group.)

The Derivative Time is a parameter group used for PID control. The controller can store up to four PID parameter groups (Pid0, - Pid3) for regular operation. One of the PID parameter groups can be selected manually, or the controller selects the PID parameter group

that has a Target SV that is the nearest to the SV set by the operator.

The parameter d is the Derivative Time of the PID parameter group for Event 2 input. This parameter is only displayed when the Event 2 input is on. The Event 2 input is only available on the SL4896 and SL9696 series controllers.

PdoF — PD Control Offset — ID Number P1-7

Range: 0.0 to 100.0 (%)

The PD Control Offset parameter is available when the P or PD control is selected [Integral Time parameter (In, P1-5) is zero].

This parameter defines the offset of the output. When the P or PD control is used, the control cannot stabilize the PV at the SV because the output is zero when the PV is equal to the SV. This parameter modifies the output level when the PV is equal to the SV.

IoFn — Integral Offset — ID Number P1-8

This parameter name will be displayed as one of the following.

IoF0	Integral Offset of PID Parameter Group 0
IoF1	Integral Offset of PID Parameter Group 1
IoF2	Integral Offset of PID Parameter Group 2
IoF3	Integral Offset of PID Parameter Group 3
IoF	Integral Offset of PID Parameter Group for Event 2 Input

Range: 0.0 to 100.0 (%)

(For more information about the parameter groups, refer to PID Parameter Group, P1-2.)

The Integral Offset parameter is available when the PI or PID control is selected. [Integral Time parameter (In, P1-5) is not zero.]

The Auto Tuning process will decide the offset value automatically.

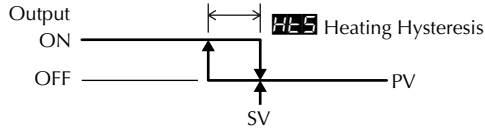
If this parameter is not used (IoF = 0), the output is zero when the PV is equal to the SV. If the Integral Time parameter (In, P1-5) is used only to eliminate the steady error, it may take a long time to reach the SV because it needs time to accumulate the error. In this case, this parameter is useful. This parameter defines the default output level on start up. It will inprove the speed that the PV reaches the SV.

The parameter IoF is the Integral Offset of the PID parameter group for Event 2 input. This parameter is only displayed when the Event 2 input is on. The Event 2 input is only available on the SL4896 and SL9696 series controllers.

HtS Heating Hysteresis — ID Number P1-9

Range: 0.0 to 999.9

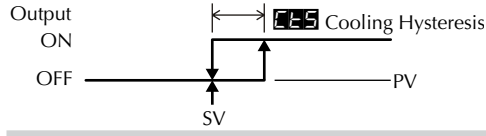
The Heating Hysteresis parameter defines the amount that the PV must go below the SV before the output turns on. This parameter is available only for On / Off control with an output programmed for heating.



CtS Cooling Hysteresis — ID Number P1-10

Range: 0.0 to 999.9

The Cooling Hysteresis parameter defines the amount that the PV must go above the SV before the output turns on. This parameter is available only for On / Off control with an output programmed for cooling.



HtPd Output 1 Heating Period — ID Number P1-11

Range: 0.5 to 99 seconds

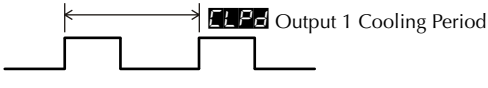
The Output 1 Heating parameter defines one output period or the duration of one on / off cycle for Output 1.

This parameter is available when Output 1 is programmed as a heating output in the PID or Ramp / Soak mode.

CLPd Output 1 Cooling Period — ID Number P1-12

Range: 0.5 to 99 seconds

The Output 1 Cooling parameter defines one output period or the duration of one on / off cycle for Output 1.

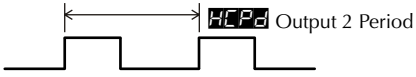


This parameter is available when Output 1 is programmed as a cooling output in the PID or Ramp / Soak mode.

HCPd Output 2 Period — ID Number P1-13

Range: 0.5 to 99 seconds

The Output 1 Cooling parameter defines one output period or the duration of one on / off cycle for Output 2.



This parameter is available when Output 2 is programmed as a heating or cooling output in the PID or Ramp / Soak mode.

CoEF Proportion Band Coefficient — ID Number P1-14

Range: 0.01 to 99.99

This Proportion Band Coefficient parameter is available when a dual output mode (heating and cooling) is selected. This parameter allows the second output control to have a different proportional setting than the first output control. The first output control proportional band setting is multiplied by this parameter to create a proportional band setting for the second output control.

(First Output) Proportion Band * Proportion Band Coefficient = Second Proportional Band

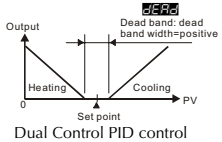
(Pn, P1-4) (CoEF, P1-14)

dEAd Dead Band — ID Number P1-15

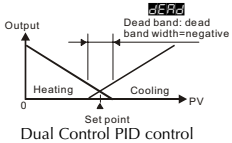
Range: The range varies according to the Decimal Point Position (SP, P2-3).

SP	0	1	2	3
dEAd	-99 to 999	-99.9 to 999.9	-9.99 to 99.99	-.999 to 9.999

The dead band zone is the area around the SV where the output is not effected by the proportional control value (PV). For PID control, as long as the PV remains within the dead band zone, the output is not affected by the proportional control. The integral and derivative controls ignore the dead band setting and may cause the output to be on within the dead band zone.

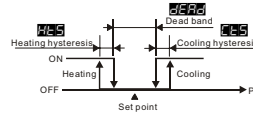


Dual Control PID control positive dead band



Dual Control PID control negative dead band

For On / Off type control the Dead Band parameter defines the area around the SV where the output remains off. The PV must go beyond the dead band range in order for either output 1 or output 2 to turn on.



Dual Loop On / Off control output operation

tPoF **PV Offset** **ID Number P1-16**

Range: The range varies according to the Decimal Point Position (SP, P2-3).

SL4824				
	Decimal Position			
tPoF	0 (****)	1 (*.***)	2 (**.**)	3 (***.*)
0~50 mV	0	0.0	00.00	0.000
4~20 mA	0	0.0	00.00	n/a
0~20 mA	0	0.0	00.00	n/a
0V~10V	0	0.0	00.00	n/a
0V~5V	0	0.0	00.00	n/a
(Pt100)	0	0.0	n/a	n/a
(JPt100)	0	0.0	n/a	n/a
Thermocouple type TXK	0.0	0.0	n/a	n/a
Thermocouple type U	0.0	0.0	n/a	n/a
Thermocouple type L	0.0	0.0	n/a	n/a
Thermocouple type B	0.0	n/a	n/a	n/a
Thermocouple type S	0.0	n/a	n/a	n/a
Thermocouple type R	0.0	n/a	n/a	n/a
Thermocouple type N	0.0	0.0	n/a	n/a
Thermocouple type E	0.0	0.0	n/a	n/a
Thermocouple type T	0.0	0.0	n/a	n/a
Thermocouple type J	0.0	0.0	n/a	n/a
Thermocouple type K	0.0	0.0	n/a	n/a

SL4848 / SL4896 / SL9696				
	Decimal Position			
tPoF	0 (****)	1 (*.***)	2 (**.**)	3 (***.*)
0~50 mV	0	0.0	00.00	0.000
4~20 mA	0	0.0	00.00	00.00
0~20 mA	0	0.0	00.00	00.00
0V~10V	0	0.0	00.00	00.00
0V~5V	0	0.0	00.00	00.00
(Pt100)	0	0.0	n/a	n/a
(JPt100)	0	0.0	n/a	n/a
Thermocouple type TXK	0.0	0.0	n/a	n/a
Thermocouple type U	0.0	0.0	n/a	n/a
Thermocouple type L	0.0	0.0	n/a	n/a
Thermocouple type B	0.0	n/a	n/a	n/a
Thermocouple type S	0.0	n/a	n/a	n/a
Thermocouple type R	0.0	n/a	n/a	n/a
Thermocouple type N	0.0	0.0	n/a	n/a
Thermocouple type E	0.0	0.0	n/a	n/a
Thermocouple type T	0.0	0.0	n/a	n/a
Thermocouple type J	0.0	0.0	n/a	n/a
Thermocouple type K	0.0	0.0	n/a	n/a

This parameter is used to add an offset value to the PV.

CrHi Analog High Adjustment — ID Number P1-17

The Analog High Adjustment parameter is used to adjust the actual analog output value when the output is 100%. To set up this parameter, place the SOLO controller in the Manual control mode and set the Output 1 Level (out1, P2-11) to 100% then increase / decrease the parameter value to get the desired analog output value.

The tables below show the approximate Analog High Adjustment values needed to obtain the desired output value. The actual controller output will vary. Check and adjust the values until the desired output level is achieved.

Current Output								
	0mA	1mA	2mA	3mA	4mA	5mA	6mA	7mA
CrHi	-7198	-6838	-6478	-6118	-5758	-5398	-5038	-4678
	8mA	9mA	10mA	11mA	12mA	13mA	14mA	15mA
CrHi	-4319	-3959	-3599	-3239	-2879	-2519	-2159	-1799
	16mA	17mA	18mA	19mA	20mA			
CrHi	-1440	-1080	-720	-360	0			

Voltage Output								
	0V	1V	2V	3V	4V	5V	6V	7V
CrHi	-7589	-6830	-6071	-5312	-4553	-3795	-3036	-2277
	8V	9V	10V					
CrHi	-1518	-758	0					

Note: When decreasing the parameter value for Analog High Adjustment below -1999, the SOLO display will "roll over" to -0, indicating a value of -2000. Two "roll overs" equal a value of -4000 and so forth. For example, to enter a value of -5312 for Analog High Adjustment, hold the ▼ button until the SOLO display "rolls over" two times and the display reads -1312.

Note: The output may be saturated before it reaches the minimum or maximum value.

This parameter is available when Output 1 is Current or Linear Voltage.

CrLo **Analog Low Adjustment** **ID Number P1-18**

The Analog Low Adjustment parameter is used to adjust the actual analog output value when the output is 0%. To set up this parameter, place the SOLO controller in the Manual control mode and set the Output 1 Level (OUt1, P2-11) to 0% then increase / decrease the parameter value to get the desired analog output value.

The tables below show the approximate Analog Low Adjustment values needed to obtain the desired output value. The actual controller output will vary. Check and adjust the values until the desired output level is achieved.

Current Output								
	0mA	1mA	2mA	3mA	4mA	5mA	6mA	7mA
CrLo	-1440	-1080	-720	-360	0	360	720	1080
	8mA	9mA	10mA	11mA	12mA	13mA	14mA	15mA
CrLo	1440	1799	2159	2519	2879	3239	3599	3959
	16mA	17mA	18mA	19mA	20mA			
CrLo	4319	4678	5038	5398	5758			

Voltage Output								
	0V	1V	2V	3V	4V	5V	6V	7V
CrLo	0	759	1518	2277	3036	3795	4553	5312
	8V	9V	10V					
CrLo	6071	6830	7589					

Note: When increasing the parameter value of Analog Low Adjustment above 9999, the SOLO display will "roll up" to 0000, indicating a value of 10000. For example, to enter a value of 10625 for Analog Low Adjustment, hold the ▲ button until the SOLO display reads 0625.

Note: The output may be saturated before it reaches the minimum or maximum value.

This parameter is available when Output 1 is Current or Linear Voltage.

Operation Mode Parameters

Press the ↵ button to access these parameters.

r-S Run / Stop — ID Number P2-1

The Run / Stop parameter is used to control the operational status of the SOLO Controller. The available range varies according to the control mode and the status of the EVENT 1 input. The Event 1 input is available only for the SL4896 and SL9696 series controllers.

PID, On / Off and Manual Control Modes		
	Run	Stop
Event 1 input is off. (Event 1 input is open.)	run	EStP
Event 1 input is on. (Event 1 input is closed.)	N/A	StoP, EStP

Ramp / Soak Control Mode			
	Run	Hold	Stop
Event 1 input is off. (Event 1 input is open.)	run	PHod	EStP, PStP
Event 1 input is on. (Event 1 input is closed.)	N/A	N/A	StoP, EStP

- run — Run mode
- EStP — Stop mode
- StoP — Stop mode (The controller was in Stop mode when the Event 1 input was closed.)
- EStP — Stop mode (The controller was in Run mode when the Event 1 input was closed.)
- PHod — Ramp / Soak control is on hold. The controller keeps the current Ramp / Soak step number and time. Ramp / Soak control continues when the mode is changed to Run.
- PStP — Ramp / Soak control is stopped. The controller restarts the Ramp / Soak control at the first step when the mode is changed to Run.

Ptrn Starting Ramp / Soak Pattern — ID Number P2-2

Range: 0 to 7

Select the Ramp / Soak pattern number to start the Ramp / Soak control.

SP Decimal Point Position — ID Number P2-3

Range: 0 (****)
1 (***.*)
2 (**.**)
3 (*.***)

This parameter defines the decimal point position on the PV and SV display.

AL1H Alarm 1 High Limit — ID Number P2-4

This parameter is used to set the high limit for Alarm 1. The range varies according to other parameter values.

AL1L **Alarm 1 Low Limit** **ID Number P2-5**

This parameter is used to set the low limit for Alarm 1. The range varies according to other parameter values.

AL2H **Alarm 2 High Limit** **ID Number P2-6**

This parameter is used to set the high limit for Alarm 2. The range varies according to other parameter values.

AL2L **Alarm 2 Low Limit** **ID Number P2-7**

This parameter is used to set the low limit for Alarm 2. The range varies according to other parameter values.

AL3H **Alarm 3 High Limit** **ID Number P2-8**

This parameter is used to set the high limit for Alarm 3. The range varies according to other parameter values.

AL3L **Alarm 3 Low Limit** **ID Number P2-9**

This parameter is used to set the low limit for Alarm 3. The range varies according to other parameter values.

LoC **Lock Mode** **ID Number P2-10**

Range: oFF The Lock feature is disabled.
LoC1 Lock Mode 1
LoC2 Lock Mode 2

Lock Mode 1: All key pad operation is ignored. Press the SET key and the ↩ key at the same time to cancel this lock mode.

Lock Mode 2: All key pad operation is ignored except changing the SV. Press the SET key and the ↩ key at the same time to cancel this lock mode.

oUt1 **Output 1 Level** **ID Number P2-11**

Range: 0.0 to 100 (%)

The value for this parameter can be changed in the Manual control mode. In other control modes, this parameter is read-only.

oUt2 **Output 2 Level** **ID Number P2-12**

Range: 0.0 to 100 (%)

This parameter is available when Output 2 is used. Refer to the Heating / Cooling parameter (5-HC, P3-7) to disable / enable Output 2. The value for this parameter can be changed in the Manual control mode. In other control modes, this parameter is read-only.

Initial Setting Parameters

Press the SET button for more than three seconds to access these parameters.

InPt **Input Type** **ID Number P3-1**

This parameter defines the input signal type.

Thermocouple* Type and Temperature Range		
Input Temperature Sensor Type	**LED Display**	**Temperature Range**
Thermocouple TXK type	txk	-328 ~ 1472°F (-200 ~ 800°C)
Thermocouple U type	u	-328 ~ 932°F (-200 ~ 500°C)
Thermocouple L type	L	-328 ~ 1562°F (-200 ~ 850°C)
Thermocouple B type	b	212 ~ 3272°F (100 ~ 1800°C)
Thermocouple S type	S	32 ~ 3092°F (0 ~ 1700°C)
Thermocouple R type	r	32 ~ 3092°F (0 ~ 1700°C)
Thermocouple N type	n	-328 ~ 2372°F (-200 ~ 1300°C)
Thermocouple E type	E	32 ~ 1112°F (0 ~ 600°C)
Thermocouple T type	t	-328 ~ 752°F (-200 ~ 400°C)
Thermocouple J type	J	-148 ~ 2192°F (-100 ~ 1200°C)
Thermocouple K type	K	-328 ~ 2372°F (-200 ~ 1300°C)
RTD Type and Temperature Range		
Input Temperature Sensor Type	**LED Display**	**Temperature Range**
Platinum Resistance (Pt100)	Pt	-328 ~ 1112°F (-200 ~ 600°C)
Platinum Resistance (JPt100)	JPt	-4 ~ 752°F (-20 ~ 400°C)
Voltage Input Type and Input Range		
Voltage Input Type	**LED Display**	**Temperature Range**
0~50mV Analog Input	50u	-999 ~ 9999
0V~10V Analog Input	0.10	-999 ~ 9999
0V~5V Analog Input	0.5	-999 ~ 9999
Current Input Type and Input Range		
Current Input Type	**LED Display**	**Temperature Range**
4~20mA Analog Input	4A4	-999 ~ 9999
0~20mA Analog Input	0A0	-999 ~ 9999
**Note - Use only ungrounded thermocouples*		

tPUn **Temperature Unit** **ID Number P3-2**

Range: F, C

This parameter is available when the parameter Input Type is a thermocouple or RTD.

tP-H **Input Range High** **ID Number P3-3**

Range: From the value of Input Range Low to 9999.

This parameter defines the high limit of the PV. This is the maximum value of the operational temperature range. In operation, if the PV value is higher than the tP-H value, th PV flashes to indicate an error and the controller outputs shut off. The SV value cannot exceed the tP-H value. This parameter cannot be lower than the Input Range Low parameter (tP-L, P3-4).

tP-L **Input Range Low** **ID Number P3-4**

Range: From -999 to the value of Input Range High.

This parameter defines the low limit of the PV. This is the minimum value of the operational temperature range. In operation, if the PV value is lower than the tP-L value, th PV flashes to indicate an error and the controller outputs shut off. The SV value cannot be set lower than the tP-L value. This parameter cannot be higher than the Input Range High parameter (tP-H, P3-3).

CtrL **Control Mode** **ID Number P3-5**

Range:
- PId — PID control mode
- onoF — On / Off control mode
- mAnU — Manual control mode
- ProG — Ramp / Soak control mode

This parameter is used to select one of the control modes. See Chapter 5 for a complete discription of each control mode.

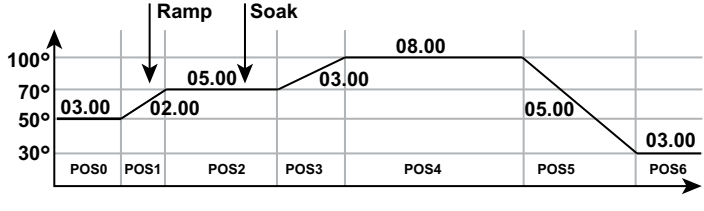
PAtn **Ramp / Soak Pattern** **ID Number P3-6**

Range: oFF Ramp / Soak pattern is not selected.
0 to 7 Ramp / Soak pattern number.

This parameter is used to select the appropriate Ramp / Soak pattern number for setting up it's individual parameters. Once a Ramp / Soak pattern number (0-7) is selected, the controller only displays the following pattern setup parameters until the SET key is pressed.

	Ramp / Soak Pattern Number							
	0	1	2	3	4	5	6	7
Step 0 SV	SP00	SP10	SP20	SP30	SP40	SP50	SP60	SP70
Step 0 Time	tr00	tr10	tr20	tr30	tr40	tr50	tr60	tr70
Step 1 SV	SP01	SP11	SP21	SP31	SP41	SP51	SP61	SP71
Step 1 Time	tr01	tr11	tr21	tr31	tr41	tr51	tr61	tr71
Step 2 SV	SP02	SP12	SP22	SP32	SP42	SP52	SP62	SP72
Step 2 Time	tr02	tr12	tr22	tr32	tr42	tr52	tr62	tr72
Step 3 SV	SP03	SP13	SP23	SP33	SP43	SP53	SP63	SP73
Step 3 Time	tr03	tr13	tr23	tr33	tr43	tr53	tr63	tr73
Step 4 SV	SP04	SP14	SP24	SP34	SP44	SP54	SP64	SP74
Step 4 Time	tr04	tr14	tr24	tr34	tr44	tr54	tr64	tr74
Step 5 SV	SP05	SP15	SP25	SP35	SP45	SP55	SP65	SP75
Step 5 Time	tr05	tr15	tr25	tr35	tr45	tr55	tr65	tr75
Step 6 SV	SP06	SP16	SP26	SP36	SP46	SP56	SP66	SP76
Step 6 Time	tr06	tr16	tr26	tr36	tr46	tr56	tr66	tr76
Step 7 SV	SP07	SP17	SP27	SP37	SP47	SP57	SP67	SP77
Step 7 Time	tr07	tr17	tr27	tr37	tr47	tr57	tr67	tr77
Last Step Number	SPLS	SPL1	SPL2	SPL3	SPL4	SPL5	SPL6	SPL7
Additional Cycles	CYC0	CYC1	CYC2	CYC3	CYC4	CYC5	CYC6	CYC7
Next Pattern Number	Lnk0	Lnk1	Lnk2	Lnk3	Lnk4	Lnk5	Lnk6	Lnk7

Below is an example of a typical Ramp / Soak Pattern.



SP00 Step00 = 50°
tr00 Time00 = 3 hrs 00 min.
SP01 Step01 = 70°
tr01 Time01 = 2 hrs 00 min.
SP02 Step02 = 70°
tr02 Time02 = 5 hrs 00 min.

SP03 Step03 = 100°
tr03 Time03 = 3 hrs 00 min.
SP04 Step04 = 100°
tr04 Time04 = 8 hrs 00 min.
SP05 Step05 = 30°
tr05 Time05 = 5 hrs 00 min.

SP06 Step06 = 30°
tr06 Time06 = 3 hrs 00 min.
PSt0 Process Step = 6
CYC0 Cycle times = 0
Lnk0 Link = OFF

S-HC **Heating / Cooling** **ID Number P3-7**

Range:
- HEAt Output 1 = Heating, Output 2 = Unused
- CooL Output 1 = Cooling, Output 2 = Unused
- H1C2 Output 1 = Heating, Output 2 = Cooling
- H2C1 Output 1 = Cooling, Output 2 = Heating

The Heating / Cooling parameter defines whether one or two outputs will be controlled and what type of control they will perform.

Note: Unused Ouput 2 can be used as an Alarm.

AL1 **Alarm 1** **ID Number P3-8**
AL2 **Alarm 2** **ID Number P3-9**
AL3 **Alarm 3** **ID Number P3-10**

Range: 0 to 18

The SOLO controllers support 3 alarm outputs. (The SL4824 series supports only one alarm output.) The Alarm1, Alarm2 and Alarm3 parameters are used to select the alarm type. Refer to Chapter 4 for details.

SALA **System Alarm** **ID Number P3-11**

Range:
- oFF System Alarm feature is disabled
- AL1 Alarm 1
- AL2 Alarm 2
- AL3 Alarm 3

This parameter defines which Alarm output is used for the system alarm. The System Alarm parameter defines an alarm output if there is an input error or process control failure. Refer to Chapter 4 for complete details.

Initial Setting Communication Parameters

CoSH **On-Line Configuration** **ID Number P3-12**

Range:
- oFF Do not allow changes to the parameters through the RS-485 port.
- on Allow changes to the parameters through the RS-485 port.

C-SL **Modbus Protocol** **ID Number P3-13**

Range:
- ASCII Modbus ASCII
- rtU Modbus RTU

C-no **Network Address** **ID Number P3-14**

Range: 1 to 247

This is the Modbus network address of the SOLO Controller.

Note: Each controller on the same network must have a unique Modbus network address

bPS **Baud Rate** **ID Number P3-15**

Range:
- 2400 2400 bps
- 4800 4800 bps
- 9600 9600 bps
- 19E2 19200 bps
- 38E2 38400 bps

LEn **Bit Length** **ID Number P3-16**

Range: 7, 8

PrtY **Parity** **ID Number P3-17**

Range: None, Even, Odd

StoP **Stop Bit** **ID Number P3-18**

Range: 1, 2

Initial Setting Ramp / Soak Parameters

SPmn **Ramp / Soak SV** **ID Number P3-19**

Range: -99.9 to 999.9

This parameter is the set point value (SV) of each Ramp / Soak step.

This parameter can be displayed as SP00 to SP77. The third character indicates the Ramp / Soak pattern number (*m*) and the last digit indicates the step number (*n*).

e.g. SP35 = SV set point value of Step 5 of the Ramp / Soak pattern 3.

tLmn **Ramp / Soak Time** **ID Number P3-20**

Range: 00.00 to 15.00 (0 to 15 hours) [Format: hours.minutes]

This parameter is the time duration of each Ramp / Soak step.

This parameter can be displayed as tL00 to tL77. The third character indicates the Ramp / Soak pattern number (*m*) and the last digit indicates the step number (*n*).

e.g. tL35 = SV set point value of Step 5 of the Ramp / Soak pattern 3.

PSYn Last Step Number **ID Number P3-21**

Range: 0 to 7

Each Ramp / Soak pattern can have up to seven steps. This parameter is the last step number that is to be used in the Ramp / Soak pattern. When the parameter value is set to 0, the SOLO controller executes only step 0 when the Ramp / Soak pattern is selected. When the value is 7, the controller executes step 0 through step 7 when the Ramp / Soak pattern is selected.

CYCn Additional Cycles **ID Number P3-22**

Range: 0 to 199

As the default, the SOLO controller executes a Ramp /Soak pattern only once. Use this parameter to set the number of additional times a Ramp / Soak pattern will execute. When the parameter value is set to 0, the SOLO controller executes the Ramp / Soak pattern one time. When this parameter value is 2, the Ramp / Soak pattern will execute two additional times for a total of three executions.

LCnn Next Pattern Number **ID Number P3-22**

Range: 0 to 7, OFF

This parameter is used to select a Ramp / Soak pattern that will execute after the current Ramp / Soak pattern is completed. If the parameter value is set to OFF, the SOLO controller will not begin another Ramp / Soak pattern after the current pattern.

Reset to Factory Default

Note: Resetting the Temperature Controller back to factory default erases all of the values entered by the user. Record any necessary settings before proceeding

Warning: Erasing the user entered values may result in a safety hazard and system malfunction.

The following instructions reset the controller to the factory default.

1. Press the • button until the parameter LoC appears. Use the ▲ button to select LoC 1. Press the SET button.
2. Press and hold the ▼ and ▲ buttons simultaneously for one second and release.
3. Press the • button until the PV display shows PASS. Use the ▼ button to change the value on the SV display to 1357. Press the SET button.
4. Cycle power on the Controller to reset to factory default mode. All user set values are erased.