

SOLO Basic

AUTOMATIONDIRECT.com

3505 HUTCHINSON ROAD
CUMMING, GA 30040-5860

Quick Start Guide

SOLO Temperature Controller

SLB4848 Series



This Quick Start Guide provides basic information on setting up the SOLO Basic temperature controller. For advanced setup visit the AutomationDirect web site at www.AutomationDirect.com.

Product Support

- For product support, specifications, and installation troubleshooting, a complete User Manual can be downloaded from the On-line Documentation area of the **AutomationDirect** web site.
- For additional technical support and questions, call our Technical Support team @ 1-800-633-0405 or 770-844-4200.



1 Safety Information

WARNING: To minimize the risk of potential safety problems, you should follow all applicable local and national codes that regulate the installation and operation of your equipment. These codes vary from area to area and it is your responsibility to determine which codes should be followed, and to verify that the equipment, installation, and operation are in compliance with the latest revision of these codes.

Equipment damage or serious injury to personnel can result from the failure to follow all applicable codes and standards. We do not guarantee the products described in this publication are suitable for your particular application, nor do we assume any responsibility for your product design, installation, or operation.

If you have any questions concerning the installation or operation of this equipment, or if you need additional information, please call us at 1-800-633-0405 or 770-844-4200.

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WARNING! Electric shock danger

- To prevent electric shock, do not touch the AC terminals while the power is supplied to the controller.

WARNING! This controller is an open-type temperature controller. Make sure to evaluate any dangerous application in which a serious human injury or serious property damage may occur.

- Always use recommended solder-less terminals: Fork terminal with insulation (M3 screw, width is 5.8 mm, hole diameter 3.2mm). Screw size: M3 x 5 (With square washer). Recommended tightening torque: 0.4 Nm. Applicable wire: Solid/twisted wire 14AWG to 22AWG.
- Protect the controller from dust or foreign objects to prevent controller malfunction.
- Do not modify or disassemble the controller.
- Do not connect anything to the "Not used" terminals.
- Make sure all wires are connected correctly.
- Do not install and/or use the controller in places subject to: (a) Dust or corrosive gases and liquid (b) High humidity (c) Vibration and shock (d) EMI / RFI (e) high temperature.
- Turn power off when wiring or changing a temperature sensor.
- Be sure to use wires that match the thermocouple types when extending or connecting the thermocouple wires.
- Use wires with correct resistance when extending or connecting a platinum resistance thermometer (RTD).
- Keep the wire as short as possible when wiring a platinum resistance thermometer (RTD) to the controller and route power wires as far as possible from load wires to prevent interference and induced noise.
- This controller is an open-type unit and must be placed in an enclosure away from high temperature, humidity, dripping water, corrosive materials, airborne dust and electric shock or vibration.
- Make sure power cables and signals from instruments are all installed properly before energizing the controller, otherwise serious damage may occur.
- To prevent electric shock, do not touch the terminals in the controller or try to repair the controller when power is applied.
- Use a soft, dry cloth to clean the controller. Do not use acid or alkaline liquids for cleaning.
- This instrument is not furnished with a power switch or fuse. Therefore, if a fuse or power switch is required, install the protection close to the instrument. Recommended fuse rating: Rated voltage 250 V, Rated current 1 A. Fuse type: Time-lag fuse
- Note: This controller does not provide overcurrent protection. Use of this product requires that suitable overcurrent protection device(s) must be added to ensure compliance with all relevant electrical standards and codes. (Rated 250 V, 15 Amps max). A suitable disconnecting device should be provided near the controller in the end-use installation.

2 General Description

AutomationDirect's SOLO Basic is a single loop temperature controller that can control heating or cooling processes. Depending upon the particular model of controller, the available outputs include relay, voltage pulse or current. On select models there are two alarm outputs available with nine selectable alarm types. SOLO Basic controllers have a single control output that can be used for control of a heating or cooling application. Models with alarm outputs can also be configured to use one of the alarm outputs as a second control output allowing both heating and cooling control or two stage heating or two stage cooling control. There are three types of control modes: PID, ON/OFF and Manual. SOLO Basic can accept various types of thermocouple and RTDs.

Other features include:

- Auto Tuning (AT) function with PID control
- 1/16 DIN panel size
- 2 line x 4 character 7-segment LCD display for Process Value (PV): Red color, and Set Point (SV): Green color
- Selectable display decimal point XXX.X or XXXX
- Selectable between °C and °F
- UL, CUL and CE agency approvals

3 Specifications

Specifications	
Input Power Requirements	100 to 240 VAC 50 / 60 Hz
Operation Voltage Range	85 to 264 VAC
Power Consumption	5 VA Max
Control Mode	PID, ON/OFF or Manual
Input Accuracy	TC temperature indication accuracy: $\pm(0.3\%$ of span + 1 digit) at 25°C ambient after 20 minutes warm up. Including NIST conformity, cold junction effect, A/D conversion errors and linearization conformity RTD temperature indication accuracy: $\pm(0.2\%$ of span + 1 digit)
Vibration Resistance	10 to 55 Hz, 10 m/s ² for 10 min, each in X, Y and Z directions
Shock Resistance	Max. 300 m/s ² , 3 times in each 3 axes, 6 directions
Ambient Temperature Range	32°F to 122°F (0°C to 50°C)
Storage Temperature Range	-4°F to 149°F (-20°C to 65°C)
Altitude	2000m or less
Relative Humidity	35% to 80% (non-condensing)
IP Rating	IP66: Complete protection against dust and powerful water jets from all directions. (**inside suitable enclosure)
Agency Approvals	UL, CUL, CE (UL file number E311366)
Pollution Degree	Degree 2 - Normally, only non-conductive pollution occurs. Temporary conductivity caused by condensation is to be expected.
Input Types	
• Thermocouple*	K, J, T, E, N, R, S, B, L, U, TXK (Sampling Rate: 100 ms / per scan)
• Platinum RTD	3-wire Pt100, JPt100 (Sampling Rate: 100 ms / per scan)
• Copper, Nickel RTDs	Cu50, Ni120 (Sampling Rate: 100 ms / per scan)
Control Output Options	
• Relay (R)	SPST max. 5A @ 250 VAC resistive load
• Voltage Pulse (V)	DC 12V \pm 15%, output current 40mA Max
• Current (C)	DC 4-20 mA output (sourcing) (Load resistance: Max 600 Ω)
Alarm Output Option	(2) SPST relays with shared common, 3A @ 250VAC resistive load

*Note: Use only ungrounded thermocouples.

** No corrosive gases

Selection Guide

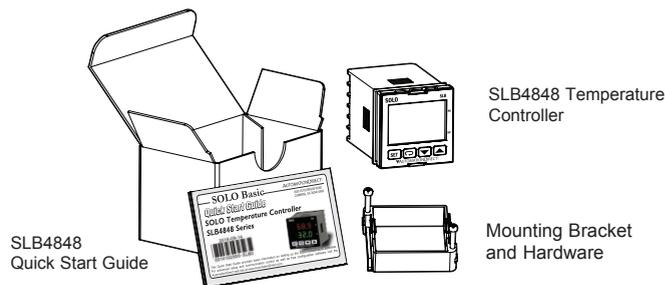
Part Number	Input Voltage	Output #1	Alarm #1* / Output #2**	Alarm #2*
SLB4848-R0	100 - 240 VAC	Relay - SPST	-	-
SLB4848-V0	100 - 240 VAC	Voltage Pulse	-	-
SLB4848-C0	100 - 240 VAC	Current	-	-
SLB4848-R2	100 - 240 VAC	Relay - SPST	Relay - SPST	Relay - SPST
SLB4848-V2	100 - 240 VAC	Voltage Pulse	Relay - SPST	Relay - SPST
SLB4848-C2	100 - 240 VAC	Current	Relay - SPST	Relay - SPST

*Alarm #1 and Alarm #2 have a shared common

** Alarm #1 can be configured to function as Alarm #1 or as Control Output #2

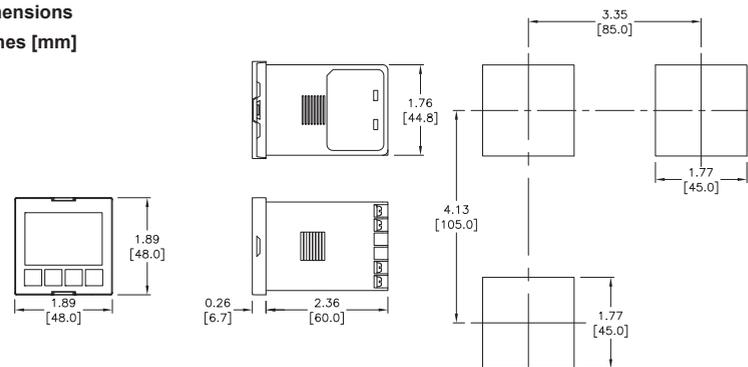
4 Box Contents and Unpacking Instructions

- Unpack the SOLO Basic temperature controller from its shipping carton. Included in the carton is the temperature controller, mounting bracket plus hardware and this Quick Start Guide.
- Inspect all equipment for completeness. If anything is missing or damaged, immediately call the **AutomationDirect** returns department @ 1-800-633-0405.
- Inspect the part number to ensure the model received matches the output type required.



5 Controller and Panel Cutout Dimensions

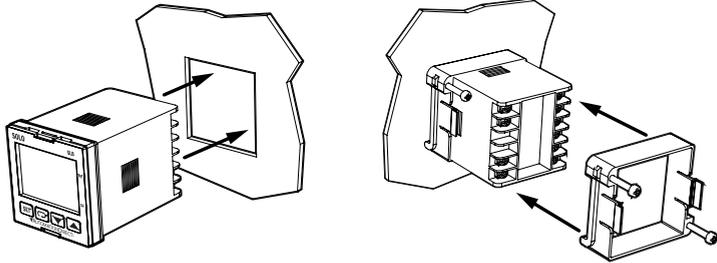
Dimensions
inches [mm]



6 Mounting Instructions

SOLO Basic temperature controllers can be mounted through a cutout in an enclosure or panel by using the dimensions shown in Section 5. The directions for mounting the controller through a cutout are:

1. Insert the temperature controller through the panel cutout.
2. Slide the M3X0.5 nut into the opening in the top of the mounting bracket and insert the M3X0.5 X 30mm mounting screw in the mounting bracket.
3. Insert the mounting bracket into the mounting groove at the left and right of the controller, and push the mounting bracket forward until the bracket stops.
4. Tighten both screws evenly to secure temperature controller in place (The screw torque should be 0.4 to 0.5 N-m)



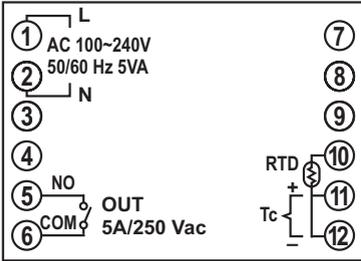
7 Terminal Identification

WARNING! Electric shock danger

To prevent electric shock, do not connect AC power to your device until all input and output connections are completed.

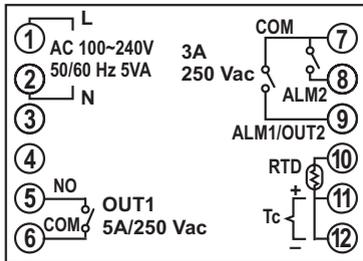
SLB4848-R0

(No alarm output)



SLB4848-R2

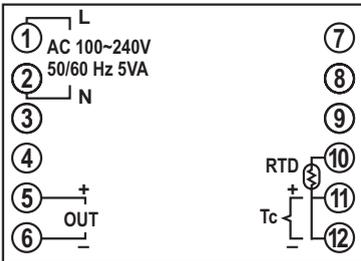
(2 sets of alarm outputs)



SLB4848-C0

SLB4848-V0

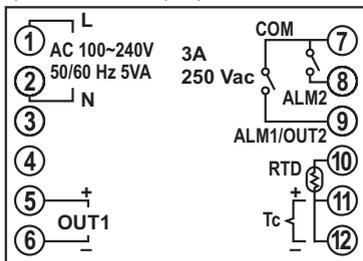
(No alarm output)



SLB4848-C2

SLB4848-V2

(2 sets of alarm outputs)



8 Display and Key Pad



PV Display: Display the process value or parameter type.

SV Display: Display the set point, parameter operation, read value, manipulated variable or set value of the parameter.

A/M: Auto-tuning/Manual indicator, flashes when the Auto-tuning operation is ON and is solid when in Manual mode.

OUT1/OUT2: Output indicator, lights when the output is ON.

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

1/2: Alarm output indicator, lights when one of the alarms is on.

Key Indicator: Key indicator lights when key lock is enabled.

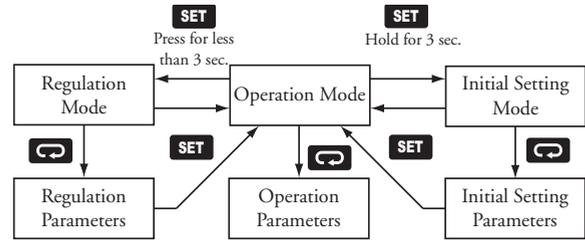
SET Set Button: Press this key to select the desired function mode and confirm the setting value.

Rotate Rotate Button: Press this key to select parameters within the function mode.

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

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

9 Key Pad Operation



The SOLO Basic temperature controller has three function modes: Initial Setting mode, Operation mode and Regulation mode. 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 input and output types for that particular model on the SV display. After three seconds, the controller will automatically proceed to the Operation mode main screen. 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 access the individual parameters for each function mode. Use the **Down** and **Up** 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.

10 Reset to Factory Default Instructions

All of the following set up instructions are for setting up a controller from the factory defaults. If the application for a controller needs to be changed, reset the controller to factory default using the following steps.

1. Press the **Rotate** button until the parameter **L00** appears. Use the **Down** button to select **L00**. Press the **SET** button.
2. Press and hold the **SET** and **Down** buttons simultaneously for three seconds and release.
3. Use the **Down** button to change the value on the SV display to **1357**. Press the **SET** button.
4. Display will change from **PASS** to **PAR-E**. Press **Down** button symbol to change value from no to yes and press **SET** button.
5. Display will be fully lit and then controller will reboot.

11 Thermocouple or RTD Input

1. Access the Initial Setup mode by pressing and holding the **SET** button for three seconds. In the parameter **TEMP**, use the **Down** and **Up** buttons to select the value that corresponds to the thermocouple or RTD type that will be attached to the controller. See the table below for specifications. Press the **SET** button to save the selected value. The controller will display the module information splash screen for three seconds and then return to the main screen.
2. Press the **SET** button for three seconds again. Press the **Rotate** button to access the **TEMP** parameter. Use the **Down** and **Up** buttons to select either **F** for Centigrade or **F** for Fahrenheit display. Press the **SET** button to save the selected value. Press the **SET** button again to go to the main screen.
3. Press the **SET** button for three seconds again. Press the **Rotate** button repeatedly until the **TP-H** parameter appears. Use the **Down** and **Up** buttons to set the maximum value of the operational temperature range. The SV value cannot exceed the TP-H value. Press the **SET** button to save the selected value. Press the **Rotate** button to access the **TP-L** parameter. Use the **Down** and **Up** buttons to set the minimum value of the operational temperature range. The SV value cannot be set lower than the TP-L value. Press the **SET** button twice to save the selected value and return to the controller main screen.
4. Press the **Rotate** button repeatedly until the parameter **SP** appears. Use the **Down** and **Up** buttons to select either **1** for a whole degree or **1** for a tenth degree temperature display. If tenth degree is selected the maximum temperature displayed (PV) will be limited to 999.9. Press the **SET** button twice to save the selected value and return to the controller main screen.
5. If the input temperature from the thermocouple or RTD needs to be adjusted, press the **SET** button for less than 3 seconds. Press the **Rotate** button repeatedly until the parameter **P00F** appears. Use the **Down** and **Up** buttons to adjust a positive or negative offset to the PV value displayed on the controller. Press the **SET** button twice to save the selected value and return to the controller main screen.

Thermocouple* Type and Temperature Range		
Input Temperature Sensor Type	LED Display	Temperature Range
Thermocouple TXK type	TXK	-238 ~ 1472°F (-150 ~ 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 (Pt100)	PT	-328 ~ 1562°F (-200 ~ 850°C)
Platinum (JPT100)	JPT	-148 ~ 752°F (-100 ~ 400°C)
Copper (Cu50)	CU	-58 ~ 302°F (-50 ~ 150°C)
Nickel (Ni120)	NI	-112 ~ 572°F (-80 ~ 300°C)

*Note: Use only ungrounded thermocouples.

12 Control Setup

Please choose the desired control mode and follow the instructions in that section. For example, to control heat in an oven, the Heating Loop with PID Control could be used by following the steps in 12-2. For a cooling operation like a freezer one could use Cooling Loop with ON / OFF Control in section 12-5.

To change the control mode, it is recommended to do a factory reset before setting up the new control mode. Please see section 10 of this document for instructions on how to complete a reset to factory defaults.

12-1 PID Control Setup

Note: PID options only available when control mode is set to PID.

Use the and buttons to set the desired setpoint and press to save before starting the auto-tune process

The parameters for PID can be auto-tuned using the parameter. Access this parameter by pressing the button for less than three seconds. Use the button to turn the auto-tune feature . Press the button to save the value. Optimal PID values are automatically determined with the auto-tune feature. PID operation can also be controlled by programming the individual , , and parameters. Access these parameters by pressing the button for less than three seconds and press the button repeatedly until the parameter appears. Use the and buttons to change the value for the Proportional band if desired and press the button to save the value. Press the button to access the parameter. Use the and buttons to change the value for the Integral time if desired and press the button to save the value. Press the button to access the parameter. Use the and buttons to change the value for the Derivative time if desired and press the button twice to save the value and return to the controller main screen.

12-2 Heating Loop with PID Control

1. Access the Initial Setup mode by pressing and holding the button for three seconds. Press the button repeatedly until the parameter appears. Confirm the default value is selected for PID control. Press the button to access the parameter . Confirm the default value is selected for controlling a heating loop. Press the button to return to the controller main screen.
2. Press the button to access the parameter . Verify that the default value is selected. Press the button to return to the controller main screen.
3. Refer to Section 12-1 of this Quick Start Guide to set up the PID control parameters.
4. If the temperature controller's output is discrete, access the regulation mode again by pressing the button for less than three seconds. Press the button repeatedly until the parameter appears. Use the and buttons to set the time period in seconds for the heating control. Press the button twice to save the value and return to the controller main screen.

12-3 Heating Loop with ON / OFF Control

1. Access the Initial Setup mode by pressing and holding the button for three seconds. Press the button repeatedly until the parameter appears. Use the and buttons to select for ON / OFF control. Press the button to save the value. Press the button to access the parameter . Confirm the default value is selected for controlling a heating loop. Press the button to return to the controller main screen.
2. Press the button to access the parameter . Verify that the default value is selected. Press the button to return to the controller main screen.
3. Press the button for less than three seconds to access the parameter . Use the and buttons to enter hysteresis. This is the amount the PV must go below the SV before the controller output turns on. Press the button twice to save the selected value and return to the controller main screen.

12-4 Cooling Loop with PID Control

1. Access the Initial Setup mode by pressing and holding the button for three seconds. Press the button repeatedly until the parameter appears. Confirm the default value is selected for PID control. Press the button to access the parameter . Use the button to select for controlling a cooling loop. Press the button twice to save the value and return to the controller main screen.
2. Press the button to access the parameter . Verify that the default value is selected. Press the button to return to the controller main screen.
3. Refer to Section 12-1 of this Quick Start Guide to set up the PID control parameters.
4. If the temperature controller's output is discrete, access the regulation mode again by pressing the button for less than three seconds. Press the button repeatedly until the parameter appears. Use the and buttons to set the time period in seconds for the cooling control. Press the button twice to save the value and return to the controller main screen.

12-5 Cooling Loop with ON / OFF Control

1. Access the Initial Setup mode by pressing and holding the button for three seconds. Press the button repeatedly until the parameter appears. Use the and buttons to select for ON / OFF control. Press the button to save the value. Press the button to access the parameter . Use the button to select for controlling a cooling loop. Press the button twice to save the value and return to the controller main screen.
2. Press the button to access the parameter . Verify that the default value is selected. Press the button to return to the controller main screen.
3. Press the button for less than three seconds to access the parameter . Use the and buttons to enter hysteresis. This is the amount the PV must go above the SV before the controller output turns on. Press the button twice to save the selected value and return to the controller main screen.

12-6 Manual Control

1. Access the Initial Setup mode by pressing and holding the button for three seconds. Press the button repeatedly until the parameter appears. Use the and buttons to select for manual control. Press the button twice to save the selected value and return to the controller main screen.
2. Press the button to access the parameter . Use the and buttons to set a value between and to control output directly. If the controller has a discrete output, a value of turns the output on 20% of the time. A value of would turn the output on 100% of the time. A manually controlled analog output value is a percentage of the analog signal. For example, if the controller has a 4-20mA current output, a setting of would mean that the output would be 4mA. The output would be 20mA with a setting of . Press the button to save the selected value. The same process can be followed for on units with alarms configured for dual output. Refer to Section 12-7 or 12-8.

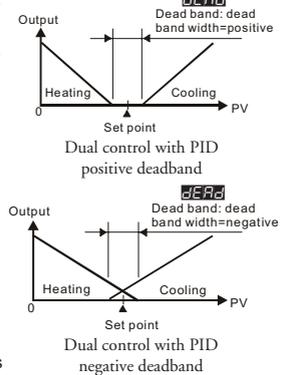
12-7 Dual Output with PID Control

Only available on the SOLO Basic units with alarms. When used in a dual output mode the output for Alarm 1 is reassigned as Output 2. Output 2 and Alarm 2 will share the same common in this configuration and should be taken into consideration when planning unit wiring.

1. Access the Initial Setup mode by pressing and holding the button for three seconds. Press the button repeatedly until the parameter appears. Confirm the default value is selected for PID control. Press the button to access the parameter . Use the or button to select for controlling a dual heating / cooling loop or a dual cooling / heating loop. The setting will assign the heating control to Output 1 and the cooling control to Output 2 and will assign the cooling control to Output 1 and the heating control to Output 2. Press the button twice to save the value and return to the controller main screen.
2. Press the button to access the parameter . Verify that the default value is selected. Press the button to return to the controller main screen.
3. Refer to Section 12-1 of this Quick Start Guide to set up the PID control parameters.

4. To adjust the control cycle for Output 1 access the regulation mode again by pressing the button for less than three seconds. Press the button repeatedly until the parameter or appears if heating or cooling is assigned to Output 1. Use the and buttons to set the time period in seconds for the control cycle of Output 1. Press the button to save the value. To adjust the control cycle for Output 2 press the button repeatedly until the parameter or appears if heating or cooling is assigned to Output 2. Use the and buttons to enter the cycle period in seconds for Output 2. Press the button twice to save the value and return to the controller main screen.

5. Optional regulation parameters can be programmed for dual output control. If this is desired, access the regulation mode again by pressing the button for less than three seconds. Press the button repeatedly until the parameter appears. This value allows the control selected for Output 2 to have a different proportional setting than the control selected for Output 1. The Output 1 proportional band setting is multiplied by the value to create a proportional band setting for Output 2. Use the and buttons to change this value if desired. Press the button to save the selected value. Press the button to access the parameter . Use the and buttons to enter a deadband zone value around the setpoint where the output is not affected by the proportional control value. If the PV remains within the deadband zone the output is not affected by the proportional control. The integral and derivative controls ignore the deadband setting and may cause the output to be on within the deadband zone. Press the button twice to save the value and return to the controller main screen.



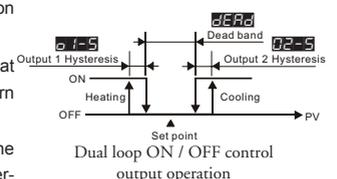
12-8 Dual Output with ON / OFF Control

Only available on the SOLO Basic units with alarms. When used in a dual output mode the output for Alarm 1 is reassigned as Output 2. Output 2 and Alarm 2 will share the same common in this configuration and should be taken into consideration when planning unit wiring.

1. Access the Initial Setup mode by pressing and holding the button for three seconds. Press the button repeatedly until the parameter appears. Use the and buttons to select for ON / OFF control and press the button to save the selected value. Press the button to access the parameter . Use the and buttons to select for controlling a dual heating / cooling loop or a dual cooling / heating loop. The setting will assign the heating control to Output 1 and the cooling control to Output 2 and will assign the cooling control to Output 1 and the heating control to Output 2. Press the button twice to save the value and return to the controller main screen.

2. Press the button to access the parameter . Verify that the default value is selected. Press the button to return to the controller main screen.
3. Press the button for less than three seconds to access the parameter . Use the and buttons to enter hysteresis for Output 1, the heating control in the example diagram. This is the amount the PV must go below, or above if Output 1 is setup for cooling, the SV before the controller output turns on. Press the button to save the selected value. Press the button to access the parameter . Use the and buttons to enter hysteresis for Output 2, the cooling control in the example diagram. This is the amount the PV must go above, or below if Output 2 is setup for heating, the SV before the controller output turns on. Press the button twice to save the selected value and return to the controller main screen.

4. Optional regulation parameters can be programmed for additional dual loop control. If this is desired, access the regulation mode again by pressing the button for less than three seconds. Press the button repeatedly until the parameter appears. Use the and buttons to enter a deadband zone value around the setpoint where the output is not on. The PV must go beyond the deadband range for either the heating or cooling output to turn on. Press the button twice to save the selected value and return to the controller main screen.



13 Alarm Outputs

For models equipped with alarms there are two alarm outputs. Each alarm can be programmed for one of nine different alarm types. To set up the first alarm output, press the **SET** button for three seconds. Press the **↵** button repeatedly until the parameter **AL1** appears. If the controller is configured for dual output control, parameter **AL2** is not available. Use the **▲** button to choose the set value for the desired alarm type. Refer to the chart below for alarm type information. Press the **SET** button to save the selected value. If additional alarm outputs are required press the **↵** button to proceed to **AL2**. Follow the same procedure to program the additional alarm. When the desired alarm(s) are programmed, press the **SET** button repeatedly until the controller returns to the main screen.

The alarm output limits are controlled by the parameters **ALnH** and **ALnL**, where "n" corresponds to the alarm output chosen. After selecting the desired alarm, press the **↵** button repeatedly until the parameter **ALnH** and/or **ALnL** appears. Use the **▲** and **▼** buttons to enter the high and/or low values for each alarm outputs selected. Press the **SET** button to save each selected value. Press the **SET** button again to return to the controller main screen.

For advanced alarm options **AL1a** / **AL2a** and alarm delay **AL1d** / **AL2d** please reference the parameter descriptions in chapter 3 of the user manual.

AL1 and **AL2** are both SPST resistive load 3A @ 250 VAC, normally open relay outputs with a shared common.

Set Value	Alarm Type	Alarm Output Operation
0	Alarm function disabled	Output is OFF
1	Deviation upper- and lower-limit: Alarm output activates when PV value is higher than the setting value SV+(AL-H) or lower than the setting value SV-(AL-L).	
2	Deviation upper limit: Alarm output activates when PV value is higher than the setting value SV+(AL-H).	
3	Deviation lower limit: Alarm output activates when PV value is lower than the setting value SV-(AL-L).	
4	Absolute value upper and lower limit: Alarm output activates when PV value is higher than the setting value AL-H or lower than the setting value AL-L.	
5	Absolute value upper limit: Alarm output activates when PV value is higher than the setting value AL-H.	
6	Absolute value lower limit: Alarm output activates when PV value is lower than the setting value AL-L.	
7	Hysteresis upper limit alarm output: Alarm output activates when PV value is higher than the setting value SV+(AL-H). The alarm output turns OFF when the PV value is lower than the setting value SV+(AL-L).	
8	Hysteresis lower limit alarm output: Alarm output activates when PV value is lower than the setting value SV-(AL-H). The alarm output turns OFF when the PV value is higher than the setting value SV-(AL-L).	
9	Disconnection Alarm: This alarm output is enabled if the sensor connection is incorrect or has been disconnected.	

Note: Alarm types 1-9 will enable the alarm output if a sensor disconnect or incorrect connection is detected.

14 Error Display Information

The chart below shows the possible error displays on the Solo Basic temperature controller.

Controller Error Display				
Display Position	Display	Meaning	Cause	Corrective Action
PV	no	No sensor input	The input terminals are open.	Check the input wiring. If the problem still exists, replace the sensor or the controller.
SV	font			
PV	Sen	Sensor type error	Temperature is out of range for sensor type	Check sensor type and its condition. If damaged or wrong, replace and update settings. Check actual condition to make sure temperature is within sensor range.
SV	Err			

Notes:

15 Parameter Default Settings

Parameter Default Settings		
Display	Description	Default Setting
1234	Use ▲ or ▼ to set temperature set point. Press ↵ to switch digits and SET to set value.	
r-s	RUN/STOP: Control setting RUN/STOP	RUN
SP	SELECT POINT: Decimal point setting (0: integer; 1: one decimal point)	0
LoC	LOCK: Setting lock mode (LOCK1: all; LOCK2: only SV changes are allowed)	OFF
AL1H	ALARM1 HIGH: Upper limit alarm 1 (display according to the setting in ALARM mode)	4.0
AL1L	ALARM1 LOW: Lower limit alarm 1 (display according to the setting in ALARM mode)	4.0
AL2H	ALARM2 HIGH: Upper limit alarm 2 (display according to the setting in ALARM mode)	4.0
AL2L	ALARM2 LOW: Lower limit alarm 2 (display according to the setting in ALARM mode)	4.0
OUT1	OUT1: Display and adjust output value of 1st output group	0.0
OUT2	OUT2: Display and adjust output value of 2nd output group (display when S-HC is set to a dual output mode)	0.0
OUT1A	OUT1 MAX.: Upper limit % of 1st output group	100.0
OUT1L	OUT1 MIN.: Lower limit % of 1st output group	0.0
OUT2A	OUT2 MAX.: Upper limit % of 2nd output group (display when S-HC is set to a dual output mode)	100.0
OUT2L	OUT2 MIN.: Lower limit % of 2nd output group (display when S-HC is set to a dual output mode)	0.0
INPt	INPUT: Set input type (refer to section 11 for a list of supported temperature sensors)	K
TEMP	TEMP. UNIT: Set temperature unit C/F	C
TEMPH	*TEMP. HIGH: Set up upper temperature limit (the upper limit setting is different for different types of sensors)*	1300
TEMPL	*TEMP. LOW: Set up lower temperature limit (the lower limit setting is different for different types of sensors)*	-200
CTRL	CONTROL: Select control modes (3 different modes: ON-OFF, PID, and MANUAL)	PID
S-HC	SELECT HEAT/COOL: Select heating, cooling or dual-output heating and cooling.	H1
AL1	ALARM1 SET: Set up Alarm 1 mode (refer to section 13 "Alarm Outputs")	0
AL1a	ALARM1 OPTION: Set up Alarm 1 options	0
AL1d	ALARM1 DELAY: Set up Alarm 1 delay	0
AL2	ALARM2 SET: Set up Alarm 2 mode (refer to section 13 "Alarm Outputs")	0
AL2a	ALARM2 OPTION: Set up Alarm 2 options	0
AL2d	ALARM2 DELAY: Set up Alarm 2 delay	0
AT	AT: Auto tuning (display when setting CTRL = PID/RUN)	OFF
P	P: Proportional Band (display when setting CTRL = PID automatically set after auto tuning)	30.0
I	I: Integral Time (display when setting CTRL = PID automatically set after auto tuning)	120
D	D: Deviation Time (display when setting CTRL = PID automatically set after auto tuning)	30
PD	PD OFFSET: PD offset when Integral = 0 to eliminate a consistent deviation (display when setting CTRL = PID automatically set after auto tuning)	50.0
OUT1S	OUT1 HYSTERESIS: Adjust Output 1 hysteresis (when CTRL = ON/OFF)	0
OUT2S	OUT2 HYSTERESIS: Adjust Output 2 hysteresis (when CTRL = ON/OFF)	0
OUT1H	OUT1 HEAT: Heating control cycle for Output 1 (when CTRL = PID/MANUAL)	Output type: C: 1 sec V: 5 sec R: 20 sec
OUT1C	OUT1 COOL: Cooling control cycle for Output 1 (when CTRL = PID/MANUAL)	
OUT2H	OUT2 HEAT: Heating control cycle for Output 2 (when CTRL = PID/MANUAL)	
OUT2C	OUT2 COOL: Cooling control cycle for Output 2 (when CTRL = PID/MANUAL)	
COEF	COEF: Proportional band coefficient of Output 1 against Output 2 (when CTRL = PID and when in dual output control)	1.00
DEAD	DEAD: Set up deadband (when CTRL is not set to MANUAL and when in dual output)	0
PV-F	PV FILTER: Set up input filter factor of PV	2
PV-R	PV RANGE: Set up input filter range of PV	1.00
PV-O	PV OFFSET: Adjust input compensation of PV	0
PV-G	PV GAIN: Adjust input gain of PV	0.000
OUT1A	ANALOG OUT1 MAX.: Adjust upper limit compensation for analog Output 1 (1 scale = 1 μ A)	0
OUT1L	ANALOG OUT1 MIN.: Adjust lower limit compensation for analog Output 1 (1 scale = 1 μ A)	0