

Arrow Springs

OWNERS MANUAL

Model ASC/4A Temperature Controller

15 Amps, 120 Volts

The **Model ASC/4A** is a digital set point controller with a single ramp and an automatic on/off feature. It allows you to ramp either up or down to a desired temperature and either hold that temperature indefinitely or turn off.

SET UP

First, make sure the controller is off by placing the toggle switch labeled **POWER** in the down (off) position. It is located on the front panel and is the lower of the two switches. Then, insert the thermocouple into the oven as described by the oven manufacture. The thermocouple is the temperature sensor that the controller uses to make its decisions whether to turn on or off the oven. It is the very tip of the thermocouple that senses the temperature and is it very important that the tip is well into the oven, not in the wall of the oven. If it is in the wall, the controller will be reading the wrong temperature and cause the oven to actually be hotter than the controller thinks it is. Next, plug the controller into an ordinary 15 or 20 Amp, 120 volt electrical outlet, and then the oven into the controller.

OPERATING

The controller has three features that are all accessed through the three flat buttons on the face of the controller. These features are Set Point, Ramp Rate and Automatic ON/OFF. Set Point is the temperature that you want the oven to go to. Ramp Rate is the rate at which you want the oven to either heat up or cool down. The Automatic ON/OFF feature, when set to ON, holds the oven at the Set Point temperature indefinitely and when set to OFF, turns the oven off when the Set Point temperature is reached. These features are only accessible in the order as listed above.

To access the features, press and hold the **SEL** (Select) button. After about three seconds the display will change to showing "S.P.", which stands for Set Point. Let go of the button and the display will show the Set Point temperature that is currently set. If you hold the button for too long a period of time, the display will revert back to showing the oven temperature. If after letting go of a button you delay too long while modifying any of the features, the display will automatically revert back to displaying the temperature and the value that was in the display just before it reverted will be saved as the new value. After the set point is displayed you can change it by using the up and down arrow buttons. The up and down arrow buttons will accelerate. In other word, the longer you hold down an arrow button, the faster the display will change. After you have made a change, press the **SEL** button again to store the new Set Point temperature. You will hear a beep indicating that a change has been made. The new set point temperature will be showing on the display. Press the **SEL** button a second time to advance into Ramp Rate feature. If you did not make a change, you will not hear a beep and the controller will go directly into the Ramp Rate feature with just a single press of the **SEL** button. If you do not press the **SEL** button, the display will revert to showing the oven temperature within one minute. Any change you may have made will automatically be saved.

While you were pressing the **SEL** button that enters the controller into the Ramp Rate programming the display will show "rA. r.", which stands for Ramp Rate. This indicates that when you release the button the display will then show the ramp rate, which is the rate in temperature change that you want the oven to go through on its way to the Set Point temperature. Only press the **SEL** button momentarily or the display will change from "rA. r." back to "S.P." and you will need to press the **SEL** button again to get back to programming the Ramp Rate.

Change the Ramp Rate, as you did the set temperature, by using the up and down arrow buttons. The rate change is in degrees Fahrenheit per minute. For example, if the ramp rate is set to 10° per minute, the set

temperature is set to 670° F, and lets say that the temperature is 70° F inside the oven, the controller will make the oven heat up to 80°F after one minute and after one hour to 670° F. To calculate degrees per hour, multiply by 60. 10° per minute is the same as 600 ° per hour. If the rate is set to "FuLL", the controller will not control the ramp rate, but will let the oven heat up or cool down at its maximum capability. "FuLL" is located where you would expect to find 0.

After you have made a change in the Ramp Rate, press the **SEL** button to store the new rate. You will hear a beep indicating that a change has been made. The new ramp rate will be showing on the display. Press the **SEL** button a second time to advance into the "Function" options. If you did not make a change, you will not hear a beep and the controller will go directly into Function feature with just a single press of the **SEL** button. If you do not press the **SEL** button, the display will revert to showing the oven temperature within one minute. Any change you may have made will automatically be saved.

Note that while you were pressing the **SEL** button that enters the controller into the Function programming the display will show "Func.", which stands for Function. This indicates that when you release the button the display will then show the currently set function of either "oN" or "oFF". Only press the **SEL** button momentarily or the display will change from "Func." back to "rA. r." and you will need to press the **SEL** button again to get back to programming the Function feature. When the Function is set to "oN" the controller will automatically hold the temperature in the oven at the Set Point temperature indefinitely. When the Function is set to "oFF" the controller will automatically shut off the oven when the temperature in the oven reaches the Set Point temperature.

After you have made a change in the Function, press the **SEL** button to store it. You will hear a beep indicating that a change has been made. The new function will be showing on the display. Press the **SEL** button a second time to return to displaying the oven's temperature. If you did not make a change, you will not hear a beep and the controller will go directly into showing the oven temperature with just a single press of the **SEL** button. While pressing the **SEL** button the display will show "----". If you do not press the **SEL** button, the display will revert to showing the oven temperature within one minute. Any change you may have made will automatically be saved.

The controller's toggle switch labeled **POWER** is used to turn on and off power to both the controller and the oven. The controller is capable of ramping the temperature, either up or down, at any rate from .1° to 999.9° per minute or the rate can be set to full, which allows the oven to heat up or loose heat at the ovens maximum capability. The controller comes preset from the factory at 940° F for the Set Point, the Ramp Rate set to full and the Function set to on. The temperature is displayed in degrees Fahrenheit. The display shows the temperature followed by the letter F for temperatures below 1000 degrees. At 1000 degrees and above the letter F is dropped. The maximum range of the controller is 2500 degrees.

There is a second way to program the Set Temperature. It is as follows: While the display is showing the oven's temperature, press an up or down arrow button. Note that while the button is held down that the display will show "S.P.", which stands for Set Point, indicating that when you release the button the display will then show the Set Point temperature, which is the temperature that you want the oven to go to. Use the up and down arrow buttons to set the desired Set Point temperature. The longer a button is pushed the faster the numbers will change. When you have changed the Set Point temperature to the desired temperature, you can store the new number in one of two ways. Press the **SEL** button or don't press any button for about three seconds. In either case, you will hear a beep and the display will revert to showing the oven temperature. The beep indicates that the Set Point has changed. If you don't hear a beep when the display reverts back to the oven temperature then there was no change in the Set Point temperature. If you want to verify that the Set Point temperature has changed, once again press an arrow button. As before, press the **SEL** button or wait for about three seconds and the display will revert to showing the oven temperature. If you did not change the set point temperature, you will not hear a beep.

The set temperature, the ramp rate and function can be reviewed at any time without changing their values by only using the **SEL** button.

If the set temperature is higher than the oven temperature, the controller will send electrical power to the oven and a red panel light comes on. When the light goes out, the controller is not sending power to the oven. It is important to remember that the controller will never automatically turn off if Function is set to "oN".

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There are two ways to be sure that the controller does not allow electricity to go to the oven. One is to turn off the controller by placing the toggle switch labeled **POWER** in the down (off) position. This completely turns off the controller. The other way is to place the toggle switch labeled **RELAY CUTOUT** in the down (relay disabled) position. This will still allow electrical power to run the controller, but will not let the controller actuate the relay which sends electricity to the oven. Using the **RELAY CUTOUT** switch allows you to turn off the electrical power to the oven without interrupting the controller while it is running. This is especially helpful when entering an oven while it is in operation and electrical shock is possible.

Note: It is generally better to change the Ramp Rate first and then change the Set Point followed by the Function. If, for instance, the oven has been holding at 940° F and you now want to lower the temperature down to a new Set Point at the rate of 5 degrees per minute (300 degrees per hour). If you were to change the Set Point and the Ramp Rate was set at "FuLL", the controller would have the oven essentially turned off until it reached that temperature or until you set in a new ramp rate. The quick drop in temperature would probably not be desirable. If you change the Ramp Rate first and then the Set Point, the controller will hold the oven at 940° F until the Set Point is changed. If Function is set to "oFF" and the controller is currently holding at the Set Point temperature the controller will end the program. Always change the Function last.

When Function is set to "oFF" and the Set Point temperature is reached the controller will end the program and turn off the oven. To restart the controller you must turn off the controller by placing the **POWER** switch in the down (off) position and then back in the up (on) position.

To prevent electrical shock or burns, always turn off the controller or disable the relay before opening any oven. Even if you were to set the Set Point below room temperature while Function is set to "oN" and the ovens temperature is at room temperature, the controller might still send electrical power to the oven when the ovens door is opened and a sudden draft of cool air rushes in.

The **POWER** switch contains a fuse to protect the temperature controller circuitry. The switch controls power to the temperature controller. To check the fuse, place the lever in the down (off) position, gently push the lever in and rotate it about 1/8 turn counterclockwise until it stops. The lever can now be pulled out revealing the fuse. If the fuse requires replacing, use a 120 volt fuse with an amperage rating of 1 or 2 amps. Reverse the procedure to reinstall the fuse and lever.

If the controller display flashes between "EEEE" and "SEn", the thermocouple is either broken or its connection is loose.

EXAMPLES

The Controller is set to "FuLL" for the Ramp Rate and the Function is set to "oN".

The display flashes between the actual temperature in the oven and the Set Point. When the oven reaches the Set Point temperature the controller holds that temperature indefinitely. When the Ramp Rate is set to "FuLL" the controller does not control the rate at which the oven either increases or decreases, but allow the oven to reach the Set Point as fast as it is capable of.

The Controller is set to a specific number for the Ramp Rate and the Function is set to "oN".

The display flashes between the actual temperature in the oven and the temperature that the controller calculates that the oven should be at during the ramp. For example, the starting temperature is 70°F and the Ramp Rate is 10° per minute, the display will start by alternating between 70F and 70. After a moment the controller will send electrical power to the oven. The temperature will start to rise and the temperature that the oven is at and what it should be at during the ramp will alternate on the display. After one minute the display should flash between the actual temperature in the oven and the temperature the oven should be which is 76F and 76. The oven temperature might be different than what it should be. The controller needs a short while to learn the heating characteristics of the oven. The display might read after one minute 75F and 76 indicating that the actual temperature is 75°F but should be at 76°F. When the ramp reaches the Set Point temperature the display will

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alternate between the actual oven temperature and the Set Point temperature. Because Function is set to "oN" the controller will hold the oven at the set temperature indefinitely.

The Controller is set to "FuLL" for the Ramp Rate and the Function is set to "oFF".

The display flashes between the actual temperature in the oven and "EEEE". When the oven reaches the Set Point temperature the controller will end the program and turn off the oven. The display will then only show the actual temperature in the oven. To restart the controller you must turn off the controller by placing the **POWER** switch in the down (off) position and then back in the up (on) position.

The Controller is set to a specific number for the Ramp Rate and the Function is set to "oFF".

The display flashes between the actual temperature in the oven and the temperature that the controller calculates that the oven should be at during the ramp as in the second example. When the oven reaches the Set Point temperature the controller will end the program and turn off the oven. If for some reason the oven does not reach the Set Point temperature the controller will continue to calculate Ramp Rate past the Set Point and display it. When the Set Point temperature is finally reached the controller will end the program and turn off the oven. The display will then only show the actual temperature in the oven. To restart the controller you must turn off the controller by placing the **POWER** switch in the down (off) position and then back in the up (on) position.

GLOSSARY

OVEN

Any heating chamber. Includes kilns, annealers and furnaces.

PROGRAM

The actions the controller takes that includes ramping the temperature in an oven to a Set Point and then either staying there or turning off.

RAMP

It is the continual increase or decrease in temperature.

RAMP RATE

It is the amount of increase or decrease in temperature over a given amount of time.

SET POINT

The temperature at which you have the controller go to.

SOAK

Means that an oven is held at a steady temperature.

THERMOCOUPLE

The temperature sensor or probe.

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