Thermo Scientific Programmable Temperature Vacuum Oven

Operating Manual 057-127-00 Rev. 0

Part of Thermo Fisher Scientific

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Models covered in this manual		
Catalog number	**Model number**	**Voltage**
3618PDT	6268	120V
3618P	6275	120V
3618P-1	6276	240V
3618-1PDT	6278	240V

MANUAL NUMBER 057-127-00 (7006268)

REV	ECR/ECN	DATE	DESCRIPTION	By
0	--	3/31/10	Transfer to Marietta (was 057-127-00 7/21/08)	ccs

Important Read this instruction manual. Failure to read, understand and follow the instructions in this manual may result in damage to the unit, injury to operating personnel, and poor equipment performance. ▲

Caution All internal adjustments and maintenance must be performed by qualified service personnel. ▲

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Important operating and/or maintenance instructions. Read the accompanying text carefully.

Potential electrical hazards. Only qualified persons should perform procedures associated with this symbol.

Equipment being maintained or serviced must be turned off and locked off to prevent possible injury.

Hot surface(s) present which may cause burns to unprotected skin, or to materials which may be damaged by elevated temperatures.

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Section 1 Description

Programmable Temperature Vacuum Ovens are designed for drying media under carefully controlled conditions - in a normal atmosphere, a vacuum of up to 30-inches Hg, or an inert gas atmosphere.

The oven is primarily used for desiccating, vacuum embedding, plating and electronic component processing. Non-corrosive, nonflammable gases such as nitrogen and carbon dioxide can be used in the oven.

Increasing the versatility of the oven is a microprocessor-based programmable-controller which allows the user to initiate a series of ramp and soak cycles. Other features include a direct reading vacuum gauge, independent purge and evacuate valves allowing the flexibility to purge or introduce inert gases into the system, and an independent user-controlled hydraulic thermostat which prevents the oven from exceeding a maximum temperature.

All of the controls are located on the front panel.

The radiant wall heat, with no internally exposed heaters, provides uniform heat while maintaining chamber space.

The silicone door gasket assures a tight seal at all vacuum levels. A high strength tempered glass window, fully protected by a safety shield allows full view of oven contents. Two aluminum shelves provide good heat conduction to samples and are removable for easy cleaning. 3-inches of glass wool insulation throughout provides optimum temperature uniformity.

The chamber of the unit is not designed for exposure to concentrated solvents, oils, concentrated acids or dilute sodium hydroxide.

Note When operating in a vacuum, there is little transfer of heat from the evacuated chamber interior to objects within the chamber unless they are resting directly upon one of the shelves - do not put insulating material between a shelf and a vessel being heated. ▲

Section 2 Safety Information

Your Programmable Temperature Vacuum Oven has been designed with function, reliability, and safety in mind. It is your responsibility to install it in conformance with local electrical codes. It is most important that the user follow installation instructions exactly as written. Failure to do so is likely to lead to improper operation, erroneous calibrations and possible damage to the equipment. Do not attempt operation without this information.

Section 3 Specifications

Electrical Requirements

3618P, PDT: 120 VAC, 50/60 Hz, 12.0 A, 1600 W

3618P-1, -1PDT: 240 VAC, 50/60 Hz, 6.7 A, 1600 W

Temperature Range

Ambient +5°C to 220°C

Chamber Dimensions

14"W x 20"D x 14"H (36 x 51 x 36 cm)

Overall Dimensions:

25"W x 25"D x 22"H (64 x 64 x 56 cm)

Volume

2.3 cubic feet (65.1 liters)

Shipping Weight

300 lbs. (136 kg)

Environmental Conditions

Operating: 15°C to 40°C; 20% to 80% RH, non-condensing.

Installation Category II (overvoltage) in accordance with IEC 664.

Pollution Degree 2 in accordance with IEC 664.

Altitude Limit: 2,000 meters

Storage: -25°C to 65°C, ...10% to 85% RH

Section 4 Unpacking and Installation

The shipping carton should be inspected upon delivery. When received, carefully examine for any shipping damage before unpacking. If damage is discovered, the delivering carrier should both specify and sign for the damage on your copy of the delivery receipt.

Open the carton carefully, making certain that all parts are accounted for before packaging materials are discarded. After unpacking, if damage is found, promptly report it to the carrier and request a damage inspection promptly.

Important Failure to request an inspection of damage within a few days after receipt of shipment absolves the carrier from any liability for damage. You must call for a damage inspection promptly. ▲

Location

Place the unit where it will be operated, away from drafts and wide variations in ambient temperature. It should be near a power source that matches the unit nameplate requirements. Allow clearance around the unit for free air convection, hose/accessory attachment and user-access. DO NOT put the oven on top of or underneath another oven, or on a combustible surface.

Hose Connections

Connect a 1/4-inch OD hard tubing to the fitting on the control panel that is marked "EVACUATE." Connect the other end of the hose to a vacuum pump.

If operation will include replacing the vacuum in the chamber with an inert gas such as carbon dioxide or nitrogen, connect a 1/4-inch ID flexible hose to the right hose connector that is marked "PURGE" and to the regulator for the gas supply. DO NOT use combustible, flammable or corrosive gases.

Electrical Power

Note Disconnect unit from the power source when not in use. ▲

Caution Disconnect plug from electrical outlet before attempting any maintenance or repair on this unit. ▲

The unit is supplied with a 3-wire line cord. It should be plugged into an outlet supplying the correct voltage for the unit and designed for 3-prong plugs.

For an outlet designed to accept 2-prong (ungrounded) plugs, the best recommendation is to have a qualified electrician replace it with a new grounded outlet.

If a plug must be installed, use only the 3-prong grounded type, rated for the unit load requirements and matching the power outlet. Make sure the green ground wire is secured to the plug ground post.

Turn the power switch to the OFF position and insert plug into an outlet meeting the electrical requirements of the unit's nameplate.

Section 5 Features

1. POWER SWITCH: Power is on to the unit when this switch lamp is lit.

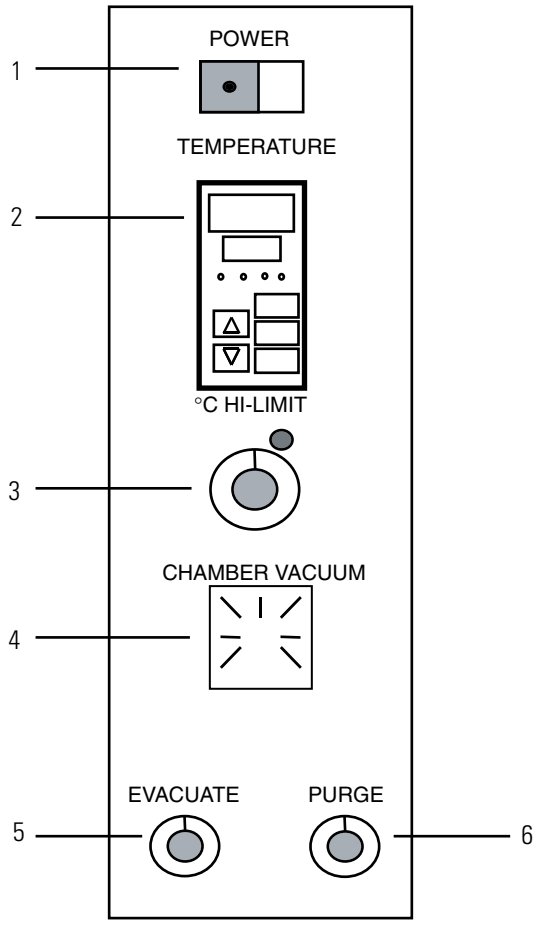
2. PROGRAMMABLE CONTROLLER: Includes: Upper digital display which shows the actual chamber temperature and parameter values, when powering up, the display is blank for 3 seconds; Lower digital display shows the selected setpoint temperature and menu parameters; Programming; Auto-tuning (automatic tuning); Profile; and Calibration offset.

3. HI-LIMIT THERMOSTAT: Enables the user to establish a temperature above which the heaters become inoperative if the programmer-controller experiences a malfunction for any reason.

4. VACUUM GAUGE: Depending on the model ordered, the vacuum gauge displays chamber vacuum level in inches of mercury or TORR units. In the case of Model 3618P (shown), this area on the control panel is occupied by a square analog gauge.

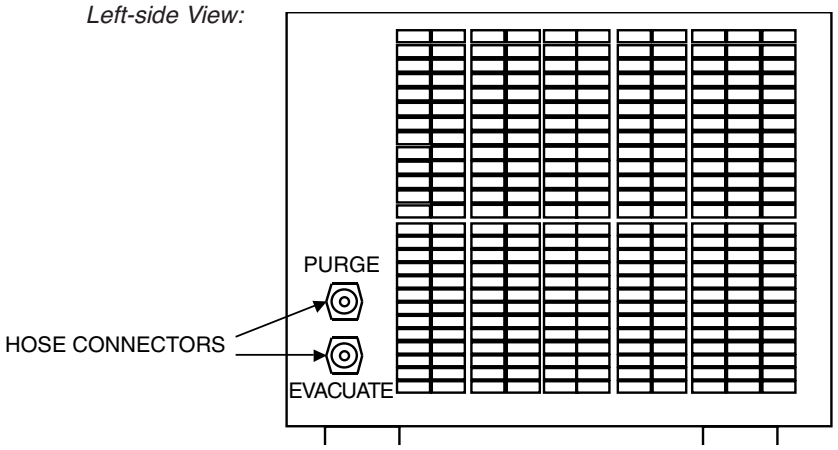
5. EVACUATE CONTROL: Draws, holds or releases a vacuum.

6. PURGE CONTROL: Introduces atmospheric air or an inert, nonflammable gas into the oven.



Vacuum/Purge Connections

There are two hose connections on the back of the unit (left hand side): one is marked "Evacuate" for connection to vacuum pump (not furnished) and the other is marked "Purge."



Section 6 Operation

Caution Do not use in the presence of flammable or combustible materials or explosive gases. Do not use in the presence of pressurized or sealed containers - fire or explosion may result, causing death or severe injury. ▲

Caution Do not heat any substance above a temperature which will cause it to emit toxic fumes - death or severe injury may result. ▲

Hi-Limit Thermostat

The hi-limit thermostat protects the contents of the chamber by setting an upper temperature limit beyond which the chamber cannot operate.

After the operating temperature has been established with the programmer-controller, rotate the hi-limit thermostat counterclockwise until the hi-limit status lamp lights; then rotate the thermostat clockwise approximately 5° beyond the point at which the status lamp goes off - this establishes the hi-limit setpoint.

Control Atmospheric Pressure in Chamber

There are two valves for control: one is marked "Evacuate" to initiate and control vacuum levels and the other is marked "Purge" to return the chamber to ambient conditions or inject an inert, nonflammable gas.

Maintain Proper Vacuum Level

The vacuum level will decrease slightly over a period of time. To bring it back up, rotate the vacuum/vent valve to "EVACUATE" and start the vacuum pump. When the vacuum gauge again shows the desired level, rotate the vacuum/vent valve to the setting marked "CLOSED" and shut off the vacuum pump.

Releasing the Vacuum

If the vacuum is to be replaced by ambient air, disconnect any tubing attached to the hose connector marked "PURGE" and rotate the vacuum/vent valve to its "PURGE" setting.

Purging the Chamber with Inert Gas

Caution Do not pressurize the chamber above atmospheric pressure - the oven will not withstand a positive internal pressure. When the vacuum gauge reads zero, shut the gas off. ▲

Use only a non-combustible, nonflammable, non-corrosive gas - such as nitrogen or carbon dioxide—if application requires replacing the vacuum with an inert gas.

Connect ¼ inch OD (6mm) hard tubing to the connector marked "PURGE" and connect the other end of the tubing to the regulator at the inert gas source.

Start the gas flowing at no more than 5 PSI. Rotate the vacuum/vent valve to the "PURGE" position and shut off the regulator when the vacuum gauge reads zero (normal atmospheric pressure).

The oven does not require very much gas to fill the chamber. Interior volume is 2.3 cubic feet.

Unloading the Oven

When the bake is completed and the vacuum has been released or replaced as described earlier, turn the power switch to OFF.

Programmable Controller

PROGRAMMING:

5 touch-type keys are used to access parameters for developing programs.

AUTO-TUNING:

Automatic tuning eliminates complicated and time-consuming manual tuning procedures.

PROFILE DESIGN:

The controller allows the user to develop a profile consisting of ramp from current setpoint to end setpoint and a soak period. Up to 4 profiles with a maximum of 6 steps each can be created. Profiles can be linked together.

CALIBRATION OFFSET:

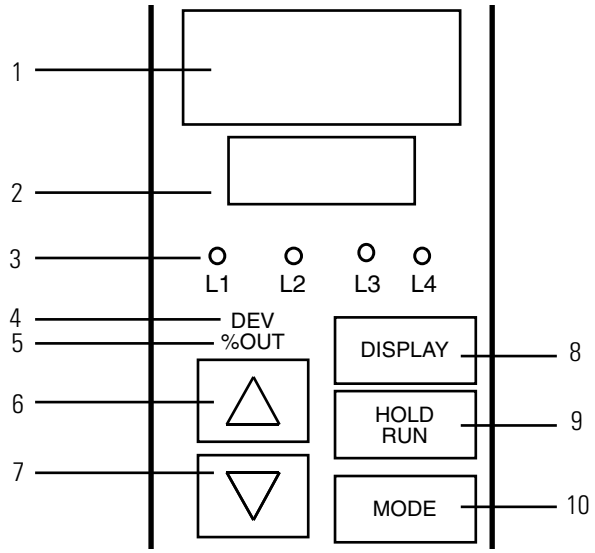
Allows the user to calibrate the upper display to match the actual chamber temperature.

Note DEV LED is lit when deviation information is displayed. ▲

Note %OUT LED is lit when output is displayed. ▲

Programmable Controller (continued)

1. UPPER DISPLAY: 4-digit display indicating actual oven temperature in addition to parameter values. When powering up, this display is blank for 3 seconds.
2. LOWER DISPLAY: 4-digit display indicates the setpoint and menu parameters.



3. L1 LED: When lit, indicates heaters are on.
4. DEV LED: When lit, the deviation from the current setpoint is shown in the lower display.
5. %OUT LED: When lit, the current percent output is shown in the lower display.
6. UP KEY: Increases the value of the displayed parameters. A quick press increases the value by one. Holding this key down increases the value at a rapid rate. New data is self-entering in 5 seconds.
7. DOWN KEY: Decreases the value of the displayed parameters. A light touch decreases the value by one. Holding this key down decreases the value at a rapid rate. New data is self-entering in 5 seconds.
8. DISPLAY KEY: On power-up, the controller displays the setpoint value in the lower display. Pressing the DISPLAY key once enters the display loop. The following parameters are displayed after pressing and releasing the key:
   - SETPOINT: On power-up or to return to normal display after using MODE key.
   - DEVIATION: Displays the difference (in degrees) between the actual oven temperature and the setpoint.
   - PERCENT OUTPUT: Displays the current percent of output power to the heaters.
   - UNITS: Indicates what temperature units (°C or °F) the upper and lower displays are indicating (factory set at °C).
9. HOLD/RUN KEY: Used to run or halt a profile.
10. MODE KEY: Steps the control through the operating menu; also, enters data changes automatically before proceeding to next parameter.

Non-Ramping Setpoint Operation

After initial power-up or when not running a program, the upper display will show the current oven temperature and the lower display will show the current setpoint. Use the UP or DOWN arrow keys to adjust the lower display to the desired operating temperature.

Auto-Tuning

Note Use only if control is unstable. ▲

Note Execute auto-tuning upon first use of the unit. It does not need to be done upon subsequent setpoint changes. However, if the controller operation becomes unstable, auto-tuning should be done again. ▲

Using the UP or DOWN arrow keys, select a setpoint at or near the operating temperature which will be used for the majority of procedures. Allow time (approx. 1 to 2 hours) for chamber temperature to stabilize.

1. Press the MODE key until AUt appears in the lower display.
2. Use the UP or DOWN arrow key to select Pid.
3. Press the MODE key, then the DISPLAY key. While the controller is in the tuning mode, the lower display alternates between the setpoint and tunE. The time frequency between alterations is 1 second.
4. When tuning is complete, the displays return to their prior state and AUt returns to OFF.
5. To abort auto-tuning, reset the AUt prompt to OFF, or cycle power off and on.

Offset Calibration

Temperature calibration can be accomplished using the controller, a known and accurate thermocouple (Type-T or -K) sensor, and a digital thermometer.

1. Insert thermocouple sensor and position it so that it is in the approximate center of the unit.
2. Set the oven temperature to the desired setpoint.
3. Allow the temperature to stabilize for at least 2 hours. This allows interior surfaces to reach thermal equilibrium.

Offset Calibration (continued)

4. Compare the readout on the digital thermometer with that of the controller. If different proceed as follows:

5. Press and hold the UP and DOWN arrow keys together for 3 seconds until the lower display shows Set and the upper display InPt. Press and release the MODE key until the lower display shows CAL1.

6. Using the UP and DOWN arrow keys, adjust the upper display to the value which will make the controller readout match the reading of the digital thermometer. An example of how this might be done is shown in the following:

Digital Temp. Reading = 65°C	Digital Temp. Reading = 55°C
Upper Display = 60°C	Upper Display = 60°C
ADD OFFSET VALUE = +5°C	SUBTRACT OFFSET VALUE = -5°C

7. After completion of offset adjustment, press DISPLAY key to return to temperature displays. Offset values are entered automatically.

Note It may be necessary to repeat this procedure whenever the setpoint is changed ±50°C or more. ▲

Programming the Controller

Note When creating a new program, it is possible to use values which exceed the capabilities of the unit, especially when ramping up or down to a specific temperature. Heating and cooling rates of the oven will vary according to load and ambient conditions. However, a ramp of approximately 2.0°C per minute is about the maximum rate. ▲

Note When viewing the program menu, the controller automatically will revert to the display loop if no keys are pressed before one minute has elapsed. ▲

The best way to learn how to program the controller is to follow an actual example. A step-by-step walk-through of a basic program follows here.

Once familiar with the program features, it will be much easier to modify or create programs to control a particular application.

When developing a program, use the charts that follow at the end of this section, see SAMPLE CHARTS - a master for making copies. The charts that are developed can also be saved to form a record for reference purposes.

Programming the Controller (continued)

In critical applications, a dry run should be made in order to insure that the oven performs satisfactorily.

Before entering a program into the controller's memory, it is important to review the program menu as outlined in the steps that follow:

1. Enter the program menu by pressing the MODE key until, OPEr, appears in the lower display.

2. Use the UP or DOWN key to select, Prog, in the upper display. Press the MODE key to enter the program menu.

3. The lower display will show, FiLE, and the upper display will show 1. As the UP arrow key is pressed and releaseed, the upper display will advance to FiLE 2, 3 and 4. This allows the selection of any of the 4 available files to run or review. Use the DOWN arrow key to set the upper display to 1.

4. Press and release the MODE key. The lower display will show StEP and the upper display will indicate 1. This is the first step in the file to be edited. As the UP arrow key is pressed and released, the upper display will advance to Steps 2, 3, 4, 5 and 6.

   This allows for editing or review of each of the 6 steps in the selected profile. Use the UP or DOWN arrow key to set the upper display to 1.

5. Press and release the MODE key. The lower display will show StYP (Step Type).

   The 5 possible Step Type choices can be accessed by pressing the UP or DOWN arrow keys and include:

   - StPt—Setpoint Step: There are two parameters associated with the setpoint step:

   - SP—SetPoint: This represents the target temperature the unit will achieve.

   - rAtE—Rate: This indicates the rate at which the setpoint changes in degrees per minute.

Programming the Controller (continued)

- SoAh - Soak: The number of hours, minutes and seconds that the selected setpoint will be maintained. Hours are adjustable from 0 to 23 while minutes and seconds are adjustable from 0 to 59.

  Also displayed under the Soak parameter is Wpr that should be in the dSbL (default) value.

  When in the Soak parameter, press and release the MODE key to view the above.

- End - End: Selects the state of the control when a profile is concluded. There are 2 choices available:

  1. HoLd: The temperature will be maintained at the same point as selected in the setpoint step.

  2. OFF: The heating control will be turned off and OFF will appear in the lower display.

  Set, press and release the MODE key. End will now appear in the lower display. Use the UP arrow key to toggle between HoLd and OFF.

The next 2 step types are visible only if the step number is set to a value greater than 1.

- JL—Jump Loop Step. This parameter commands the controller to jump backward to a prior step in the profile. There are 2 choices in the JL step:

  (1) JF—Jump File: Jumps to a selected file value that is not equal to the current file.

  (2) JS—Jump Step: This parameter allows the selection of a previous step in the profile that can be jumped to in the range from 1 to 5.

  (3) JC—Jump Count: This permits selecting the number of times the controller jumps to the step specified in JS (Jump Step). The range is from 0 to 255.

To set the Jump Loop sequence, press and release the MODE key while in the JL step type. The lower display will show JF.

Use the UP or DOWN arrow key to indicate the desired file to which to jump.

Note The selection of 0 will produce an infinite number of jumps. ▲

Programming the Controller (continued)

Press and release the MODE key. The low display will show JS. Use UP or DOWN arrow key to indicate the desired step to which to jump. Note that jumps cannot move forward, ONLY backwards.

Once the JS (Jump Step) parameter has been set, press and release the MODE key. The lower display should show JC (Jump Count). Use the UP or DOWN arrow key to set the upper display to the number of times the controller will jump to the step selected in the JS (Jump Step) parameter. Note from (2) above that the range is from 0 to 255 and selecting 0 produces an infinite number of jumps.

- LFiL - Link File. This parameter allows linking together of files, 1-4.

  To set this parameter, press and release the MODE key while in the LFiL (Link File) step type. The lower display will show LFiL. Use the UP or DOWN arrow key to select the file number to which the current file being worked on is controller will advance to the first step of the file to be linked to once the step with LFiL has been reached. A new file will now consist of a combination of 2 files.

This completes the review of the programming parameters. To exit the program menu, press and release the DISPLAY key.

Sample Program

To proceed with entering a sample program, please refer to the Sample Program Charts at the end of this section - make copies of the blank chart for entering the program steps.

Following is a brief summary of what we want the unit to do. The program will start with the unit at ambient temperature.

Step 1. Ramp at a rate of 1°C per minute to a 100°C target temperature.

Step 2. Soak at 100°C for 1 hour and 30 minutes.

Step 3. Ramp at a rate of 2°C per minute from 100°C to 150°C.

Step 4. Soak at 150°C for 30 minutes.

Step 5. Ramp at a rate of 0.5°C per minute from 150°C to 200°C.

Step 6. End program and allow unit to return to ambient.

Sample Program (continued)

The procedure for entering the sample program above is as follows:

1. Press and release the MODE key. The lower display should show OPEr and the upper display should show SyS.

2. Press and release the UP arrow key until the upper display shows Prog.

3. Press and release the MODE key. The lower display should show FiLE and the upper display should show 1.

4. Press and release the MODE key. The lower display should show StEP and the upper display should show 1.

5. Press and release the MODE key. The lower display will show StYP (Step Type). Using the UP or DOWN arrow key, adjust the upper display to read StPt (Setpoint Step).

6. Press and release the MODE key. The lower display should show SP. Using the UP or DOWN arrow key, adjust the upper display to read 100.0.

7. Press and release the MODE key. The lower display should indicate rAtE (Rate). Using the UP or DOWN arrow key, adjust the upper display to read 1.0.

8. Press and release the MODE key twice. The lower display should show StEP (Step) and the upper display should show 2.

9. Press and release the MODE key. The lower display should show StYP (Step Type). Use the UP or DOWN arrow key to adjust the upper display to read SoAh (Soak).

10. Press and release the MODE key. The lower display should show Hour. Use the UP or DOWN arrow key to set the upper display to 1.

11. Press and release the MODE key. The lower display should show Min. Use the UP or DOWN arrow key to set the upper display to 30.

12. Press and release the MODE key. The lower display should show SEC. Use the UP or DOWN arrow key to set the upper display to 0.

13. Press and release the MODE key. The display should show Wpr. Use the UP or DOWN arrow key to set the upper display to dSbL (Disable).

(continued)

Sample Program (continued)

14. Press and release the MODE key twice. The lower display should show StEP and the upper display should show 3.

15. Press and release the MODE key. The lower display should show StYP (Step Type). Use the UP or DOWN arrow key to set the upper display to show StPt (Setpoint Step).

16. Press and release the MODE key. The lower display should show SP (SetPoint). Use the UP or DOWN arrow key to set the upper display to read 150.0.

17. Press and release the MODE key. The lower display should show rAtE. Use the UP or DOWN arrow key to set the upper display to 2.0.

18. Press and release the MODE key twice. The lower display should show StEP and the upper display should show 4.

19. Press and release the MODE key. The lower display should show StYP (Step Type). Use the UP or DOWN arrow key to set the upper display to read SoAh (Soak).

20. Press and release the MODE key. The lower display should show Hour. Use the UP or DOWN arrow key to set the upper display to 0.

21. Press and release the MODE key. The lower display should show Min. Use the UP or DOWN arrow key to set the upper display to 30.

22. Press and release the MODE key. The lower display should show SEC. Use the UP or DOWN arrow key to set the upper display to 0.

23. Press and release the MODE key. The lower display should show Wpr. Use the UP or DOWN arrow key to set the upper display to dSbL (Disable).

24. Press and release the MODE key twice. The lower display should show StEP and the upper display should show 5.

25. Press and release the MODE key. The lower display should show StYP (Step Type). Use the UP or DOWN arrow key to set the upper display to show StPt (SetPoint Step).

26. Press and release the MODE key. The lower display SP (SetPoint). Use the UP or DOWN arrow key to set the upper display to 200.0.

27. Press and release the MODE key. The lower display should show rAtE. Use the UP or DOWN arrow key to set the upper display to 0.5.

Sample Program (continued)

28. Press and release the MODE key twice. The lower display will show StEP and the upper display will show 6.

29. Press and release the MODE key. The lower display should show StYP (Step Type). Use the UP or DOWN arrow key to set the upper display to read End.

30. Press and release the MODE key. The lower display should show End. Use the UP or DOWN arrow key to set upper display to read OFF.

31. Press and release the DISPLAY key. The controller should now be in the default mode with the lower display indicating the setpoint and the upper display indicating the chamber temperature.

This completes the programming of a sample file.

Run/Stop/Resume

1. RUN: To run a file, press the HOLD/RUN key once. The Run LED will begin to flash and the lower display will flash FiLE. Use the UP or DOWN arrow key to select the file number in the upper display to run.

   Press and release the MODE key. The lower display will flash StEP. Use the UP or DOWN arrow key to select the desired step number in the upper display. Press the HOLD/RUN key. The selected file will begin to run. Note that the Run LED is on steady.

2. STOP: To stop a running file, press the HOLD/RUN key once. The Run LED will go out.

3. RESUME: To resume a halted file, press the HOLD/RUN key once. The Run LED will flash.

   Press and release the MODE key until the lower display shows rESU. The upper display will show the file and step number that will be resumed. Press the HOLD/RUN key once. The Run LED should be on steady. The program will resume running.

Running the Sample Program

1. Press and release the HOLD/RUN key twice.

2. The unit should now begin to heat. The lower display will increment at the rate of 1.0°C per minute. The upper display indicates the actual oven temperature.

Guaranteed Soak Deviation

The guaranteed soak function ensures that while running a program, the actual temperature (upper display) remains within a preset window around the setpoint.

If, for example, the lower display increments at a rate faster than the temperature can increase, the internal time clock halts and the lower display flashes gSd along with the current parameter until the actual temperature returns within the preset window.

The value for the guaranteed soak is factory set at ±5.0°C.

Run Menu

At any time while a program is running, view the status of the Run menu parameters by pressing and releasing the MODE key. The Run menu will display the file number, step number, the step type, elapsed jump count (when using the jump loop), and what the parameters are set to.

The parameters displayed are shown in the following order:

1. Upper Display—Setpoint value.

   Lower Display - EnSP (End Setpoint)

   Mode Key

2. Upper Display—Rate value or time value

   Lower Display—rAtE or Hour/Min/SEC

   Mode Key

3. Upper Display—File value

   Lower Display—FiLE

   Mode Key

4. Upper Display—Step value

   Lower Display—StEP

To display one of the above parameters continuously, simply select the desired one using the MODE key. The selected parameter will remain displayed as long as the program is running.

How to Edit a Profile

To illustrate how an existing program can be edited, add a Jump Loop to the sample program that was developed. In this example, repeat steps 1 through 4 two additional times and end the program at that point.

This requires accessing the program at Step 5 and adding the Jump Loop.

1. Enter the operation menu by pressing the MODE key until OPEr appears in the lower display.

2. Use the UP or DOWN arrow key to select Prog in the upper display. Press the MODE key to enter the program menu. The lower display will show FiLE, the upper display will show 1.

3. Press the MODE key once. The lower display will show StEP and the upper display will show 1.

4. Use the UP arrow key to select 5 in the upper display.

5. Press the MODE key. The lower display will show StYP. Use the UP or DOWN arrow key to set the upper display to JL (Jump Loop).

6. Press the MODE key. The lower display will show J F(Jump File). The upper display will show 1.

7. Press the MODE key. The lower display will show JS (Jump Step). Use the UP or DOWN arrow key to set the upper display to 1.

8. Press the MODE key. The lower display will show JC (Jump Count). Use the UP or DOWN arrow key to set the upper display to 2.

Note A setting of 0 will cause an infinite number of loops. ▲

When finished, press and release the DISPLAY key.

This completes the entering and editing of a simple program. It may be worthwhile to go back and reexamine the program a few times to become familiar with it. Once the basic program steps are learned, it should be simple to design a program to suit a specific application.

Sample Program Chart

You may now proceed with entering a sample program. MAKE COPIES of the blank chart for entering the steps of your program.

STEP#	STEP TYPE	SETPOINT	TIME			EVENTS						VALUES	
							On	Off		On	Off		
	StPt	SP	HOUR	MIN	SEC	Ent3			Ent4				
			raTe										
	SoAH		HOUR	MIN	SEC	Ent3			Ent4			WE	Wpr
	JL												
											JF	JS	JC
	LFiL												
												LFil	
	END											END	

STEP#	STEP TYPE	SETPOINT	TIME			EVENTS						VALUES	
							On	Off		On	Off		
	StPt	SP	HOUR	MIN	SEC	Ent3			Ent4				
			raTe										
	SoAH		HOUR	MIN	SEC	Ent3			Ent4			WE	Wpr
	JL												
											JF	JS	JC
	LFiL												
												LFil	
	END											END	

STEP#	STEP TYPE	SETPOINT	TIME			EVENTS						VALUES	
							On	Off		On	Off		
	StPt	SP	HOUR	MIN	SEC	Ent3			Ent4				
			raTe										
	SoAH		HOUR	MIN	SEC	Ent3			Ent4			WE	Wpr
	JL									JF		JS	JC
	LFiL											LFil	
	END											END	

STEP#	STEP TYPE	SETPOINT	TIME			EVENTS						VALUES	
							On	Off		On	Off		
	StPt	SP	HOUR	MIN	SEC	Ent3			Ent4				
			raTe										
	SoAH		HOUR	MIN	SEC	Ent3			Ent4			WE	Wpr
	JL									JF		JS	JC
	LFiL											LFil	
	END											END	

STEP#	STEP TYPE	SETPOINT	TIME			EVENTS						VALUES	
							On	Off		On	Off		
	StPt	SP	HOUR	MIN	SEC	Ent3			Ent4				
			raTe										
	SoAH		HOUR	MIN	SEC	Ent3			Ent4			WE	Wpr
	JL										JF	JS	JC
	LFiL											LFil	
	END											END	

STEP#	STEP TYPE	SETPOINT	TIME			EVENTS						VALUES	
							On	Off		On	Off		
	StPt	SP	HOUR	MIN	SEC	Ent3			Ent4				
			raTe										
	SoAH		HOUR	MIN	SEC	Ent3			Ent4			WE	Wpr
	JL										JF	JS	JC
	LFiL											LFil	
	END											END	

Section 7 Maintenance

Note Make no attempt to service or repair a Thermo Scientific product under warranty before consulting your distributor. After the warranty period, such consultation is still advised, especially when the repair may be technically sophisticated or difficult.

If assistance is needed beyond what the distributor can provide, please call the Technical Services Department. No merchandise, however, should be returned without prior approval.

Caution Disconnect plug from electrical outlet before attempting any maintenance or repair of this unit. ▲

Routine Cleaning

Wash the cabinet with a solution of water and mild soap or detergent to clean off surface dirt, marks or smudges.

Keep the vents clear of dust for free air circulation. This will add to the service life of components.

The aluminum shelf assembly should be washed with a mild soap and water. Do not use abrasive or halogen-based cleaners - they will damage the finish. Rinse thoroughly and dry completely.

Wipe interior glass with an ammonia-based glass cleaner and a soft, lint-free cloth.

Clean up spills inside the chamber as soon as possible to prevent them from being baked on. When the oven is cool, use hot soapy water and a soft cloth to clean the #304 stainless steel chamber. Do not use scouring pads with metallic content, chlorine bleach or halogen-based cleaners. (Special order units may come with stainless steel shelves, in addition to the stainless steel interior.)

Door Gasket Lubrication (optional)

Apply a high quality vacuum grease to the door gasket frequently, especially before initiating a vacuum. Also apply vacuum grease to the gasket after shutdown, if the oven will not be used in the near future.

Section 8 Troubleshooting

There are few oven parts that will require repair. In case of a malfunction, the control thermostat, limit thermostat, heater status lamp, heaters, power switch, vacuum/purge valves and vacuum gauge are fairly easy to replace.

Use this troubleshooting guide to find a possible source of any problem, then test and/or make replacement as described.

Caution Before starting any repair, disconnect power cord from outlet. ▲

SYMPTOM	POSSIBLE CAUSES OF PROBLEM
Excessive vacuum leaks	Check door gasket and door alignment.
	Check for loose connections/fittings.*
	Check the vacuum or purge valves - order a replacement if leaking.*
Won't vent or evacuate	Check for open fittings, large leaks.*
	Check vacuum or purge valves; replace if bad.*
	Check tubing & fittings for obstruction.*
	Apply high quality vacuum grease to door gasket.
Vacuum gauge not at zero when oven door is open	Replace the vacuum gauge.*
Power switch does not light	Check power cord and outlet for power.
	Check main fuses inside back cover.
	Replace the power switch if necessary.
Heater status lamp is out when cold oven is heating up	Replace the heater status lamp.

**Note All pipe threads are wrapped with thread sealing tape for a leakproof fit - use new tape if any connection is loose.*

Section 9 Service Guides

Caution Turn the power switch off and unplug the oven before attempting any service or repairs on the unit. ▲

Hi-Limit Thermostat Replacement

1. Disconnect unit from power source. If previously in use, let unit cool down.
2. Locate the thermostat bulb from the back of the oven attached to the right-side heater on the vacuum chamber. Slide the bulb from its bracket.
3. Remove the thermostat knob by loosening the setscrew and take the old thermostat from the control panel. Move the 3 leads to the new thermostat, referring to the wiring schematic if necessary.
4. Install the new thermostat on the control panel and tighten the knob onto it. Uncurl enough sensor tubing to slide the new bulb into its bracket with several inches of slack. Route the sensor tubing to prevent electrical shorts to other components.
5. Replace the insulation and the back panel. Replace the control panel, power up and test run the oven.

Heater Status Lamp Replacement

1. Disconnect power.
2. Remove the status lamp at the terminal block and thermostat.
3. Press the new lamp into place. Attach the new lamp leads to the thermostat and terminal block.
4. Replace the control panel, power up and test the new status lamp.

Vacuum Valve Replacement

Disconnect power. Loosen the tubing from 2 compression fittings on the valve on the control panel.

1. Remove the control panel valve knob by loosening the hex setscrew. Then unscrew the valve-retaining nut on front of the panel and take the old valve from the back of the panel.

2. Remove the valve knob from the new valve body.

3. Install the new valve in the panel and tighten the retaining nut. Replace the valve knob and tighten the setscrew.

4. Connect the valve compression fittings.

5. Draw a vacuum and check for leaks.

Heater Replacement

Disconnect power and remove the back panel (edge screws), insulation from the back and sides. All models have 4 heaters; 2 located on each side.

1. The oven housing must be removed. The oven housing is held by screws around the bottom edges. Lift it off and remove the rest of the insulation.

2. For all models, unscrew the heater brace nuts to remove heater braces. Pull the leads from heater terminals and test each heater for shorts or low resistance at the heating element sheath. An ohmmeter resistance reading that differs greatly from 36 ohms indicates a faulty heater.

3. Install a new or original heater with terminals facing down, using a new heater brace if a new heater is installed. Attach leads to the heater, so that wires do not touch any heated surfaces (see the upcoming wiring schematic). Tighten mounting nuts securely using a nickel based anti-seize on the threads.

4. Replace the oven housing and front insulation and repack side as well as back insulation, and replace the back panel.

Door and Gasket Repairs

Note Do not let petroleum, silicone oil or grease contact the gasket or mounting groove. After pulling the old gasket from its groove, remove all dirt and foreign matter from the groove and from the mating surface on the oven. ▲

1. Press the new gasket onto the mounting surface in the middle of the top section. Press top corners into place, then the sides. Next, fit the bottom corners, then the bottom section into place. Press and spread the gasket to set it solidly in the door groove.

2. Close the door to help seat the gasket. Open the door and apply a high-quality vacuum grease to the gasket. Evacuate the oven while pressing on the door to seat the gasket firmly.

Door Alignment

Inspect the door-to-gasket seal to find where the door is out of alignment. Note that there are 2 (inner and outer) sets of hinge bolts.

1. Adjust vertical door position by loosening inner hinge-to-oven bolts. Tighten them securely when the door is straight.

2. Adjust gasket compression tolerance (in/out movement) by the outer hinge-to-door bolts, then tighten them securely.

3. After adjustment is made, check it by opening and closing the door several times. Re-grease the gasket and test the seal by evacuating the oven. Make further adjustments if necessary.

Replacement Parts

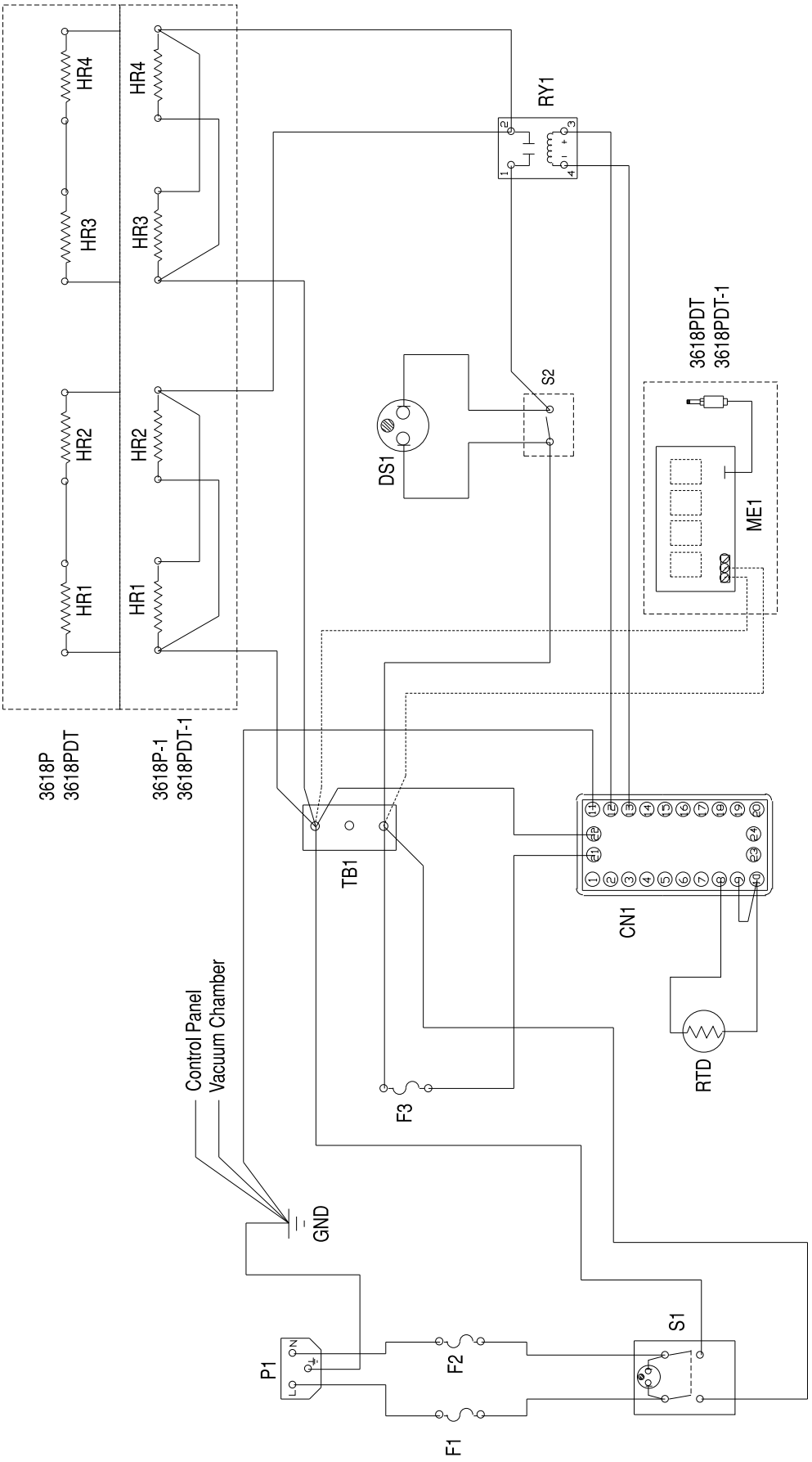
Cordset, 120V	CRX73
Cordset, 240V	CRX70
Door Gasket	530-159-00
Glass Door	540-182-01
Heater, 400 Watts (4) - HR1, HR2, HR3, HR4	340-171-00
Knob	560-223-00
Relay, Solid-State (RY1)	400-233-00
RTD Temperature Sensor	410-667-00
Shelf (2)	810-440-00
Status Lamp Base (DS1)	PL1496X1
Status Lamp Lens Red	360-234-00
Temperature Controller (CN1)	485-311-00
Thermostat, Hydraulic (S2)	920-223-00
Vacuum Gauge (ME1)	660-097-00
Vacuum/Purge Valve	950-145-00
Rocker Switch (S1) - 120V	440-359-00
Rocker Switch (S1) - 240V	440-292-00
Handle 240V	460-248-00
Mounting Feet (4)	790-078-00
Fuse, Main 120V (15 amp) - F1, F2	266058
Fuse, Main 240V (10 amp) - F1, F2	261575
Fuse, Controller (1 amp) - F3	5120-0016
Terminal Block (TB1)	TRX178
Lexan Shield	659-020-00
Power Entry Module (P1)	710-0019

Ordering Procedures

Please refer to the Specification Plate for the complete model number, serial number, and series number when requesting service, replacement parts or in any correspondence concerning this unit.

All parts listed herein may be ordered from the Thermo Scientific dealer from whom you purchased this unit or can be obtained promptly from the factory. When service or replacement parts are needed, check first with your dealer. If the dealer cannot process your request, then contact our Technical Services Department.

Prior to returning any materials, please contact our Technical Services Department for a “Return Materials Authorization” number (RMA). Material returned without an RMA number will be refused.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3618PDT
3618PDT-1
ME1
TB1
CN1
RTD
F3
Control Panel
Vacuum Chamber
GND
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S1
F1

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