

MaxQ 7000

Benchtop Water Bath Shakers

Operating Manual and Parts List 057-286-00 (7004301) Rev. 7

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Models covered in this manual	
Model number	Voltage
SHKA7000 (4301)	208V
SHKA7000-1CE (4302)	220-240V
SHKE7000 (4303)	120V
SHKE7000-1CE (4304)	240V

MANUAL NUMBER 057-286-00 (7004301)

7	40139	4/15/15	Updated warranty Information	CCS
6	31361	7/18/14	Removed CE reference on pg 2-4	CCS
5	30954	4/10/14	Updated Setting Timer for Continuous Shaking Step 3 - pg 5-8	CCS
4	30461	10/21/13	Corrected suspension arms part number in Replacement Parts section	CCS
3	29034	9/10/12	Updated Hyperterminal information	CCS
2	27615	7/22/11	Revised warranty	CCS
1	27135	3/16/11	Added warranty pages	CCS
0	--	4/20/10	Transfer to Marietta (was 057-286-00 5/15/09)	CCS
REV	ECR/ECN	DATE	DESCRIPTION	By



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.



Marking of electrical and electronic equipment, which applies to electrical and electronic equipment falling under the Directive 2002/96/EC (WEEE) and the equipment that has been put on the market after 13 August 2005.



This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the WEEE symbol. Thermo Scientific has contracted with one or more recycling/disposal companies in each EU Member State European Country, and this product should be disposed of or recycled through them. Further information on Thermo's compliance with this directive, the recyclers in your country and information on Thermo products will be available at www.thermofisher.com.

- ✓ Always use the proper protective equipment (clothing, gloves, goggles, etc.)
- ✓ Always dissipate extreme cold or heat and wear protective clothing.
- ✓ Always follow good hygiene practices.
- ✓ Each individual is responsible for his or her own safety.

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When more extensive service is necessary, we will assist you with direct factory trained technicians or a qualified service organization for on-the-spot repair. If your service need is covered by the warranty, we will arrange for the unit to be repaired at our expense and to your satisfaction.

Regardless of your needs, our professional telephone technicians are available to assist you Monday through Friday from 8:00 a.m. to 6:00 p.m. Eastern Time. Please contact us by telephone or fax. If you wish to write, our mailing address is:

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Marietta, OH 45750

International customers, please contact your local Thermo Scientific distributor.

Table of Contents

Section 1	Safety Information	1-1
Section 2	Specifications	2-1
	Analog Units Control Panel Features	3-1
Section 3	Introduction	3-1
	Digital Control Panel Features	3-2
	Location	4-1
	Unpacking	4-1
Section 4	Unpacking and Installation	4-1
	Platform Installation	4-2
	Electrical Requirements	4-2
	Optional Cooling Coil Installation	4-4
	Test Tube Rack Installation	4-5
	Flask Clamp Installation	4-5
Section 5	Operation	5-1
	Analog Units	5-1
	Time(r)	5-1
	Speed Control and Display	5-1
	Power Switch	5-1
	Temp Controller/ Setting Temperature	5-2
	Temperature Calibration	5-3
	Turning Shaker On	5-4
	Digital Units	5-4
	Setting High-Limit Control	5-4
	Calibrating Shaking Speed	5-5
	Setting Shaker Speed	5-5
	Setting High-Limit Control	5-6
	Setting Operating Temperature	5-6
	Temperature Calibration	5-7
	AC Power Loss	5-7
	RS232 Interface Port	5-8
	Setting Timer for Continuous Shaking	5-8
	Setting Timer for Timed Shaking	5-8
	RS-232 Communication Configuration	5-9

Section 6	Troubleshooting	6-1
Section 7	Maintenance	7-1
	Draining the Bath (where applicable)	7-1
	Secondary Overtemp Thermostat	7-3
	Care and Cleaning of Stainless Steel	7-4
	The pH Factor	7-4
	Cleaning Methods	7-5
	Cleansing Agents	7-5
	Refilling the Tank	7-6
	Cleaning the Low Water Level Sensor	7-6
Section 8	Replacement Parts	8-1
	Ordering Procedures	8-2

Section 1 Safety Information

Your Thermo Scientific MaxQ 7000 Shaker has been designed with function, reliability, and safety in mind. It is your responsibility to install it in conformance with local electrical codes. For safe operation, pay attention to Notes, Cautions, and Warnings throughout the manual.

This manual contains important operating and safety information. The user must carefully read and understand the contents of this manual prior to the use of this equipment.

Warnings

To avoid electrical shock, always:

1. Use a properly grounded electrical outlet of correct voltage and current handling capacity.
2. Disconnect from the power supply prior to maintenance and servicing.

To avoid personal injury:

1. Do not use in the presence of flammable or combustible materials - fire or explosion may result. This device contains components which may ignite such materials. Not rated for use in hazardous atmospheres.
2. Use appropriate hand and eye protection when handling hazardous chemicals.
3. Refer servicing to qualified personnel.
4. Do not modify construction and/or assembly of equipment.
5. Do not remove tags, labels, decals, or other information from the unit.
6. Stand clear of equipment when it is operating.
7. If shaking action will result in the evolution of gases or fumes, carry out the operation in a well-ventilated laboratory hood.

(continued)

Warnings (continued)

8. Use equipment only for its intended purpose. Use only the accessories and attachments that are shipped with the equipment or are specified for it. Substituting other attachments or accessories can produce hazards or make the unit inoperative.
9. Perform regular maintenance service as specified in this manual and keep unit in good repair. Do not operate with known defects.
10. Do not use the shaker to mix flammable materials or where the transfer of mechanical energy to glass could cause glass breakage.

Section 2 Specifications

Model number	SHKA7000	SHKA7000-1CE	SHKE7000	SHKE7000-1CE
Exterior Unit Dimensions				
Length	25" (63.5 cm)	25" (63.5 cm)	25" (63.5 cm)	25" (63.5 cm)
Width	21.5" (54.6 cm)	21.5" (54.6 cm)	21.5" (54.6 cm)	21.5" (54.6 cm)
Height	18" (45.7 cm)	18" (45.7 cm)	18" (45.7 cm)	18" (45.7 cm)
Weight	95 lbs (43.1 kg)	95 lbs (43.1 kg)	95 lbs (43.1 kg)	95 lbs (43.1 kg)
Bath Chamber Dimensions				
Length	16" (41 cm)	16" (41 cm)	16" (41 cm)	16" (41 cm)
Width	14" (36 cm)	14" (36 cm)	14" (36 cm)	14" (36 cm)
Height	7.5" (19 cm)	7.5" (19 cm)	7.5" (19 cm)	7.5" (19 cm)
Electrical - Standard Temperature				
Voltage AC	120	220-240	120	220-240
Amperage	7.0	4.0	7.0	3.5
Wattage	850	850	800	800
Frequency	50/60	50/60	50/60	50/60

Intended Use

Orbital shakers are designed to provide increased aeration in a stable temperature environment.

Unintended Use

- 1) Not intended for use in Class I or II applications as defined in 21 CFR
- 2) Not intended for mixtures of flammable materials

Section 2
Specifications

Model number	SHKA7000	SHKA7000-1CE	SHKE7000	SHKE7000-1CE
Speed Accuracy	40 to 400 rpm, ± 10 rpm	40 to 400 rpm, ± 10 rpm	15 to 500 rpm, ± 1 rpm	15 to 500 rpm, ± 1 rpm
Timer	Continuous or timed operation from 1-60 min.	Continuous or timed operation from 1-60 min.	Continuous or timed operation 0.1-999 hours or 0.1-999 mins.	Continuous or timed operation 0.1-999 hours or 0.1-999 mins.
Display	3 individual LED displays indicate temperature in 1°C increments. Analog tachometer displays speed in rpm.	3 individual LED displays indicate temperature in 1°C increments. Analog tachometer displays speed in rpm.	3 individual LED displays indicate temperature, time and speed simultaneously. 3 characters height $\frac{1}{2}$ inch (1.27 cm)	3 individual LED displays indicate temperature, time and speed simultaneously. 3 characters height $\frac{1}{2}$ inch (1.27 cm)
Mutable Alarms	None	None	Audible portion of the alarm can be silenced for a period of 1 hour without deactivating the actual alarm condition by depressing any key.	Audible portion of the alarm can be silenced for a period of 1 hour without deactivating the actual alarm condition by depressing any key.
Motor	Permanent Magnet DC	Permanent Magnet DC	Solid State Brushless DC	Solid State Brushless DC
Soft Start Feature	None	None	Software algorithms prevent sudden start/stops.	Software algorithms prevent sudden start/stops.
RS232 Interface *	None	None	Monitor speed, temperature in $^{\circ}\text{C}$ and time with a computer.	Monitor speed, temperature in $^{\circ}\text{C}$ and time with a computer.
Recorder Output *	None	None	10 mv/ $^{\circ}\text{C}$ output monitors temperature with external chart recorder.	10 mv/ $^{\circ}\text{C}$ output monitors temperature with external chart recorder.

Model number	SHKA7000	SHKA7000-1CE	SHKE7000	SHKE7000-1CE
Speed	None	None	Audible with flashing LED indicate when speed deviates more than 10% of set point.	Audible with flashing LED indicate when speed deviates more than 10% of set point.
Speed Shut off	None	None	When speed deviates 10% of set point, unit will shut down immediately.	When speed deviates 10% of set point, unit will shut down immediately.
Timer	Continuous operation (hold) or timed operation from 1 to 60 minutes	Continuous operation (hold) or timed operation from 1 to 60 minutes	Beeps twice when time has expired. Shaking motion stops.	Beeps twice when time has expired. Shaking motion stops.
Unbalanced Load	None	None	If the unit is running in an unbalanced condition, an alarm will sound and the shaker will stop until the end user corrects the condition. The speed display will flash "bAL" on speed panel LED.	If the unit is running in an unbalanced condition, an alarm will sound and the shaker will stop until the end user corrects the condition. The speed display will flash "bAL" on speed panel LED.

Optional Platform Dimensions - in. (cm)	
Catalog Number L x W	
30105	Universal 13" x 11" (33 x 27.9 cm)

The Thermo Scientific MaxQ 7000 series of bench top, water bath shakers are available in either analog or digital control configurations:

- SHKA7000, SHKA7000-1CE: control temperature by a Proportional/Integral/Derivative (PID) microprocessor-based controller. Solid-state control maintains time and speed and is adjustable with rotary dials. Analog tachometer displays speed in RPM, verifying accuracy of speed setting.
- SHKE7000, SHKE7000-1CE: control temperature, time and speed by a Proportional/Integral/Derivative (PID) microprocessor-based controller that is adjustable on a keypad in 1 rpm increments with switches. Flashing display indicates power interruption. Pressing any key will clear display. Speed and time set points are automatically reactivated after power is restored. Audible and visual signals indicate when temperature deviates more than 2°C over set point-unit will automatically shut down. Audible and visual signals indicate when water level is too low.

Temperature range: SHKA7000, SHKA7000-1CE, SHKE7000, SHKE7000-1CE, 5°C above ambient to 65°C with accuracy in flask at 37°C ±0.2°C. Cooler temperatures are attainable using the optional cooling coil.

In addition, all versions offer:

- Seamless stainless steel bath chamber with rounded corners
- Space efficient tubular heaters
- Set points are retained by non-volatile memory that automatically reactivate after power is restored
- User adjustable over temperature thermostat controls temperature if main controller fails
- ½ inch (1.27 cm) triple eccentric orbital drive
- 6 permanently lubricated ball bearings

Note Propylene glycol must be used as the media instead of water at temperatures above 90°C.

- 35 lb (15.9 kg) platform load capacity at safe speeds less than 400 rpm for SHKA7000/SHKA7000-1CE and less than 500 rpm for SHKE7000/SHKE7000-1CE

Environmental Operating Conditions	
Pollution Degree** 2	
Installation Category** II	
Altitude	2000 meters MSL (Mean Sea Level)
Relative Humidity	20% to 80% maximum, non-condensing
Electrical Supply	120 VAC or 240 VAC
Voltage Tolerance	+10% of normal rated line
Temperature	15°C to 32°C
Product Usage	Indoor use only

***Refer to IEC 664-1*

Caution Operation of the shaker in a CO₂ enriched atmosphere is not recommended. The formation of carbonic acid could cause electrical failures. ▲

Declaration of Conformity available on request

Section 3 Introduction

Analog Units Control Panel Features

1. Temperature Controller: Maintains chamber temperature.
2. Temperature Switch: Activates heater-allowing controller to maintain temperature.
3. Temperature High-Limit Light: Illuminates when high limit thermostat is controlling chamber temperature.
4. Speed Control: Sets platform rotation speed.
5. Power Switch: Turns power on and off to shaker.
6. Speed Tachometer: Analog display of platform rotation speed.
7. Time(r): Allows user to choose either continuous or timed operation.

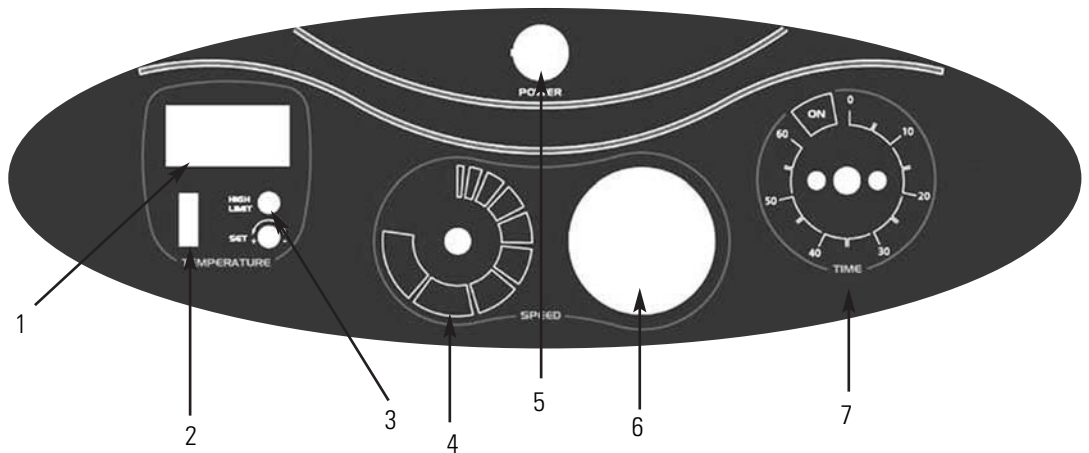
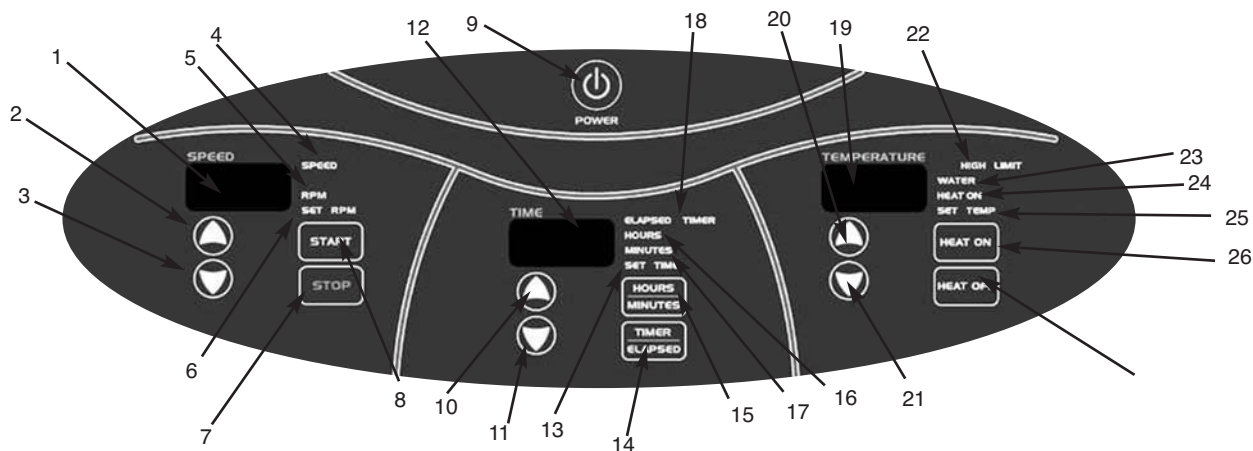


Figure 3-1. Analog Control Panel

Digital Control Panel Features



1. Speed Display: 3 digit LED indicates actual or set point speed
2. Up Arrow Key: Increases platform rotation speed
3. Down Arrow Switch: Decreases platform rotation speed
4. Speed Light: Red light Illuminates when a locked rotor or over-speed condition exists
5. RPM Light: Illuminates to indicate actual speed
6. Set rpm Light: Illuminates when speed is being set
7. Stop Switch: Stops platform rotation
8. Start Switch: Starts platform rotation
9. Power Switch: Turns power on and off to shaker
10. Up Arrow Key: Increases shaking time
11. Down Arrow Key: Decreases shaking time
12. Time(r) Display: 3 digit LED indicates time remaining or elapsed time
13. Set time: Illuminates when time is being set
14. Timer/Elapsed: Allows the user to choose elapsed time operation, elapsed, or timed operation, timer.
15. Hours/Minutes Switch: Allows user to choose timing operation in either hours or minutes

Digital Control Panel Features (continued)

16. Minutes: Timer indicates minutes
17. Hours: Timer indicates hours
18. Elapsed Timer Light: Indicates accumulated time
19. Temperature Display: 3 digit LED indicates chamber temperature
20. Up Arrow Key: Increases temperature
21. Down Arrow Key: Decreases temperature
22. High-Limit Light: Indicates high-limit control has been activated
23. Water Light: Indicates water level in tank is below recommended operating level
24. Heat on Light: Indicates heaters are energized
25. Set temp Light: Indicates temperature can be set
26. Heat on Switch: Turns on heat
27. Heat off Switch: Turns off heat

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 specify and sign for the damage on you 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 properly.

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

Unpacking

Use the packing list below when unpacking to verify that the complete unit has been received. Do not discard packing materials until all is accounted for.

The following items are included in the shipment:

Adapter Fitting (to drain tank) - 950-170-00

Male Connector (Digital Only) - 420-359-00

Splash Baffle (Qty. 2) - 014-290-00

If any items are missing, contact Technical Services.

Location

Put the shaker on a level table or bench capable of supporting the weight of the shaker with any accessories while in operation. Place shaker near an electrical outlet that matches the unit nameplate requirements. Allow approximately 2" (5 cm) of clearance around the unit for free air convection, accessory attachments and user convenience.

Electrical Requirements

SHKA7000 and SHKE7000 Series shakers require a 120VAC, 50/60 Hz power source. They are supplied with a 3-wire line cord and should be plugged into an outlet designed for 3-prong plugs. If an extension cord is used, it also should be the 3-wire grounded type. For an outlet designed to accept 2-prong plugs (ungrounded), it is required that a qualified electrician replaces the outlet with a new, grounded type.

SHKA7000-1CE and SHKE7000-1CE Series shakers require a 240 VAC, 50/60 Hz power source. Power cords are supplied.

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 terminal.

To eliminate hazard of electrical shock, make sure floor around shaker is dry. In the event of accidental spilling or splashing of liquids, clean up and/or neutralize the spilled liquids before continuing.

Disconnect the shaker from the power source when not in use.

Warning Do not operate shaker with a damaged electrical cord. ▲

Platform Installation

1. Place shaking platform on suspension arms. The short leg of each arm goes under the platform, the longer arms stand up and out from the platform. Bolt each arm in place to fit flush against the edge of the platform. Refer to Figure 4-1 on the following page.
2. Remove the clamping knobs from the support arms and set them aside. Place the suspension arms over the support arms and align the holes. Bolt the arms together with the threaded bolt attached to the knob. Arms may be squeezed together to align the bolt holes. Be sure to use a flatwasher and a lockwasher on each knob. Insert splash baffles in guides at front and back of the tank.
3. Fill the water bath to the desired level. For best operation of the equipment, fill the unit with sterilized distilled water or equivalent. The acceptable resistivity range is 50K to 1M ohms (conductivity 1 to 20 micro Siemens). A non-chlorine-based bath fungicide/bactericide can be added to increase the useful life of bath water.

Caution Do not operate shaker with an unbalanced load. Platforms should be loaded for optimum stability and operation. Do not lift shaker by the platform. ▲

Platform Installation (continued)

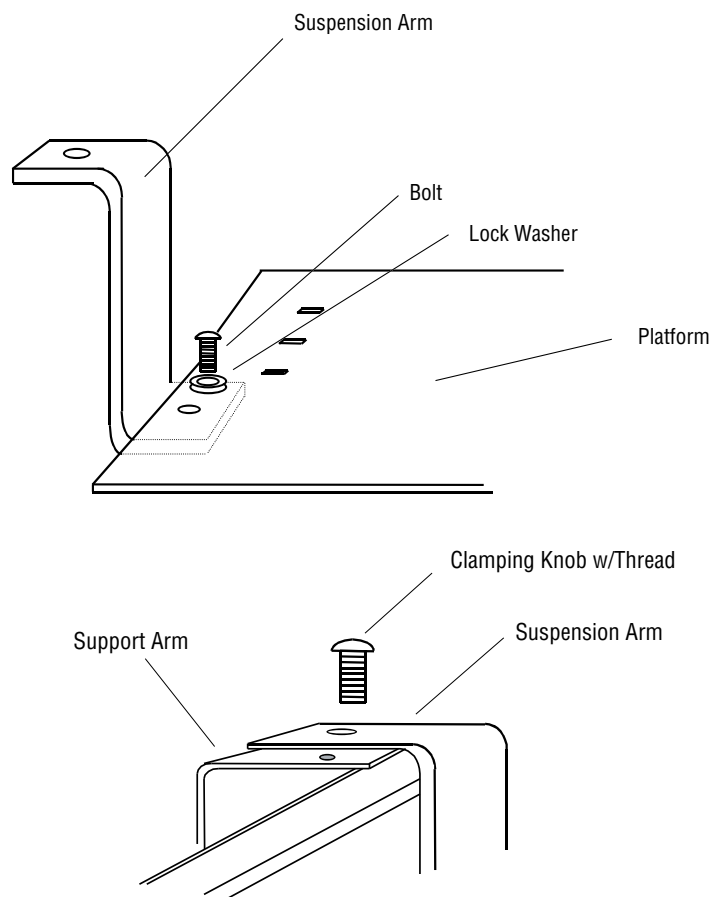


Figure 4-1. Support Arms

Warning Splash baffles must be installed before using water bath. This is especially important to prevent injury during high speed agitation and hot water conditions. ▲

Caution Using chlorinated tap water or additives that contain chlorine will void the manufacturer's warranty. Similarly, high purity (deionized) water that does not fall within a resistivity range of 50K to 1M ohm will void the manufacturer's warranty. If you should have any questions, please contact Technical Services. ▲

Optional Cooling Coil Installation

Use the optional cooling coil to maintain bath temperature at or below ambient temperature.

1. Remove rear splash baffle.
2. Mount cooling coil on 2 clips at the back of the baffle on 6" centers.

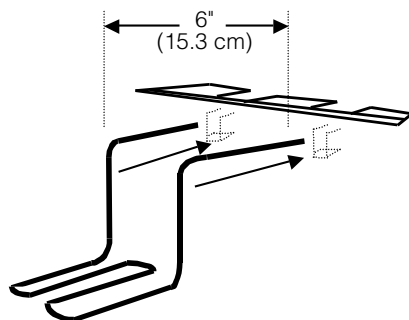


Figure 4-2. Clips

3. Centerline of coil should be $3/4$ " (1.9cm) above top of baffle. Crimp the clip tabs together using pliers.
4. Remove knobs that clamp suspension and support arms together. Remove shaking platform from tank.

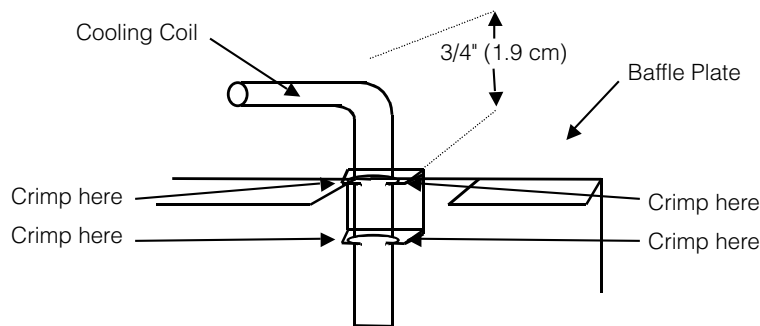


Figure 4-3. Crimp Locations

5. Install the rear baffle and cooling coil on the back of tank. Cooling coil is shaped to fit around the heater. Two compression fittings accommodate $5/16$ " (0.79cm) OD inlet and outlet tubing (supplied by user).
6. Re-install suspension arms and platform.

Note Shipped cooling coils is compressed to 3-4" across. Coil needs to be expanded to 6" for installation. This does not affect coil performance as copper coil is annealed for flexibility.

Flask Clamp Installation

Each flask clamp contains a support spring located at the narrow top of the clamp.

Depending on the size of the clamp, the clamp base may contain one or several screws necessary to secure the clamp to the platform. All screws provided with the clamp must be properly attached to the platform.

1. Carefully place the desired vessel in the clamp by first pulling the clamp spring far enough apart to enable the flask base to be positioned inside the clamp. Gently slide the flask into its proper position securing it to the wider bottom of the clamp. The spring will hold the neck of the flask securely in place and provide security during shaking.
2. Make sure all vessels are securely clamped before turning on unit.

Wherever possible, vessels should contain a stopper to prevent hazardous substances being thrown out during the mixing action.

Test Tube Rack Installation

1. Position the test tube rack on the combination platform so that the cutouts on the rack's outside bottom are aligned with corresponding mounting holes on the platform. There are two cutouts on each side of the rack.
2. Secure the rack to the platform with mounting screws provided with the rack.

Warning Do not operate the shaker at speeds that will cause the contents of vessels to be thrown out. ▲

Caution It is recommended that the shaking action be started at a low speed in order to check that all vessels are secure and that no spilling of contents will occur. ▲

Section 5 Operation

Analog Units

Refer to Section 3 for control panel references.

Power Switch

1. Depress top portion of power switch (I) to turn on shaker.
2. Depress bottom portion of power switch (0) to turn off shaker.

Caution It is recommended that shaking action be started at a low speed in order to check that all vessels are secure and that no spilling of contents will occur. ▲

Speed Control and Display

1. Slowly rotate the knob on the solid-state speed control clockwise to increase speed and counterclockwise to decrease speed. The markings on the outside of the dial are for reference purposes only.
2. The speed control tachometer provides an analog readout of the actual platform rotation speed up to a maximum of 400 rpm.

Time(r)

1. From the 12 o'clock off position, rotate timer knob counterclockwise to the On position to initiate continuous operation.
2. For timed operation, rotate timer knob clockwise from 1 minute to 60 minutes. The markings on the side of the dial are in 5-minute increments.

Note Shaker will not operate if the timer is in the Off position.

Temp Controller/ Setting Temperature

Refer to Figure 5-1 for control panel reference.

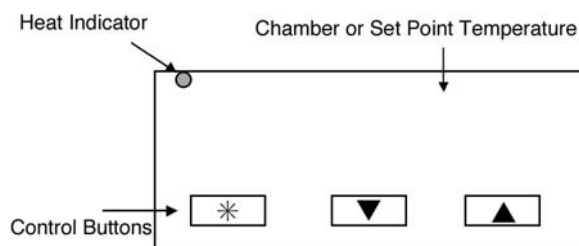


Figure 5-1. Temperature Controller

1. **CONTROLLER SELF-TEST:** When the shaker is powered up, the controller will display 8888 along with the three decimal points and the HEAT ON indicator lamp. The display will then blank out for 2 seconds before showing the chamber temperature.
2. **HEAT ON INDICATOR:** The HEAT ON indicator lamp is lit when the chamber heaters are receiving power. The lamp will normally flash when the chamber temperature is at set point.
3. **SET POINT ADJUSTMENTS:** The temperature controller normally displays the chamber temperature. To view or change the temperature set point proceed as follows:

Press	Controller
*	View set point
* ▲	Decrease set point
* ▼	Increase set point

- a. Press and hold the “star” (*) key and use either the up or down arrow key to adjust the set point to the desired temperature. Release the “star” (*) key.
- b. Allow sufficient time for chamber temperature to stabilize.

Temperature Calibration

1. Place a calibrated digital thermometer in the approximate geometric center of the bath.
2. Press and hold the “star” (*) key and using the up or down arrow key, adjust the set point to the desired temperature.
3. Allow the unit to run for at least 30 minutes.
4. The controller display should now be indicating the set point temperature. Make note of the thermometer reading.
5. Press and hold both arrow keys until the controller display indicates **tunE**. Release the arrow keys. Press and release the down arrow key, the display should now indicate LEUL. Press and hold the “star” (*) key and using the up arrow key adjust the display to read 3. Release the “star” (*) key. Press and release the up arrow key until the display indicates Zero. The display should now alternate between Zero and a numerical value.
6. Using the examples shown at the left and the thermometer value obtained in step above, enter the correct Zero value into the controller by pressing the “STAR” (*) key and using the up or down arrow key. If there is already a Zero value present, then add the new value to the one already present.
7. When the correct Zero value has been entered, press and hold the two arrow keys together until the display again indicates the chamber temperature. If the procedure was done correctly, the controller display should now agree with the thermometer reading to within $\pm 0.5^{\circ}\text{C}$.
8. Allow the unit to run for at least 60 minutes.
9. Recheck the thermometer reading the controller display and the thermometer should agree to within $\pm 0.5^{\circ}\text{C}$. If not repeat steps 5, 6, and 7 above.

Table 5-1. Determining Zero Value

Thermometer	=	60°C
Controller Reading	=	65°C
Subtract	=	-5°C
Enter Zero value of -5°C		
Thermometer	=	70°C
Controller Reading	=	65°C
Subtract	=	+5°C
Enter Zero value of +5°C		

Setting High-Limit Control

Note The high-limit control is located on the lower front side of cabinet.

1. Make appropriate power connection.
2. Turn power switch ON.
3. Rotate high-limit control fully clockwise.
4. Set chamber temperature.
5. Allow sufficient time for chamber temperature to stabilize before setting the high-limit control.
6. Rotate high-limit control slowly counterclockwise until set point is reached. High-limit light will illuminate when set point is reached. Rotate highlimit control clockwise until status lamp goes out. Make an additional 1/8 of a turn clockwise beyond this point.
7. When desired temperature is achieved, load the shaker.

Warning Do not operate shaker if any of the temperature controls become inoperative. A hazardous condition will develop which can result in injury or death and property damage. ▲

Digital Units

Refer to Section 3 for control panel references.

Turning Shaker On

Begin with the shaker power off.

1. Press power switch once (I) to turn On shaker.
2. Press power switch a second time (0) to turn Off shaker.

Note There will be a 3 second delay from the time power is turned on to the time the shaker is activated. Control panel will illuminate when shaker power is activated. There will be an audible beep before the display lights up.

Setting Shaker Speed

1. Hold down appropriate arrow switch in the speed module of the control panel, up or down, until desired speed is set up to 500 rpm. SET RPM light will illuminate.
2. Press START switch to begin shaking. RPM light will illuminate.
3. Press STOP switch to end shaking. SET RPM light will illuminate.

Note Speed can be changed without pressing the start or stop switches. Simply press the appropriate up or down switch until desired rpm is reached. There will be an audible beep before the display lights. ▲

Calibrating Shaking Speed

1. Choose a speed for which calibration is desired by using the shaker's up or down arrow keys.
2. Measure current shaker speed by using a digital hand-held tachometer.
3. If the tachometer reading matches the shaker display, no calibration is necessary. If the tachometer reading is different from the shaker's display, then calibration is required.
4. To get into Calibration mode, hold down the START key, press and release the STOP key, then release the START key.
5. The decimal point on the SPEED display will flash indicating you are in the calibration mode.
6. Use the up or down arrow keys to set the shaker speed to match the tachometer's readout.
7. Press STOP key to enter the new speed value.
8. Press START key to exit Calibration mode.

Setting Operating Temperature

1. Press and hold up arrow key to increase temperature, release key when desired set point is obtained.
2. Press and hold down arrow key to decrease temperature, release key when desired set point is obtained.
3. Once set, temperature control is initiated by pressing the heat on button; the heater will react and start increasing the temperature to reach the set point.
4. During operation, both the up and down arrow keys can be used to adjust the temperature to a new set point.

Setting High-Limit Control

Note The high-limit control is located on the lower front side of cabinet.

1. Make appropriate power connection.
2. Turn power switch ON.
3. Rotate high-limit control fully clockwise.
4. Set bath temperature.
5. Allow sufficient time for bath temperature to stabilize before setting the high-limit control.
6. Rotate high-limit control slowly counterclockwise until set point is

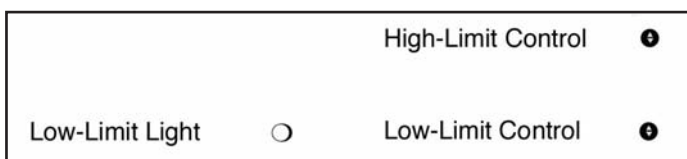


Figure 5-2. Controls

reached. High-limit status lamp will flash and the audible alarm will beep once. Rotate high-limit control slowly clockwise approximately 1/8 of a turn beyond this point.

7. When desired temperature is achieved, load the shaker.

Warning Do not operate shaker if any of the temperature controls become inoperative. A hazardous condition will develop which can result in injury or death and property damage. ▲

AC Power Loss

The operating microprocessor possesses a non-volatile memory. Upon resumption or recovery from an AC power loss, the following will be noted:

- All readouts will flash until any key is pressed.
- If unit was shaking at the time of power failure, it will resume operation at the speed and timer settings that were entered at the time that AC power failed.

Temperature Calibration

1. Fill a 250-ml Erlenmeyer flask with approximately 100 ml of water and position it at the approximate geometric center of the shaking platform.
2. Install a thermocouple inside the flask with the thermocouple junction in direct contact with the water.
3. Adjust the safety thermostat to its maximum clockwise position.
4. Using the up and down keys, adjust the set point temperature to read 37°C or any other desired set point.
5. Allow sufficient time for chamber temperature to stabilize.
6. Press HEAT ON button and, while continuing to hold, press and release the HEAT OFF button. Now, release the HEAT ON button.
7. The decimal point should now be flashing indicating that the unit is in the temperature calibration mode.
8. Use the up and down arrow keys to adjust the temperature on LED readout to match the temperature reading on the thermocouple meter.
9. Press the HEAT OFF button. The beeper will sound indicating that the new calibration value just entered is now stored in the nonvolatile memory of the temperature controller.

Note It is important to press HEAT OFF button to exit Calibration mode.

10. Press HEAT ON button twice to complete return to normal operating mode.

Setting Timer for Timed Shaking

1. Press TIMER/ELAPSED switch until TIMER and SET TIME lights are illuminated. The HOURS or MINUTES light will also light up at this point depending on which option was previously chosen.
2. Press HOURS/MINUTES switch for desired timing mode.
3. Hold down appropriate arrow switch in the TIME module of the control panel, up or down, until desired timing cycle is set from 0.1 hour up to 999 hours, or from 0.1 minute to 999 minutes depending on which timing mode is chosen. SET TIME light will illuminate.
4. Press START to begin timed shaking; countdown will begin from time set. TIMER and MINUTES or HOURS lights will illuminate and timer will count down from time selected. An audible alarm will sound at the end of the timing cycle and platform rotation will cease.

Setting Timer for Continuous Shaking

1. Press TIMER/ELAPSED switch until ELAPSED light is illuminated. The HOURS or MINUTES light will also light up at this point depending on which option was previously chosen.
2. Press HOURS/MINUTES switch for desired timing mode.
3. TIME display should show 000. Press START to begin timed shaking. Timer will begin to count up and will display accumulated time in display window. Platform rotation will continue until the operator presses the Stop button. The TIME display will flash when ELAPSED time reaches 999 minutes or 999 hours.

RS232 Interface Port

The RS232 interface port is located on the left side rear of the shaker cabinet and requires the use of a laptop or desk top computer running



Figure 5-3. RS232 Interface

Microsoft Windows 98 or newer operating system.

Note RS232 Interface Port is for output only. Interface cables must not exceed 9.8' (3m) in length.

RS-232 Communication Configuration

Note The following paragraphs detail the step-by-step procedures for configuring Microsoft® Hyperterminal running on a host computer using Windows® XP. These instructions may need to be modified to be used with a different terminal emulator program and/or operating system. Contact Technical Services if further assistance is required.

1. Power up the host computer and close any running applications.
2. Open the HyperTerminal application by clicking on “Start” \ “Programs” \ “Accessories” \ “Communications” \ “HyperTerminal.”
3. In the “Connection Description” box, enter the name “Max Q Shaker” and choose an icon and click “OK.”
4. In the “Connect To” box, verify that “COM1” is selected under “Connect Using.” Click “OK.”
5. In the “COM1 Properties” box \ “Port Settings” folder select the following options:

Bits per second:19200
Data bits:8
Parity:None
Stop bits:1
Flow controlNone

After verifying the above settings, click “OK.”
6. In the main dialog box click on “File” \ “Save.”
7. Exit the program by clicking on “File” \ “Exit” \ “Yes”.
8. Verify the program was saved by going to “Start” \ “Programs” \ “Accessories” \ “Communications” \ “HyperTerminal” \ “Max Q Shaker.”
9. This completes the configuration of HyperTerminal.
10. Turn shaker off and connect computer (COM 1) to shaker (COM PORT) with DB-9 serial printer cable.
11. Start HyperTerminal by clicking on “Max Q Shaker.”
12. Power up shaker. Shaker will screen print speed, time and temperature at one-minute intervals.

Section 6 Troubleshooting

Problem	Possible Causes	Solutions
Shaker doesn't operate	Check if power cord is plugged in.	Plug in.
Check if power supply matches requirements on data label.	Locate power supply that matches unit requirements.	
	Digital: check fuse.	Replace fuse.
	Digital: check for flashing lights on control panel.	Press any switch on control panel.
	Digital: check if elapsed timer is flashing.	Reset timer.
	Analog: check if timer is in off position.	Set timer for continuous or timed operation.
	Analog: check if power switch is functioning.	Replace if defective.
Platform doesn't rotate or has erratic speed	Check for power to motor.	Replace motor if defective.
	Check drive belt.	Replace if worn, broken or slipped off pulley.
	Analog: check for power to speed control.	Replace if defective.
Shaker won't heat	Digital: make sure "HEAT ON" lamp is lit.	Push "HEAT ON" button.

Section 7 Maintenance

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

Warning Disconnect plug from electrical outlet before attempting any maintenance or repair of the unit. Any internal adjustments or repairs must be performed by a qualified service representative. ▲

Wash the exterior of the unit with a soft cloth using a solution of mild soap and water, rinse off with distilled water and dry thoroughly.

Wash bath and components, suspension arms, platform and splash baffles with a solution of mild soapy water. Use a soft cloth, sponge or synthetic sponge scrubber. Rinse all components thoroughly and dry completely.

DO NOT USE chlorine bleach, chlorine-based cleanser, abrasives, ammonia, steel wool or scouring pads with metallic content. These will damage #302 stainless steel. If metal parts drop into the bath, remove them at once. They can leave rust deposits on the stainless steel surface that may be difficult to remove.

Draining the Bath (where applicable)

1. Disconnect shaker from electrical power.
2. Attach one end of a suitable length of 1/2" (0.64cm) tubing to the barbed end of the adapter fitting supplied with the unit.
3. Attach the opposite end of the adapter fitting to the quick-connect on the front of the shaker.
4. Place the other end of the tubing in a sink, floor drain or in an adequately sized receptacle. Bath will drain when quick-connect reset button is pressed.

Draining the Bath (continued)

5. After the bath has drained, leave the drain tube connected and flush with distilled water to remove any possible deposits within the bath.
6. Remove adapter fitting when complete.

Note The drain is located on the front of the cabinet and is opened when the ½” (0.64 cm) adapter fitting is inserted.

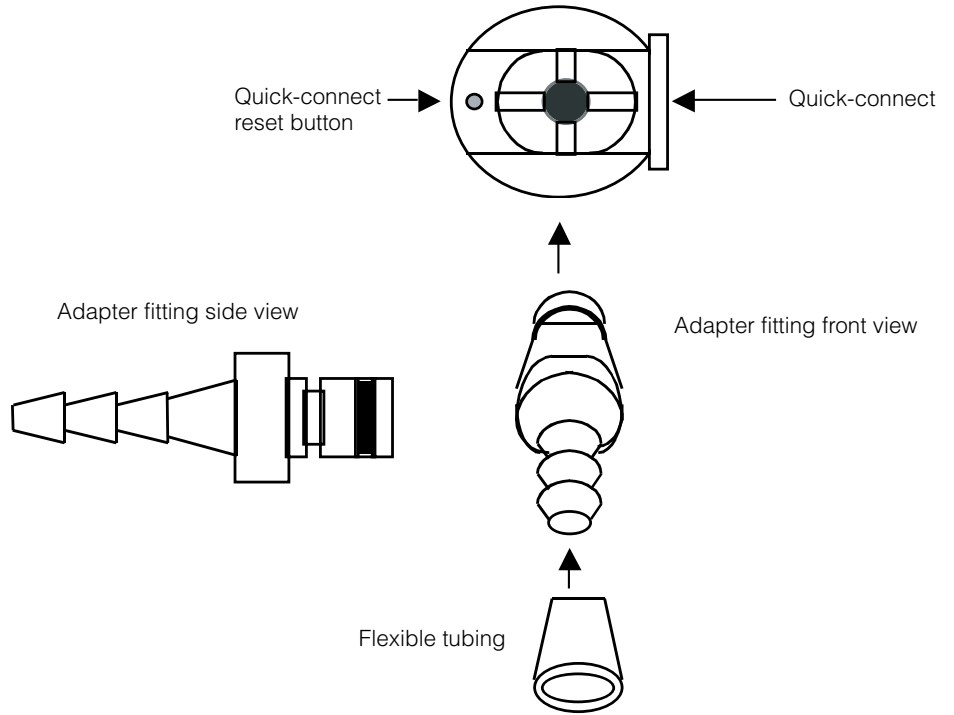


Figure 7-1. Drain Fitting Assembly

Secondary Overtemp Thermostat

In the unlikely event that the programmed hi-limit and the user-adjustable hi-limit thermostats fail, there is a third overtemperature thermostat. Two of these thermostats are located on the bottom of the water pan. If the water bath fails to heat with the “HEAT ON” lamp lit and the user-adjustable hi-limit thermostat set to the fully clockwise position, it will be necessary to reset the secondary over temperature thermostat. To do so, proceed as follows:

1. Disconnect power cord from outlet.
2. Remove rear panel.
3. Locate the thermostat access opening located in the insulation retainer just above the shaker mounting plate. These holes are not visible and must be located by feel. Each thermostat has a small button that needs to be pressed in to reset the thermostat.
4. Reset both thermostats by reaching in under the insulation retainer and pressing the button on each of the two thermostats located near the center of the access hole.
5. Once both thermostats are reset, reinstall the rear panel, plug the power cord back into the outlet and verify the unit is heating again.
6. If the shaker still fails to heat, contact Technical Services for further assistance.

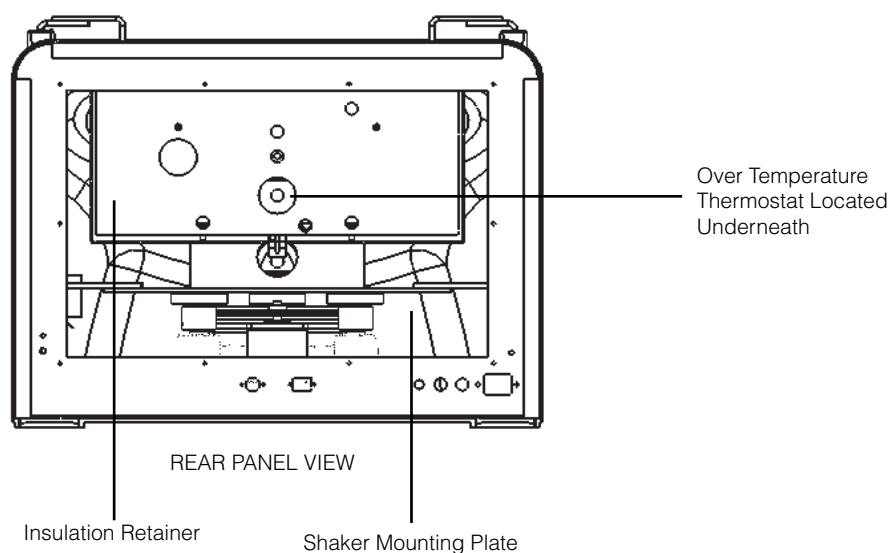


Figure 7-2. Locations on back

Care and Cleaning of Stainless Steel

Stainless steel is an alloy of steel with chromium and nickel that increase the metal's resistance to rust and corrosion. Yet, if not properly cared for, stainless steel can rust and corrode. Exposure to air provides the passivation, or oxide layer coating, for clean stainless by producing a thin, durable chromium-oxide film that forms rapidly on the alloy surface to give stainless its characteristic "stainless" quality. Also exposure of the surface to other oxidizing environments can produce a passivating film or coating.

However, if free oxygen is not available due to scale or contamination buildup the metal surface may become vulnerable to rusting and corrosion as well as pitting. Maintaining neutral pH and conducting frequent cleanings with detergent and water can obtain years of trouble-free service from stainless steel products.

Caution Electrolysis can damage stainless steel. This occurs when an object is allowed to rest directly on the surface of stainless steel, trapping moisture that becomes oxygen starved, but is surrounded by water-containing oxygen. ▲

The pH Factor

Check pH regularly. If pH is <6.0, add disodium phosphate to increase pH to a 7 to 9 value. Sodium carbonate or sodium bicarbonate may be used but they tend to form scale that must be rinsed out regularly. If pH is >10.0, add sodium bisulfate to decrease pH to a 7 to 9 value. Avoid adding harsh alkalines or acids since these may cause localized corrosion and result in unstable pH.

Special Considerations

If it is necessary to use the following chemicals, limit exposure time to a maximum of 3 hours and always clean surfaces immediately after use.

Chemicals that should be limited to a 3 hour maximum exposure time to stainless steel are:

Aluminum chloride	E.D.T.A.	Potassium permanganate
Barium chloride	Ferrous chloride	Potassium thiocyanate
Calcium chloride	Lysol	Sodium hypochlorite
Chlorinated Lime	Mercury salts	Stannous chloride
Citric acid (boiling)	Phenol	Tartaric acid
Dakin's solution		

Special Considerations
(continued)

Never use the following on stainless steel:

Aqua regia	Ferric chloride
Iodine	Sodium acid
Sodium azide	

Chemical spills, especially those agents listed here, should be removed as soon as possible and the stainless steel surface cleaned with mild soapy water followed by a distilled water rinse.

Cleansing Agents

Anti-fungal and anti-bacterial additives are permissible to use as long as the pH of the aqueous solution is kept within the range of 7 to 9. These are available through laboratory distributors but be sure to CONFIRM that they are not harmful to stainless steel.

Cleaning Methods

Do not use any metallic pads. Instead, for stubborn stains, use a plastic light duty cleansing pad and rub gently in the direction of the metal grain. If stains continue to persist, use one of the following chemicals and methods:

- Any of a variety of “scale removers” available at local supermarkets or hardware stores used for the cleaning of coffee marks, humidifiers or vaporizers.
- A 15% to 35% phosphoric acid solution is available from laboratory supply distributors for scale and rust removal. Allow solution to soak the surface affected until rust and scale is loosened. Immediately follow with a distilled water rinse.
- Citric acid based cleaners.
- Bathroom tub and tile cleaners.
- A mixture of 20% nitric acid and 1.5% hydrofluoric acid (or hydrochloric acid). Swab solution on surface allowing it to remain until rust is loosened. Immediately follow with a distilled water rinse. This method should ONLY be used if SEVERE rust and scale stains are present.
- Oxalic acid 2% to 5% in warm water. Swab solution on surface allowing it to remain until rust is loosened. Immediately follow with a distilled water rinse. This method should ONLY be used if SEVERE rust and scale stains are present.

Cleaning Methods (continued)

Regardless of the approach utilized, ALWAYS follow the manufacturer's directions and allow the chemicals to do the cleaning with MINIMAL scrubbing. Always follow cleanings with a distilled water rinse. Air dry.

Materials Effective in Disinfecting:

- Glutaraldehyde
- Alcohol

Note The use and disposal of these chemicals may be regulated by your local city codes. Consult those regulations before of disposing of these materials.

Warning Extreme care must be taken when handling these materials. Always work in an area with adequate ventilation. Use the precautions as outlined in the Material Safety Data Sheet (MSDS) and the manufacturer's instructions for the product being used. In addition, follow the personal protection index found in the hazardous materials information system (HMIS) section of the MSDS. ▲

Note This information is intended as guidelines only and the manufacturer makes no claim as to the suitability to any particular situation. Consult your staff chemist to determine what would be best for your stainless steel product and laboratory.

Cleaning the Low Water Level Sensor

To keep the low-water level sensor operating properly, it must be inspected weekly and cleaned every 2 weeks. Remove any scale build-up from the stainless steel screw sensor by scrubbing it with a toothbrush while it is immersed in water. The sensor is located behind the front splash baffle.

Refilling the Tank

For best operation of the equipment, fill the unit with sterilized distilled water or equivalent. The acceptable resistivity range is 50K to 1M ohms (conductivity 1 to 20 micro Siemens). Do not use tap water; it will cause mineral deposits and possible corrosion. Add a non-chlorine based fungicide/ bactericide to the tank to increase the useful life of the bath water.

Caution Using chlorinated tap water or additives that contain chlorine will void the manufacturer's warranty. Similarly, high purity (deionized) water that does not fall within a resistivity range of 50K to 1M ohm will void the manufacturer's warranty. Contact Technical Services with any questions. ▲

Section 8 Replacement Parts

Catalog Number (Shaker)	Description	Part Number
	Shaker Mechanism	019-551-00
SHKE7000, SHKE7000-1CE	Programmed Microprocessor Board	019-533-07
SHKE7000, SHKE7000-1CE	Power/Motor/Drive PC Board	019-534-00
SHKE7000, SHKE7000-1CE	Display/Time/Speed PC Board	019-536-00
SHKA7000, SHKA7000-1CE	Drive Belt	150-318-00
SHKE7000, SHKE7000-1CE	Drive Belt	150-288-00
SHKA7000	Speed Control	227-598-00
SHKA7000-1CE	Speed Control	229-419-00
SHKA7000, SHKA7000-1CE	Tach PCB	228-612-00
SHKA7000, SHKA7000-1CE	Timer	270-135-00
SHKA7000, SHKE7000	15 Amp Circuit Breaker	330-124-00
SHKA7000-1CE, SHKE7000-1CE	10 Amp Circuit Breaker	330-119-00
SHKA7000, SHKA7000-1CE	0.7 Amp Circuit Breaker	330-250-00
	Heater	340-171-00
SHKA7000, SHKA7000-1CE	Lamp Base	360-233-01
SHKA7000, SHKA7000-1CE	Red Lens	360-234-00
SHKA7000, SHKA7000-1CE	Motor	370-388-00
SHKE7000, SHKE7000-1CE	Motor	370-390-00
SHKA7000, SHKA7000-1CE	Solid State Relay	400-233-00
	RTD Temperature Sensor	410-632-00
SHKA7000, SHKA7000-1CE	Round Switch	440-396-00
SHKA7000, SHKA7000-1CE	Mini Rocker Switch	440-397-00
SHKA7000, SHKE7000	Line Cord	470-262-00
SHKA7000-1CE, SHKE7000-1CE	Line Cord	470-305-00
SHKA7000-1CE, SHKE7000-1CE	Line Cord, UK	CRX108
SHKA7000-1CE, SHKE7000-1CE	Line Cord, China	CRX115

(continued)

Catalog Number (Shaker)	Description	Part Number
SHKE7000, SHKE7000-1CE	Power Supply	460-315-00
SHKA7000	RPO Configured Temp Controller	485-360-18
SHKA7000-1CE	RPO Configured Temp Controller	485-522-02
SHKA7000, SHKA7000-1CE	Knob	560-275-00
	Thumb Knob	560-217-00
SHKA7000, SHKA7000-1CE	Tachometer	660-111-00
	Mounting Feet	790-078-00
SHKE7000, SHKE7000-1CE	Time/Speed/Temp Keyboard	682-674-00
	High Limit Thermostat	920-301-00
	Suspension Arms	255310
	Adapter Fitting	950-170-00

Ordering Procedures

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 Technical Services.

Prior to returning any materials, contact our Technical Services Department for a "Return Materials Authorization" number (RMA). Material returned without an RMA number will be refused.

THERMO FISHER SCIENTIFIC ANALOG SHAKER WARRANTY USA

The Warranty Period starts two weeks from the date your equipment is shipped from our facility. This allows shipping time so the warranty will go into effect at approximately the same time your equipment is delivered. The warranty protection extends to any subsequent owner during the warranty period.

During the first year, component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo's expense, labor included. For an additional 4 years, component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo's expense, labor excluded. In addition, the Orbital Shaker mechanism is warranted for 10 years, parts only, F.O.B. factory. The mechanism is defined as the bearing assemblies. The warranty will be void if the equipment is altered without written authorization from Thermo. Installation and calibration is not covered by this warranty agreement. The Technical Services Department must be contacted for warranty determination and direction prior to performance of any repairs. Expendable items, i.e., glass, filters, light bulbs and lid gaskets are excluded from this warranty. Extended warranties are dependent on the units being maintained regularly as stated in the operation and service manuals.

Replacement or repair of components parts or equipment under this warranty shall not exceed the warranty to either the equipment or to the component part beyond the original warranty period. The Technical Services Department must give prior approval for return of any components or equipment.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, OR IMPLIED. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY. Thermo shall not be liable for any indirect or consequential damages including, without limitation, damages relating to lost profits or loss of products.

Your local Thermo Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation, and preventive maintenance.

If equipment service is required, please call your Technical Services Department at 1-800-438-4851 (USA and Canada) or 1-740-373-4763. We're ready to answer any questions on equipment warranty, operation, maintenance, service and special applications. Outside the USA, contact your local distributor for warranty information.



Rev. 2 6/2015

THERMO FISHER SCIENTIFIC DIGITAL SHAKER WARRANTY USA

The Warranty Period starts two weeks from the date your equipment is shipped from our facility. This allows shipping time so the warranty will go into effect at approximately the same time your equipment is delivered. The warranty protection extends to any subsequent owner during the warranty period.

During the first 24 months, component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo's expense, labor included. For an additional 3 years, component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo's expense, labor excluded. In addition, the Orbital Shaker mechanism is warranted for 10 years, parts only, F.O.B. factory. The mechanism is defined as the bearing assemblies. The warranty will be void if the equipment is altered without written authorization from Thermo. Installation and calibration is not covered by this warranty agreement. The Technical Services Department must be contacted for warranty determination and direction prior to performance of any repairs. Expendable items, i.e., glass, filters, light bulbs and lid gaskets are excluded from this warranty. Extended warranties are dependent on the units being maintained regularly as stated in the operation and service manuals.

Replacement or repair of components parts or equipment under this warranty shall not exceed the warranty to either the equipment or to the component part beyond the original warranty period. The Technical Services Department must give prior approval for return of any components or equipment.

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During the first year, component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo's expense, including labor. For an additional 4 years, component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo's expense, excluding labor. In addition, the Orbital Shaker drive mechanism is warranted for 10 years, parts only, F.O.B. factory. The mechanism is defined as the bearing assemblies. The warranty will be void if the equipment is altered without the written authorization from Thermo. Installation and calibration is not covered by this warranty agreement. The local Thermo Fisher Scientific office must be contacted for warranty determination and direction prior to performance of any repairs. Expendable items, i.e., glass, filters, light bulbs and lid gaskets are excluded from this warranty. Extended warranties are dependent on the units being maintained regularly as stated in the operation and service manuals.

Replacement or repair of component parts or equipment under this warranty shall not exceed the warranty to either the equipment or to the component part beyond the original warranty period. The local Thermo Fisher Scientific office must give prior approval for return of any components or equipment.

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Replacement or repair of component parts or equipment under this warranty shall not exceed the warranty to either the equipment or to the component part beyond the original warranty period. The local Thermo Fisher Scientific office must give prior approval for return of any components or equipment.

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Thermo International Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation, and preventative maintenance.

If equipment service is required, please call your local Thermo Fisher Scientific office. We're ready to answer your questions on equipment warranty, operation, maintenance, service and special applications.



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