

smiths

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HOTLINE®

Blood and
Fluid Warmer

Maintenance

Before each use

Carefully inspect the HOTLINE® for signs of damage, cracked or split case, insecure poleclamp, damaged mains cable, etc.

If the Disposable Set does not install easily, lubricate the O-Ring Seals.

Lubricating the O-Ring Seals

Using a cotton swab, apply a small amount of silicone grease (Smiths Medical Part Number EZL 80-04-002) to the O-Rings in the Disposable Set connector block.

If this does not solve the problem, reject the unit.

After each use

Wipe all external surfaces of the HOTLINE® with a soft cloth, using an aqueous solution of mild detergent. If necessary, the external surfaces may be disinfected using a solution of 10% bleach in distilled water.

- *Do not autoclave.*
- *Do not use alcohol or solvents.*
- *Do not use abrasive cleaning agents.*
- *Do not use cold sterilants.*
- *Do not immerse any part of the HOTLINE® in liquids.*

Routine Maintenance Tasks

Smiths Medical recommends that preventative maintenance be carried out at specified intervals. Some maintenance tasks need to be repeated at 30-day intervals and others at annual intervals, depending on your choice of recirculating solution.

The three approved recirculating solutions and their associated maintenance protocols are:

Recirculating Solution	At 30-day Intervals	At 12-month Intervals
Sterile Distilled Water	Visual Inspection Lubricate O-Ring Seals Replace Recirculating Solution	Test All Alarms Replace O-Ring Seals Replace Recirculating Solution Verify Temperature Calibration Electrical Safety Test
Isopropyl Alcohol Solution	Visual Inspection Lubricate O-Ring Seals Replace Recirculating Solution	Test All Alarms Replace O-Ring Seals Replace Recirculating Solution Verify Temperature Calibration Electrical Safety Test
Hydrogen Peroxide Solution	Visual Inspection Lubricate O-Ring Seals	Test All Alarms Replace O-Ring Seals Replace Recirculating Solution Verify Temperature Calibration Electrical Safety Test

Precise directions for mixing the above solutions to the correct strength are given on page 54.

Exceptionally, if the unit has had any non-routine servicing or repair work, it will need to undergo a more thorough test and recalibration sequence. This is detailed on page 64 and onwards.

Every 30 days

- Perform a Visual Inspection looking for damage to the case, poleclamp, mains cable, etc.
- Lubricate O-Ring Seals with a cotton swab, applying a small amount of silicone grease to the O-Rings.

Either, if using **DISTILLED WATER** as the recirculating solution:

- Drain and replace the recirculating solution as described on page 54.

or, if using **ISOPROPYL ALCOHOL** as the recirculating solution:

- Drain and replace the recirculating solution as described on page 56.

Finally

- Fill in, sign, and date the maintenance log record!

Every 12 Months

Alarm Testing

Place the **HOTLINE®** on a suitable firm surface. Visually check that the recirculating solution level in the reservoir is above the MIN mark. Attach a Disposable Set, ensuring that it is free from kinks and twists.

Plug the unit into the electricity supply and switch on. Verify that the unit is working normally (recirculating solution circulating, temperature display gradually rising towards 41°C).

General Alarm Test



Press the General Alarm Test button. Observe:

- *the GREEN LED extinguishes.*
- *the THREE RED LEDs light up.*
- *the AUDIBLE ALARM commences beeping.*
- *the RECIRCULATING SOLUTION ceases circulating.*

If any of the above responses are missing, the unit must be removed from service and repaired.

Over Temperature Alarm Test



Allow the unit to run for sufficient time to stabilise the temperature. Press and hold the Over Temperature Alarm Test button. Observe:

- *the DISPLAY rises to 43°C - 44°C .*
- *the GREEN LED extinguishes.*
- *the RED Over Temperature LED lights up.*
- *the AUDIBLE ALARM commences beeping.*
- *the RECIRCULATING SOLUTION ceases circulating.*

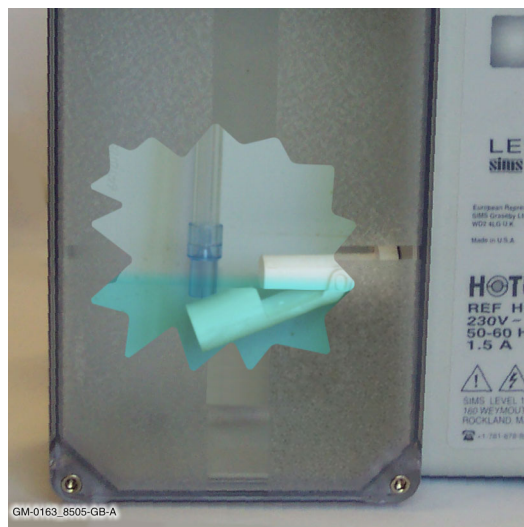
If any of the above responses are missing, the unit must be removed from service and repaired.

Recirculating Solution Level Alarm

Remove the Fill Port plug. Using a non-magnetic tool, gently depress the float switch arm.



Figure 5 - 1: Depressing the float switch. Here you see an offcut of scrap Disposable Set performing excellently as a non-magnetic probe.



Observe that:

- *the GREEN LED extinguishes.*
- *the RED recirculating Solution Level LED lights up.*
- *the AUDIBLE ALARM commences beeping.*
- *the RECIRCULATING SOLUTION ceases circulating.*

If any of the above responses are missing, the unit must be removed from service and repaired. The unit should return to normal operation upon releasing the float switch.

Disposable Set Interlock Alarm



While the unit is working normally, gently ease the Disposable Set away from the interlock block. **Be aware that a small amount of recirculating solution may escape during this test.** Before the Disposable Set is fully disconnected, the alarm should operate. Observe that:

- *the GREEN LED extinguishes.*
- *the RED Interlock Alarm LED lights up.*
- *the AUDIBLE ALARM commences beeping.*
- *the recirculating SOLUTION ceases circulating.*

If any of the above responses are missing, the unit must be removed from service and repaired. The unit should return to normal operation upon correctly reattaching the Disposable Set.

Replace O-Ring Seals

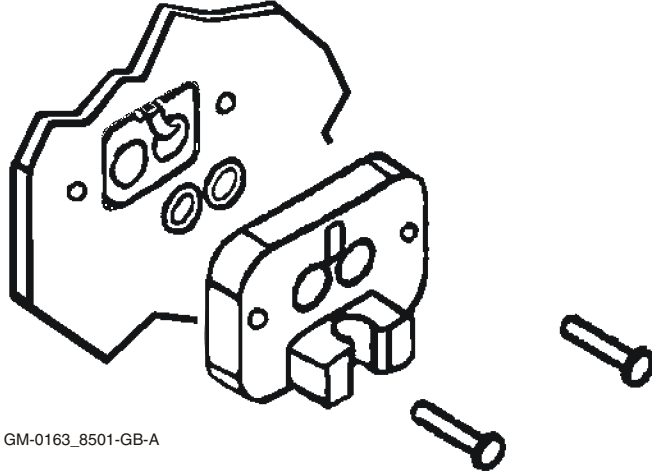


Figure 5 - 2: Getting access to the O-Ring Seals

- Remove the socket head screws with an $\frac{1}{8}$ -inch Allen key.
- Remove the disposable interface block, being careful of the microswitch lever.
- Using a cotton swab, remove the old O-Rings, and clean out the empty sockets.

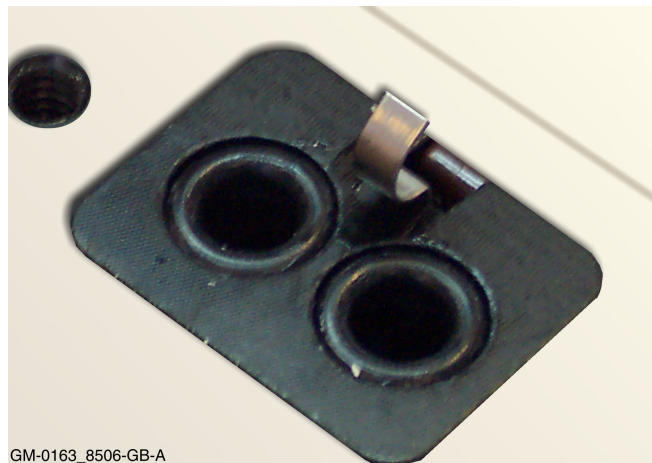


Figure 5 - 3: Revealed: the O-Rings in their niches

-
- *Apply a smear of silicone grease (Smiths Medical Part Number EZL 80-04-002) to two new O-Rings, and locate them in the sockets.*
 - *Re-attach the disposable interface block.*
 - *Re-fit the socket head screws. Again, take care not to damage or bend the microswitch operating lever.*

A kit of parts is available to make this task simpler. Please ask for part number reference EZL 80-04-001.

Either, if using DISTILLED WATER as the recirculating solution:

- Drain and replace the recirculating solution as described on page 54.

or, if using ISOPROPYL ALCOHOL as the recirculating solution:

- Drain and replace the recirculating solution as described on page 56.

or, if using HYDROGEN PEROXIDE as the recirculating solution:

- Drain and replace the recirculating solution as described on page 57.

Finally

- Fill in, sign, and date the maintenance log record!

Maintenance Solutions

At service intervals of either 12-months or 30-days, depending on the composition of your recirculating solution, you will need supplies of ready mixed solutions to perform maintenance. To make up a batch (1.4 litres) of solution, you will need:

Formula 1

140ml of 3% Hydrogen Peroxide PLUS 1260ml distilled water

This may be used as a disinfectant fluid for flushing the recirculating solution path during routine maintenance, or as a long-life recirculating solution enabling fluid change intervals to be extended to 12-monthly.

Formula 2

700ml of 70% Isopropyl Alcohol PLUS 700ml distilled water

This may be used as a disinfectant fluid for flushing the recirculating solution path during routine maintenance, or as a recirculating solution. It is NOT suitable for long-term use, and must be replaced at 30-day intervals.

Changing Recirculating Solution (Distilled Water)

If using plain distilled water as the recirculating fluid, then this must be changed at the 30-day service interval, using the procedure given here. Smiths Medical currently recommends using the Hydrogen Peroxide based recirculating solution which allows a 12-monthly recirculating solution change protocol, resulting in a significant reduction of service time.

- *Unplug the HOTLINE®.*
- *(Old case) Remove the Fill Port plug and hold the Unit over a sink to empty the water.*
(New case) Deploy the drain tube to empty the Unit.

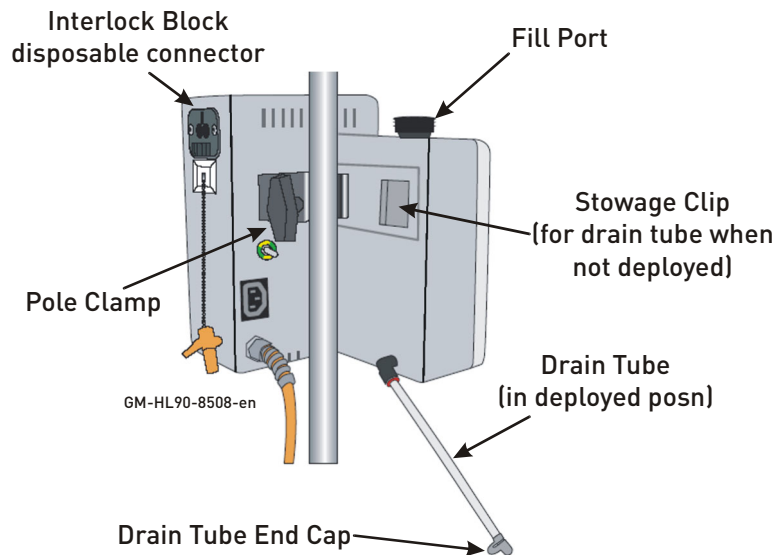


Figure 5 - 4: Rear view of new-style HOTLINE case, showing drain tube

- *Rinse reservoir with distilled water twice.*
- *Refill the reservoir with 1.4 litres of disinfectant flushing solution made to one of the formulae shown in the blue panel above. Do not fill the HOTLINE® reservoir with a Disposable Set in place, as this may result in an airlock in the HOTLINE® warmer.*
- *Connect a Disposable Set to the HOTLINE®.*
- *Plug the Unit in and switch on.*
- *Allow the disinfectant solution to circulate for 30 minutes.*

-
- *Switch off and disconnect the Unit.*
 - *Empty the unit once more.*
 - *Rinse reservoir with distilled water again.*
 - *Refill the unit with 1.4 litres of sterile distilled water.*
 - *Replace the Fill Port plug.*

NOTE: *Unless using one of the approved maintenance solutions, use only sterile distilled or de-ionised water. Failure to do so may lead to a build-up of mineral deposits in the recirculating solution path which may impair heater performance.*

Changing Recirculating Solution (Isopropyl Alcohol)

Since the Isopropyl Alcohol solution gradually loses potency, it must be replaced at the 30-day service interval using the following procedure:

- *Prepare two batches of 1.4 litres of recirculating solution according to formula 2 above for 35% Isopropyl Alcohol maintenance solution.*
- *Drain the HOTLINE®, and refill with one of the prepared batches.*
- *Install an L-70 or L-70 NI Disposable Administration Set in the HOTLINE®'s Disposable Set connector.*
- *Turn on the HOTLINE® and allow the fresh fluid to circulate for 30 minutes.*

-
- *Switch off the HOTLINE® and dispose of the Disposable Set in accordance with the usual procedures for your establishment. Drain the Fluid from the HOTLINE® and discard.*
 - *Refill the HOTLINE® with the second of the Isopropyl Alcohol solution batches you made earlier.*

NOTE: *If the HOTLINE® requires topping up at any time before the next routine recirculating solution change, make sure you always use the correct mix of Isopropyl Alcohol and Distilled water.*

Changing Recirculating Solution (Hydrogen Peroxide)

At the annual routine service interval the Hydrogen Peroxide solution must be replaced as follows:

- *Prepare two batches of 1.4 litres of recirculating solution according to formula 1 above for 0.3% Hydrogen Peroxide maintenance solution.*
- *Drain the HOTLINE®, and refill with one of the prepared batches.*
- *Install an L-70 or L-70 NI Disposable Administration Set in the HOTLINE®'s Disposable Set connector.*
- *Turn on the HOTLINE® and allow the fresh fluid to circulate for 30 minutes.*
- *Switch off the HOTLINE® and dispose of the Disposable Set in accordance with the usual procedures for your*

establishment. Drain the fluid from the **HOTLINE®** and discard.

- Refill the **HOTLINE®** with the second of the recirculating solution batches you made earlier.

NOTE: If the **HOTLINE®** requires topping up at any time before the next routine recirculating solution change, make sure you always use the correct mix of Hydrogen Peroxide and Distilled water.

Temperature Checking

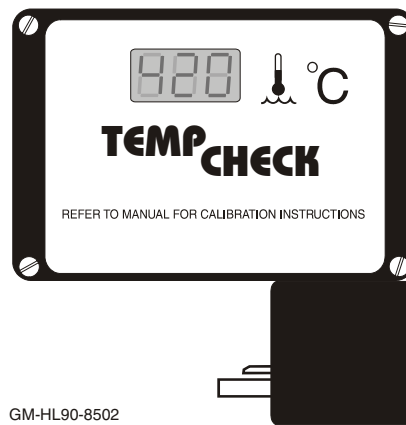


Figure 5 - 5: A **HOTLINE®** HLTA-40 TEMP CHECK wet thermometer

To accurately verify the displayed recirculating solution temperature, you will need a **HOTLINE®** HLTA-40 TEMP CHECK thermometer. This bespoke unit is inserted into the recirculating solution flow and reads the temperature directly from the recirculating solution as it leaves the heater element and internal thermistor sensors. This is the point at which the recirculating solution is at its highest temperature.

Measuring the temperature in the recirculating solution reservoir is less accurate. Typically the temperature here may be several degrees cooler, dependent on ambient temperature and other factors.

If you do not have a HOTLINE® TEMP CHECK thermometer, units may be returned to Smiths Medical for temperature verification.

Set up the HOTLINE® ready for use as before. Attach the TEMP CHECK thermometer to the interlock block of the HOTLINE® and connect the Disposable Set to the TEMP CHECK.

Carefully unpeel the black sticker from the back of the HOTLINE®, and loosely attach it in a safe place ready for re-use. Plug the TEMP CHECK's Mains cable into the Auxiliary Outlet socket of the HOTLINE®.

NOTE: *The Auxiliary Outlet is for use only with approved accessories supplied by your Smiths Medical distributor for that purpose.*

Run the HOTLINE® for 15 minutes to allow the temperature to stabilise. Verify that:

- the TEMP CHECK indicates a recirculating solution temperature between 41°C and 42°C
- The HOTLINE®'s display indicates the same temperature.

If either of these conditions is not met, the unit will require either recalibration or repairing and recalibration before it can be returned to active service.

If both conditions are satisfied, dismantle the test assembly, and replace the black sticker over the Aux socket. Document the date and results of your tests and return the HOTLINE® to active service.

Routine Maintenance Checklists

You may freely photocopy the checklists on the next three pages to act as a continuing record of your routine HOTLINE® HL-90 maintenance.

The correct checklist to use is dependent on the choice of protocol used for maintenance on the HOTLINE®s in your care. If you choose to stick to the traditional distilled water recirculating solution, you will need the first checklist. This allows for the changing of the recirculating solution on a monthly cycle.

Otherwise, the third checklist corresponds with Smiths Medical's recommended protocol of having a 12-month interval between solution changes, and using a disinfectant mixture as the recirculating solution on a permanent basis.

In some territories, Hydrogen Peroxide may not be readily available, or it may be that it is not included in the establishment's preferred protocols. If that is the case, and it is still necessary to maintain a disinfectant recirculating solution, then the second checklist gives the correct pattern when using Isopropyl Alcohol solution with a 30-day replacement cycle. It is not permitted to use the Isopropyl Alcohol solution on a 12-monthly replacement cycle as it loses its potency much more rapidly than the recommended Hydrogen Peroxide solution. For this reason, batches of Isopropyl Alcohol solution (Formula 2) should ideally be freshly mixed immediately before use.

Recirculating Solution is 35% Isopropyl Alcohol

Unit Serial Number	
Date of Acquisition	
Month 1 was when?	

	MONTH 1	MONTH 2	MONTH 3	MONTH 4	MONTH 5	MONTH 6	MONTH 7	MONTH 8	MONTH 9	MONTH 10	MONTH 11	MONTH 12
Change Recirculating Solution	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Grease O-Ring Seals	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓
Replace O-Ring Seals	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
General Alarm Test	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Over Temperature Test	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Interlock Alarm Test	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Low Recirculating Solution Alarm Test	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Verify Temperature Calibration	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
<i>Tested by</i>												
<i>Date of Test</i>												

START A FRESH RECORD CARD FOR THIS HOTLINE® NOW

Recirculating Solution is 0.3% Hydrogen Peroxide

Unit Serial Number	
Date of Acquisition	
Month 1 was when?	

	MONTH 1	MONTH 2	MONTH 3	MONTH 4	MONTH 5	MONTH 6	MONTH 7	MONTH 8	MONTH 9	MONTH 10	MONTH 11	MONTH 12
Grease O-Ring Seals	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗
Replace O-Ring Seals	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
Change Recirculating Solution	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
General Alarm Test	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
Over Temperature Test	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
Interlock Alarm Test	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
Low Recirculating Solution Alarm Test	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
Verify Temperature Calibration	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓

START
A FRESH
RECORD CARD
FOR THIS
HOTLINE®
NOW



Tested by

Date of Test

GM-01.63_8507-GB-A

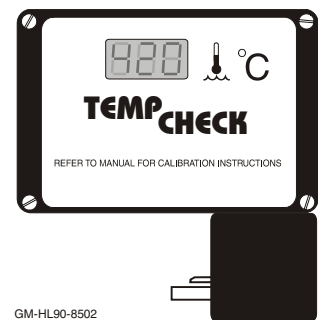
Full Service Test Procedure

This sequence must be used:

- either after any repair or service work where the case was opened,
- or when the unit has failed temperature calibration verification.

Things you will need

- Room Thermometer
- TEMP CHECK HLTA-40
- HOTLINE® Disposable Set L-70
- Small and Medium Straight Screwdrivers
- Non-magnetic Probe



CAUTION: Take care while operating the HOTLINE® with the case front open. Mains voltages are present inside. Avoid contact with any internal components not specified in this procedure.

CAUTION: The Auxiliary Outlet is for use only with approved accessories supplied by your Smiths Medical distributor for that purpose.

CAUTION: Do not fill the HOTLINE® reservoir with a Disposable Set in place. Failure to remove the Disposable Set before the fill procedure may result in an airlock in the HOTLINE® warmer.

NOTE: When filling the HOTLINE®, use approved recirculating solutions only. Failure to do so may cause damage to the equipment.

NOTE: Check the calibration due date on the back of the TEMP CHECK before commencing this procedure.

NOTE: TEMP CHECK thermometers are designed for measuring circulating recirculating solution flow only and are not intended for measuring ambient (air) temperatures.

HL-90 Service Test Specification

Setup

- [i] *Fill unit up with de-ionised water, attach an L-70 Disposable Set, turn on and let the HOTLINE® run for 40 minutes minimum.*
- [ii] *Check that the Ambient Room Temperature is $22.0^{\circ}\text{C} \pm 2.0^{\circ}\text{C}$. If the temperature is out of this specified range, do NOT proceed with this calibration procedure.*
- [iii] *Remove the Disposable Set, install the Temp Check to the unit, and re-attach the Disposable Set.*
- [iv] *Remove case front. Confirm that J201 is in the "40" position. (See Appendix 2)*

Check For Leaks

- [i] *Observe that the fluid is circulating in the HOTLINE® reservoir.*
- [ii] *Check all fittings and seams in the recirculating system for leaks.*

Interlock Switch Test

- [i] *Slowly release the Temp Check from the interlock switch. A small amount of recirculating fluid may escape. The alarm should activate.*
- [ii] *Return the Temp Check to the interlock switch. Unit should return to being operational.*

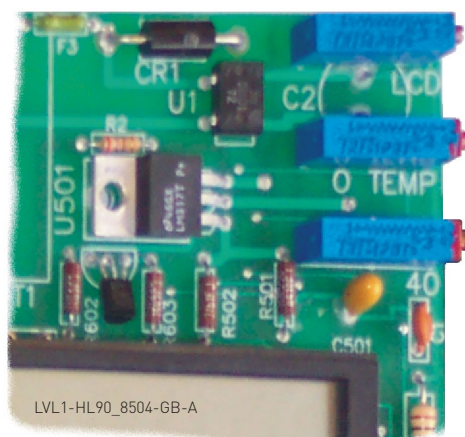
Alarm Test Switch

- [i] Depress the General Alarm Test switch.
- [ii] The "Operational" or "Warming" LED should turn off. All "Alarm" LED's should be flashing and the alarm must be audible.
- [iii] Release switch and the system should become operational again.

Check Float Switch

- [i] To check float switch, remove the fill port cap and depress the float switch (which is located inside the reservoir) with a non-magnetic float switch probe.
- [ii] The "Recirculating Solution Level" warning LED should light and the alarm will be audible. The Green "Operational" LED and the pump should turn off.
- [iii] Release the float switch and the system will once more become operational.

Set Recirculating Solution Temperature



- LCD** Used to align the displayed temperature with the actual water temperature
- O TEMP** Adjusts the set point for the Over Temperature Alarm
- H20** Sets the operating point of the temperature control circuit. On older pumps this may be labelled "40" as shown here.

Figure 5 - 6: Purpose of the Pots

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- [i] *If necessary, turn the "H2O" or "40" temperature set point adjustment pot clockwise to increase recirculating solution temperature, or counter-clockwise to decrease recirculating solution temperature. A quarter turn of the pot corresponds to a change in temperature of about 0.3°C. Allow 5 minutes between adjustments for the temperature to stabilise.*
 - [ii] *Set unit to run at 41.9°C ± 0.1°C as measured by the TEMP CHECK and allow to stabilise.*

Set Over Temperature Alarm Set Point

- [i] *Adjust the "LCD" adjustment pot so the LCD reads 43.1°C. If the alarm activates before the display reaches 43.1, then adjust the over temperature pot clockwise until the alarm turns off and continue adjusting LCD.*
- [ii] *Adjust the over temperature pot counter-clockwise until the alarm sounds.*
- [iii] *Adjust the "LCD" adjustment pot counter-clockwise and confirm that the alarm deactivates.*
- [iv] *Adjust the "LCD" adjustment pot clockwise again and confirm that the alarm activates at 43.1°C.*
- [v] *Repeat the test twice to confirm the activation set point.*

Calibrate LCD

- [i] *Turn the "LCD" adjustment pot on the PCB so that the unit display (LCD) is equal to the that of the Temp Check ± 0.0°C.*
- [ii] *To confirm the Over Temperature Alarm, depress and hold the over temperature switch on the side of the enclosure.*

[iii] *The PCB display should increase to $43.6^{\circ}\text{C} \pm 0.3^{\circ}\text{C}$ and then the Over Temperature Alarm should activate. Release and the unit should return to normal operation.*

[iv] *Attach and close the case front.*

Idle Check

[i] *Allow the unit to run at $41.9^{\circ}\text{C} \pm 0.1^{\circ}\text{C}$ for 15 minutes and confirm that the display is stable for a further 5 minutes.*

[ii] *Record the ambient room temperature which should be $22.0^{\circ}\text{C} \pm 2.0^{\circ}\text{C}$. If it is out of this range you can not complete this calibration. You must start a fresh calibration sequence.*

Safety Test

[i] *Safety test the HOTLINE[®] in accordance with the Electrical Safety Testing System normally used by your establishment.*

Test Completion

[i] *Drain the distilled water and refill unit with 1.4 litres of either fresh sterile distilled water or whatever formula is the usual establishment practice.*

[ii] *Verify that the Service History record has been completed. Clean case and return to service.*

Other Territories

Nominal Temperature	Water Temperature (paragraph 6)	Over Temperature Set Point (paragraph 7)
40	39.9	41.1
42	41.9	43.1

It is common practice both in the U.S.A. and in the U.K. to set a nominal temperature of 42°C.

In other territories, a different set point (40°C) may be adopted as the “normal” setting.

For reference, the details for the alternative Nominal Temperature adjustment set points are shown here.