

# CytoTherm

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## CytoTherm-4S

### Owners Manual

COMPACT  
PLASMA THAWING  
WATER BATH  
with Sliding Agitation

Model **CT-4S**  
Version 4.09 and  
higher.

#### Warranty



*Each CytoTherm product is produced under rigid quality control standards. This unit is fully warranted for a period of two years from the date of purchase. Call (609) 396-1456 or (800) 747-9699 for help. If necessary send unit to:*

*CytoTherm 110 Sewell Avenue Trenton, NJ 08610 Fax (609) 396-9395*

Please mail in your warranty card.

Please record the following: Serial No. \_\_\_\_\_ Date of Purchase \_\_\_\_\_

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**SPECIFICATIONS:** Thawing temperature adjustable 25°C to 40°C. Preset to 37.0°C. Overtemp alarm 1.0°C over thawing temperature. 45°C safety thermostat. Accuracy 0.1°C. Easy to do, digital temperature calibration. Power 770 Watt, Available in 120 Volt or 230 Volts, 50 or 60 Hz. (must be grounded).

## **DESCRIPTION**

The CytoTherm-4S (CT-4S) is laboratory instrument that uses a recirculating water temperature bath and a sliding action to agitate the plasma. The bags are pushed against bars to stir the plasma inside the bags and speed up the thawing time.

The CT-4S comes with a RACK that will thaw 1 to 4 plasma bags (up to 600 ml) at a time. The operator never comes in contact with the water in the BATH when handling the plasma. The RACK keeps the entry ports of flat-frozen units out of the water so an overwrap bag is not necessary. Folded frozen plasma units require an overwrap bag to protect the entry ports of the plasma bag. Both types of freeze methods can be thawed together.

A large digital display indicates the temperature and counts down the thawing time. The CT-4S comes with an evaporation lid.

## **SETTING-UP**

The unit comes packed in 1 box. Make sure you have received the following:

..... Water Bath	..... Link bar
..... Rack with 4 bag clamps	..... Drain Tubing
..... Evaporation Lid	..... Power Cord
..... Instruction Book	..... Overwrap bags
..... Algaecide USA only	

Links to instructional videos found at [www.cytotherm.com](http://www.cytotherm.com).

Fill the BATH with tap water to the bottom of the shelf that supports the RACK (12 liters). If your water contains a lot of lime, use distilled or de-ionized water, add a pinch (0.01 gr.) of salt to make the water conductive so the level sensors will work. Do NOT use saline solution. Add Algaecide Part #ALG240 (3.0 ml. Available USA only) to the water. Any other bath clearing agent can also be used.

Connect the power cord to the BATH and then plug the power cord into a properly grounded electrical outlet.

Turn the POWER switch ON. The pump will start recirculating the water and the display will indicate the temperature. The unit will heat up to 37.0°C. (The thawing temperature is adjustable. See Programming in MODES). The display will show “HEAT ON” when the unit is heating.

## **OPERATION**

Wait for the water to heat up to 37.0°C.

For your protection, use gloves when working with any blood products.

Flat-frozen plasma units can be thawed without an overwrap bag. Hold a bag of flat-frozen plasma (bare or overwrapped) with the tubes up. Slip the CLAMP (plastic piece with a stainless spring attached) over the top of the bag and line up the 3 grooves in the CLAMP with the tubes of the plasma bag.

Place the bottom of the plasma bag into the water, between the rods of the RACK. Pull the stainless spring of the CLAMP over the screw head in the RACK. The spring should pull the plastic bar and plasma bag snugly against the corral. The spring tension can be adjusted by bending the stainless steel spring. If the stainless steel spring breaks, the clamp must be replaced (Part # C4S-CLM).

Folded frozen plasma must be overwrapped. Load it the same way. The CLAMP will hold the plasma unit by the overwrap bag.

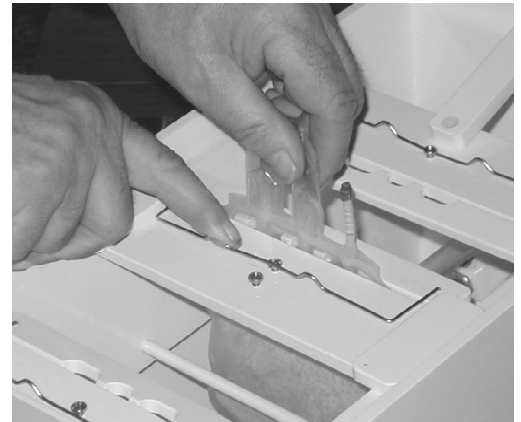
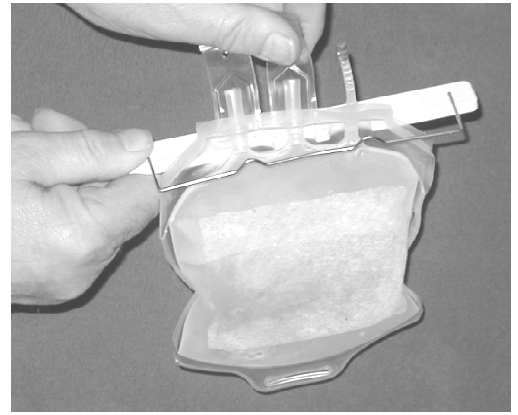
Overwrap bags 15 cm. wide by 30 cm. (6" x 12") long are available from Rutan Supply 39 Siding Pl. Mahwah, NJ 07430 Tel. 800 872-1474.

The LINK bar connects the RACK to the rack motor. Place the protruding rod of the LINK into the hole on top of the RACK. The hole in the LINK fits over the protruding rod on the rack motor cam.

Push START to begin thawing for the programmed time. The RACK will slide back and forth forcing the plasma bags against the rods of the RACK and massaging the plasma. Use PLUS or MINUS to increase or decrease the thawing time. When the time is finished, the buzzer will call the operator back.

The STOP switch ends the thawing. If more thawing time is needed, hold PLUS while pushing START and the unit will thaw for another 3 minutes.

Remove the LINK and lid the bath with the evaporation lid when plasma is not being thawed. Turn the POWER switch off if the CT-4S will not be used for a while. The BATH requires 25 minutes to raise the temperature from room temperature to 37° C, ready for thawing plasma.



## **LEAKY PLASMA BAG**

If a Plasma bag leaks, turn the unit off and discard the leaking bag. The remaining bags are not contaminated, because the ports are always kept out of the water. The bath water is contaminated and must be drained and the bath cleaned. See **CLEANING the BATH.**

## **CLEANING the BATH**

For your protection use gloves when working with any blood products. Turn the unit off.

1. Remove the RACK and LINK and take it to the sink, clean under running water and wipe with bleach towelettes or a 10% bleach solution. Rinse off in running water.
2. Drain the bath by attaching the provided tubing to the DRAIN valve. [ See page 9 ] Tilt the bath to drain as much water as possible through the drain valve.
3. Wipe the BATH with bleach towelettes or a 10% bleach solution. Use only water and bleach towelettes or a 10% bleach solution for cleaning. Use alcohol for removing oil or grease. **DO NOT IMMERSE THE WHOLE BATH. WIPE THE PUMP SCREEN FROM THE OUTSIDE ONLY. DO NOT REMOVE THE SCREWS.** Rinse out the bleach with water.
4. Remove the drain tubing and fitting to close the DRAIN valve. Fill the bath with water. If you use deionized or distilled water add a little pinch (about 0.01 gr.) of table salt. . Add Algacide Part #ALG240 (1.0 ml. per 4 liter of water. Available USA only) to the water. Any other bath clearing agent can also be used.
5. Mount the RACK

Reassemble the unit. See **SETTING UP.**

## MODES

**STANDBY MODE.** Just turn the unit ON. The unit recirculates the water in the BATH, The unit heats up and maintains 37.0°C in the BATH.

**THAWING MODE.** The unit continues recirculating tempered water through the BATH and starts moving the RACK back and forth. The hanging plasma bags are pushed against rods in the RACK mixing the plasma in the bags. A count-down timer is started to display the time-to-completion of thawing. START initiates thawing. Timing out or pushing STOP stops thawing.

**DIAGNOSTIC MODE.** Is for technician access. Hold MINUS as you turn the unit ON.

1. To restore the unit to initial factory settings, press ENTER while still holding MINUS. The unit displays “UNIT RESET”. Turn the unit off. You have to re-calibrate the temperature after resetting the unit.
2. “PUMP TEST” is a diagnostic tool to check if each actuator turns on. It is checked only when a pump does not operate. Release MINUS then push ENTER to verify that you are a technician. The display shows “PUMP TEST”. MINUS turns on Pump 1, ENTER turns the cam to push the RACK back and forth. Push PLUS to go to next function.
3. Overtemperature Alarm Test. Hold MINUS as you turn the unit ON. DIAGNOSTICS will be displayed. Push ENTER. Push and release PLUS until ALARM TEST is displayed. Push ENTER, the heater will heat continuously and the pumps will turn on. When the temperature reaches 1.0C above the target temperature the alarm will sound. Turn Off the unit. If alarm does not sound, contact CytoTherm. Alarm test should be performed every 3 months as part of unit maintenance.

**PROGRAM MODE.** Allows you to:

1. Program the thawing time.
2. Calibrate the temperature.
3. Set the target thawing temperature. The Alarm temperature is 1.0C above the target temperature.
4. Select the signal when thawing is done (continuous or pulsed).

Enter PROGRAM MODE by holding ENTER while turning the unit ON. Follow the displayed instructions to program. Pushing PLUS advances the menu to the next parameter.

Programming the Thawing Time. When the thawing time is displayed, press MINUS because you want to change the time. Use PLUS or MINUS to set the desired new thawing time, press ENTER to program in the new time. Turn the unit off.

Calibrating Temperature. Turn the unit on and let it heat up to 37.0°C. Check the displayed temperature with your accurate thermometer. Hold or hang your thermometer so the end is in the water in the bath. If the displayed temperature needs to be changed, turn the unit off. Enter PROGRAMMING MODE by holding ENTER as you turn the unit on. When the thawing time is displayed push PLUS until the display shows “CALIBRATE TEMPERATURE”. Push MINUS because you want to change the displayed temperature. Use PLUS or MINUS to make the displayed temperature agree with your thermometer. Push ENTER to record the calibration. Turn the unit off. If the unit can not be calibrated, or if the calibrated temperature is not stable, have a technician check the unit. See TECHNICIAN FUNCTIONS.

**SWITCH FUNCTIONS** There are 6 switches on the front panel:

**START.** Starts function.

**STOP.** Stops function.

**ENTER.** Records parameter changes.

**PLUS.** Steps through parameters and increases value of parameter.

**MINUS.** Allows change in parameter and decreases value of parameter.

**Sketch of FIN logo.** Not currently used. Future expansion.

# **TROUBLESHOOTING**

English: *Unit should be opened by qualified technicians only.*

French: *Ne puet être ouvert que un techicien autorize.*

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Unit is "dead"	Verify that you are plugged into a live, grounded outlet.  Have qualified technician check if fuse is blown or connectors are loose. There are three fuses (see wiring diagram) in the unit. Fuse-1 & Fuse-2 are located on the circuit board. 8Amp for 120Vac models and 5Amp for 240 Vac models. Fuse-3 is a ¾ Amp slow blow inline fuse on the transformer 12 Vac line.
Computer does not boot when turned on. Does not display readable messages.	Unit is not responding, but the display is backlit. Backlit display indicates that the unit has power. Turn unit off for at least 10 seconds and turn unit back on. If this does not solve problem, replace the computer (program module part# C4S-PM).
Display says "low water" but there is water.	The unit is not sensing that water is present. a. Make sure you are using tap water or adding salt to deionized water to make it conductive. b. The level sensor (screw inside the BATH on the right side) is dirty. Scrape it and then clean with alcohol.
Unit does not heat but "heating" is displayed	Was the unit filled with water over 40C.? If yes then cool the water to 20C to reset the safety thermostat.  Check the Safety thermostat (#C-TH) and the heaters (#14-77) for continuity.
Temperature calibration does not "hold", it changes .	Replace temperature sensor (#CT4-TS).
Temperature calibration is out of range.	Have technician check the voltage at TP1 (see wiring diagram) , it should be 0.395 +/- .001 Vdc. If TP1 was correct, replace the temperature sensor (#CT4-TS).  If TP1 was not correct, restore the unit to initial factory settings (see DIAGNOSTICS) do full calibration. See Technician Functions > Full Calibration.
Pump does not circulate. No hum.	No power to pump or pump winding open. Check the pump (#14-PM). DO NOT DISASSEMBLE PUMP.
Pump does not circulate. Makes humming noise.	Blow air through pump outlet tubing to clear small obstruction. Check pump (#14-PM). DO NOT DISASSEMBLE. Any evidence of leaking on motor side means pump must be replaced.
RACK not moving back and forth	Check if cam is loose on motor. Check the rack motor (#C4S-RKM).

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## MESSAGES, Troubleshooting

**COLD** indicates that the water temperature is less than 20.0C. As soon as the temperature rises above 20C, it will display the true temperature.

**TOO HOT** is an audible and displayed alarm condition that indicates that the bath temperature is 1.0C higher than the set temperature. If the operator pours hot water into the bath he/she will trigger this alarm. This should never happen in normal operation. If it does, contact CytoTherm.

**LOW WATER** First make sure that a pinch ( 0.01 gr) of salt was added if deionized water was used. Pour water into the BATH to the correct level (see SETTING UP).

## MAINTENANCE

Daily: Wipe off the unit.

Once every two weeks:

### Clean the BATH

1. Remove the RACK and LINK and take them to the sink, clean under running water and wipe with bleach towelettes or a 10% bleach solution. Rinse off in running water.
2. Drain the bath by attaching the provided tubing to the DRAIN valve. [ See page 9 ] Tilt the bath to drain as much water as possible through the drain valve.
3. Wipe the BATH with bleach towelettes or a 10% bleach solution. Use only water and bleach towelettes or a 10% bleach solution for cleaning. Use alcohol for removing oil or grease. DO NOT IMMERSER THE WHOLE BATH. WIPE THE PUMP SCREEN FROM THE OUTSIDE ONLY. DO NOT REMOVE THE SCREWS. Rinse out the bleach with water.
4. Remove the drain tubing and fitting to close the DRAIN valve. Fill the bath with water. If you use deionized or distilled water add a little pinch (about 0.01 gr.) of table salt. . Add Algacide Part #ALG240 (1.0 ml. per 4 liter of water. Available USA only) to the water. Any other bath clearing agent can also be used.
5. Mount the RACK

Every 3 Months:

Temperature Calibration. Run temperature calibration at least every 3 months or more often if your institution procedures or regulations require. See PROGRAM MODE > TEMPERATURE CALIBRATION.

Overtemperature Alarm Test. Hold MINUS as you turn the unit ON. DIAGNOSTICS will be displayed. Push ENTER. Push and release PLUS until ALARM TEST is displayed. Push ENTER, the heater will heat continuously and the pumps will turn on. When the temperature reaches 1.0C above the target temperature the alarm will sound. Turn Off the unit. If alarm does not sound, contact CytoTherm. Alarm test should be performed every 3 months as part of unit maintenance.

## PARTS LIST CT-4S

14-MP	Magnetic pump	DP-SW	Switch, 2-pole
14-77	Heater (2 needed)	C-TH	Safety Thermostat
CT4-PC	Printed Circuit Board	C4-DISP	Display
C4S-BTH	Bath Section	C4-TR	Transformer 120V
C4S-RKM	Rack Motor	C4-TR2	Transformer 240V
C4-TS	Temperature Sensor	C4S-CLM	Clamp ( bag to rack)
C4S-EL	Evaporation Lid	C4S-RK	Rack (holds 4 bags)
C4S-LINK	Link Bar	C4S-PM	Program Module
C-VLVF	Drain Valve Female	ALG240	Algacide. USA only
C-VLVM	Drain Valve Insert + Tubing		

Always specify model and serial number when ordering.

## SOURCES for SUPPLIES

BAGS overwrap 15 cm. wide by 30 cm. (6" x 12") long are available from US Plastics 1390 Neubrecht Rd. Lima OH 45801 Tel. 800 537-9724. Part #47352.

## **TECHNICIAN FUNCTIONS**

### **FULL CALIBRATION**

Adjust the 10-turn potentiometer so that the voltage between TP1 and Ground (Earth) is .395 V (see wiring diagram for locations). Actual temperature calibration is then set in Programming Mode (see PROGRAMMING MODE).

The trimmer near the BODY connector adjusts the display contrast.

### **SAFETY FEATURES**

#### **WATER LEVEL SENSOR**

The unit will display LOW WATER and beep if there is not enough water to cover the level sensor inside the bath, a screw located 3/4" above the temperature sensor. The heat will also turn off. The water must be conductive in order for the level sensor to work. Use tap water or add a pinch (0.01 gr.) of salt if you are using de-ionized or distilled water.

#### **OVER TEMPERATURE**

The unit will display TOO HOT and emit double-beeps if the temperature reaches 1.0°C above the thawing temperature. The controls will turn the heaters off. In the unlikely situation that there is a component failure and the unit continues heating, an independent safety thermostat will turn the heating off at 45 °C.

#### **SAFETY THERMOSTAT**

An independent safety thermostat will turn heaters off if the temperature goes above 45 °C. It has to be cooled to 20 C to reset.

#### **FUSING**

The main fuses (Fuse-1 & Fuse-2) are located on the Printed Circuit Board and are 8Amp for 120Vac and 5Amp for 240Vac units. Correct the cause of the blown fuse.

The transformer has a ¾ Amp slow blow fuse (Fuse-3) on the wires of the 12 Vac winding used to generate the 5 Vdc supply.

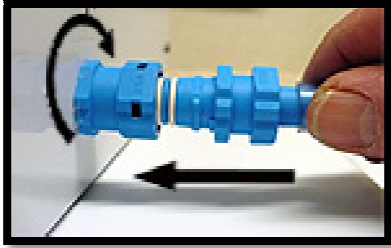
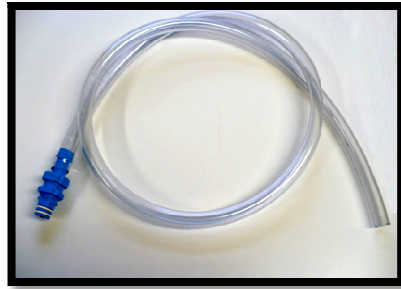
#### **ISOLATION**

The circuitry is isolated from the power lines by a transformer and from the heaters by an opto-coupled solid state relay.



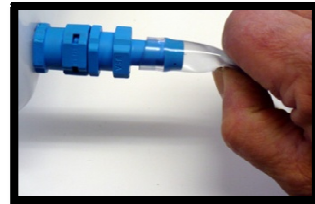
## CT-4S Quick Connect Drain

**Drain Tube Assembly  
Part C-VLVM**

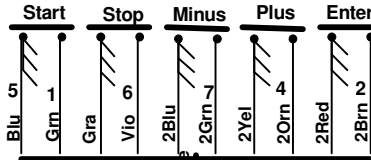
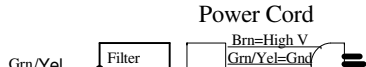


**Insert drain tube into drain housing part C-VLMF Twist clockwise until it engages. Push in and turn clock wise to lock.**

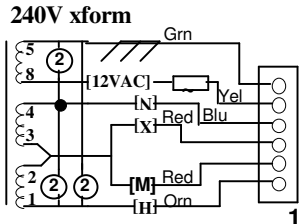
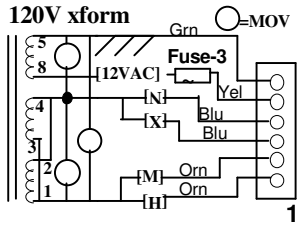
**After water starts to flow, gently pinch the drain tube and release to remove any air to improve flow.**



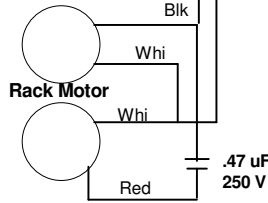
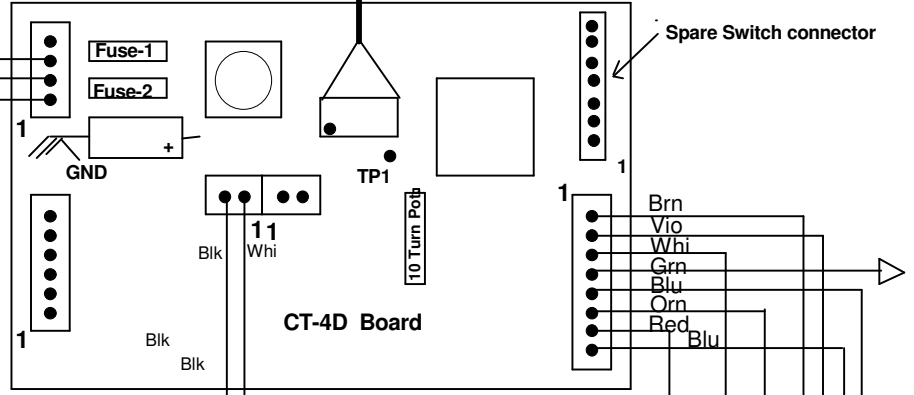
Rev 25 Jun 06 Fuse Table & TP1  
 Rev 5 June 04 add 3/4A slow blow fuse  
 to 12 Vac Xform lead. See D 467.



Fuse	Amps	Vac	Type
1&2	8	120	Fast
1&2	5	240	Fast
3	3/4	12	Slow Blow



② = 240V MOV



# Wiring CT-4S

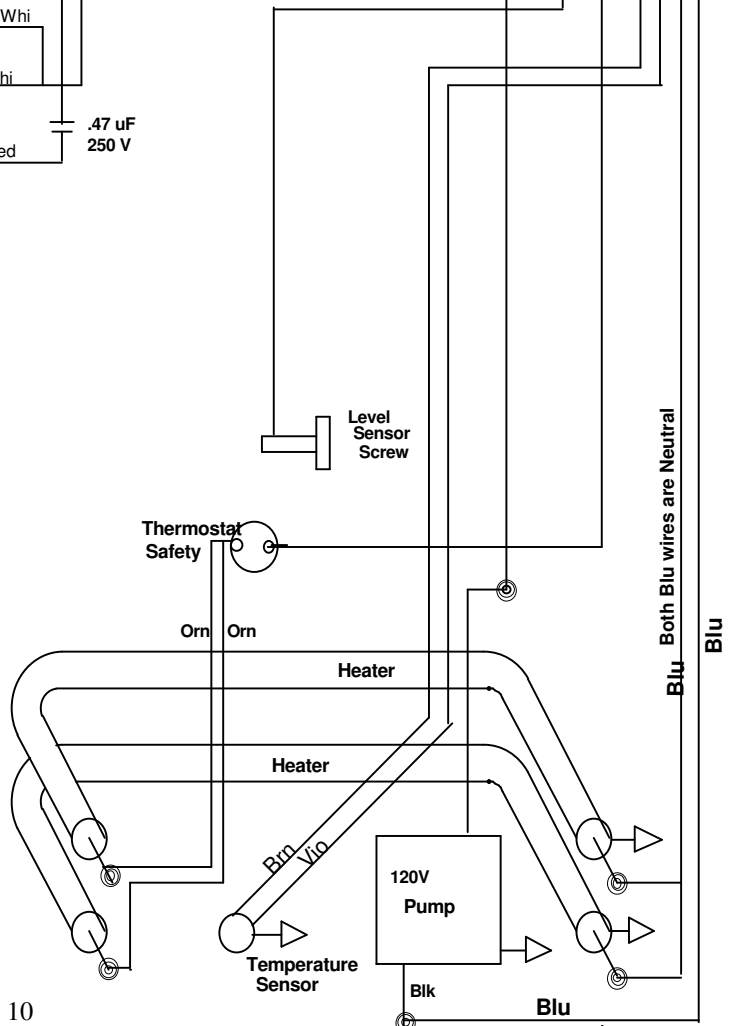
## Dwg # 433

File WCT4S.kcw Home  
 May 2002  
 Used in CT-4S Instruction Book \Draw#\CT4SinsX.doc

Ground is Green with Yellow stripe

- ⎓ & → Ground
- ⊙ Wire Nut

120V wired as shown  
 240V the 2 heaters are in series



Both Blu wires are Neutral  
 Blu