

# CytoTherm

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## CytoTherm-D4 Dry Plasma Thawing with Massaging Action

Model

### CT-D4

Ver 409 and  
higher

### Owner's Manual



### WARRANTY

*Each CytoTherm product is manufactured 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 assistance. If necessary send unit to:*

**CytoTherm** 110 Sewell Ave. Trenton, NJ USA Tel 609 396-1456 Fax 609 396-9395  
Please record the following: Serial No. \_\_\_\_\_ Date of Purchase \_\_\_\_\_

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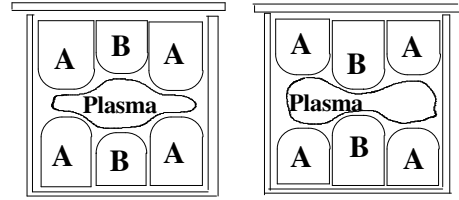
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**SPECIFICATIONS:** Thawing temperature adjustable 25°C to 40°C. Preset to 37.0°C. Overtemp alarm 1.0°C over thawing temperature. 45°C safety thermostat. Accuracy 0.1°C. Easy to do, digital temperature calibration. Power 900 Watt, Available in 120 Volt or 230 Volts, 50 or 60 Hz. (must be grounded).

## **DESCRIPTION**

The CytoTherm-D4 (Model CT-D4) is a laboratory instrument for thawing plasma while keeping the plasma bag dry. Tempered water is recirculated through a bladder. The plasma bag to be thawed lays on one part of the bladder, while rest of the bladder is folded over and covers the plasma bag(s). The bladder is divided into segments which are pressurized at different times to gently massage the plasma bag(s), thereby speeding thawing. The plasma bag(s) remains dry.



There are 2 isolated sections. If a leak is detected, the thawing stops and an alarm sounds. The plasma bags in the other section remains sterile.

A digital timer displays the time to completion of the thawing. The plasma bag is visible through the clear lid during thawing so you can see when it has been fully thawed.

Each of the 2 sections can thaw two 450ml. bags or one 1,000ml. Jumbo bag for a total of 4 x 450ml. or 2 Jumbo bags.

All the air that comes in contact with the internal water is filtered with a 0.1 micron AIR FILTER.

## **SETTING-UP**

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

- |                                                      |                                               |
|------------------------------------------------------|-----------------------------------------------|
| ..... Main Bath                                      | ..... 6 Y shaped blue silicone accelerators   |
| ..... Rack                                           | ..... Inlet and Outlet Port Plugs (4 of each) |
| ..... Lid                                            | ..... Instruction Book                        |
| ..... 4 Bladders, 2 of which are mounted inside RACK | ..... Power Cord                              |
| ..... Drain tubing                                   | ..... Algacide (contiguous USA only)          |
| ..... 4 x Air Filters                                |                                               |

For video instructions, visit [www.cytotherm.com](http://www.cytotherm.com).

Place the Bath on a counter. Fill with tap water to the Water label inside the BATH. If you use deionized water, add a pinch of salt to make the water conductive. Do NOT use saline solution. Add 3 ml. of Algicide Part #ALG240 (1.0 ml. per 4 liter of water available in contiguous USA only) to the water. Any other bath clearing agent can also be used.

Place the RACK and LID on the BATH. Lift the front of the rack and attach the tubing from the Bath right side to the RACK left side fitting. Attach the BATH right side tubing to the RACK left side fitting. Push the front of the RACK down and towards the center of the bath to engage the leak detector connectors (SS springs). Push the back of the RACK down to squeeze the air seal.

The RACK has 2 bladders mounted inside. They are easy to remove and replace by just twisting the bladder FITTINGS as you push down or pull up on the bladder FITTINGS.

Plug the unit in and turn it on. The bath will warm up and maintain the programmed thawing temperature, preset to 37.0°C.

## OPERATION

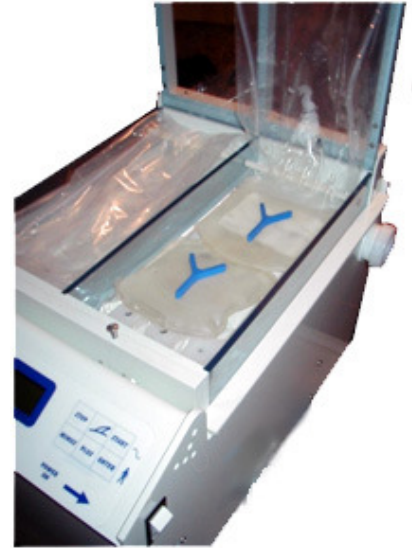
Wait for the water to heat up to 37.0°C. Open the LID by:

1. Pushing the LOCKBAR to the left.
2. Lifting the front of the LID until it is vertical.
3. Lowering the LID into the slot .

Lift the top of the BLADDER and place the plasma bags on the bottom part of the BLADDER. Place the "Y" accelerators on the middle of each plasma bag. Cover the plasma bags with the top portion of the bladder. Tuck in the BLADDER so that it stays within the walls of the section of the RACK.

Close the LID by lifting straight up until it stops and then rotating it down (forward). Lock it into place by pushing the LOCKBAR to the right.

Push START to begin thawing for the programmed time. The pumps will pump tempered water through the BLADDER and massage the plasma bags. The thawing time will be displayed. Use PLUS or MINUS to increase or decrease the thawing time. When the time has expired, the buzzer will call the operator back.



STOP ends the thawing and drains the bladders.

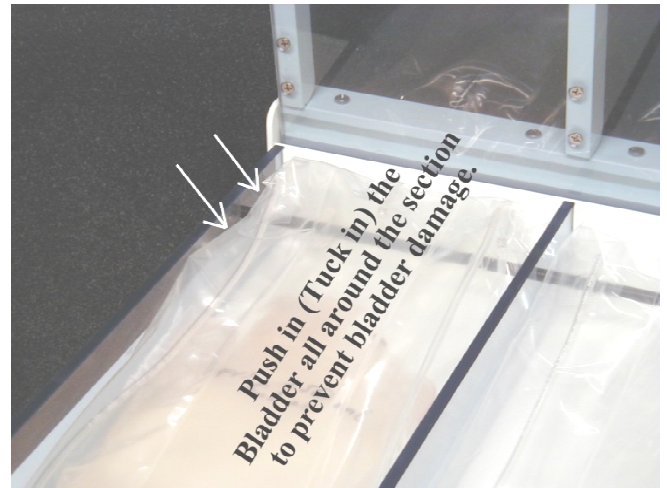
If more thawing time is needed, hold PLUS while pushing START and the unit will thaw for another 3 minutes.

Thawing time is mainly a factor of thickness of the plasma in the bag. Flat-frozen plasma thaws quicker than folded-frozen plasma, which is thicker.

## LEAKS

In case of a leak, the alarm will sound and the thawing will stop. Open the LID to see which bag leaked. The leak will be confined to only one of the sections. The other section is not contaminated. Determine what leaked:

**1. Plasma bag leaked.** Pick up the plasma bag and observe for leaks. If there is a leak, discard the bag(s). Check if the Bladder also leaked. See # 3 below. If the BLADDER did not leak, use a paper towel to soak up the visible leaked solution. Remove the BLADDER by first lifting the top of the BLADDER up to drain out as much of its internal water as possible. Remove the INLET and OUTLET FITTINGS by holding the FITTINGS and twisting them as you pull up.



If you need to rush thawing the plasma bags in the non-contaminated section, you can do the full clean up later. Use the plastic plugs to close off the stainless steel ports, turn the unit on and start thawing. You will have to watch the plasma bags to see when they are thawed, because the count down timer starts at the full thawing time.

Rinse the BLADDER under flowing water and wipe with a bleach towelette or a 10% bleach solution.

Wipe out the inside of the RACK and then wipe it with a bleach towelette or a 10% bleach solution. Remount the cleaned BLADDER in the RACK.

**2. BLADDER leaked.** If the plasma bag did not leak, the leak must be in the bladder. Wipe off and place the plasma bag(s) aside. Remove and discard the BLADDER by first lifting the top of the BLADDER up to drain out as much of its internal water as possible. Remove the INLET and OUTLET FITTINGS by holding the FITTINGS and twisting them as you pull up. Wipe up all the leaked solution inside the RACK. Wipe the inside of the RACK with a bleach towelette or a 10% bleach solution. Remount a new BLADDER. You are ready to start thawing again.

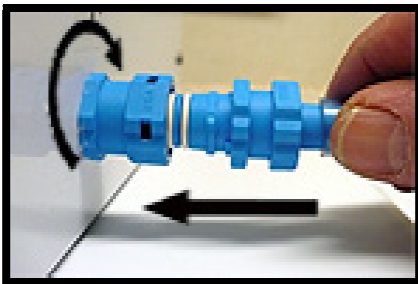
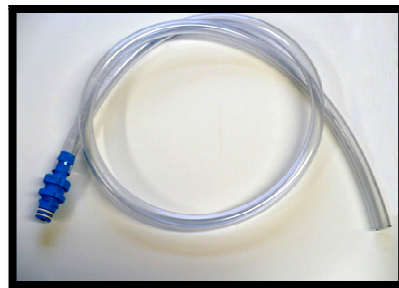
3. Plasma bag and BLADDER both leaked. It is a very unlikely case. After you determine that the plasma bag leaked, discard the plasma bag(s) and squeeze down lightly on the BLADDER. If the bladder is also leaking, the volume of the leaked solution in the front of the RACK will increase. Remove the BLADDER (see #2 above) and discard it. Wipe the section of the RACK with bleach towelettes or a 10% bleach solution. **DO NOT USE CONCENTRATED BLEACH.**

If you need to rush thawing the plasma bags in the sterile section, you can do the full clean up later. Use plugs to close off the stainless steel ports, turn the unit on and start thawing. You will have to watch the plasma bags to see when they are thawed, because the count down timer will restart from the full thawing time.

Do a full clean up. Lift the front of the RACK, disconnect the RACK TUBING and place the RACK aside. Drain all the water in the bath.

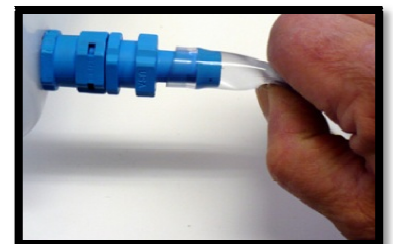
## CT-D4 Quick Connect Drain

**Drain Tube Assembly  
Part C-VLVM**



Insert drain tube into drain housing part C-VLMF. 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 .



Most of the water will drain out. Tilt the bath to drain more of the water. Wipe the inside of the BATH and the RACK with a bleach towelette or a 10% bleach solution. Mount a new BLADDER to replace the leaked BLADDER in the RACK. Reassemble (See SETTING-UP). Plug in and turn on the unit and push START and let it run for a few minutes so that the water passes through and rinses the pumps and the BLADDERS on the inside. Turn the unit off, drain out all the water a second time. Reassemble (see SETTING-UP). The unit is ready to start thawing.

## **BLADDER REPLACEMENT**

Hold the BLADDER so that the holes in the FITTINGS (water connectors) face down. Push the top of the BLADDER underneath the black rod that passes across the RACK near the back of the RACK. Gently pull the BLADDER up until the FITTING is lined up with the Stainless Steel PORT (Exit Tube) near the black rod. Push down on the FITTING as you twist back and forth until the FITTING bottoms against the bottom of the RACK.

Mount the other three FITTINGS the same way.

## **BLADDER STORAGE**

When storing, roll the bladders up loosely, start with a 2.5 cm. (1") diameter. Do not fold. Folding the bladder will crimp the internal venturi tubing. If the bladder is dry it can be stored in a zip lock bag. If the bladder is wet then allow air flow around the rolled bladder.

## **MODES**

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

**THAWING MODE.** Push START when in STANDBY mode to start thawing. The unit then recirculates tempered water through the BLADDERS, and massages the plasma bags. The countdown timer indicates the remaining time. The plasma bags are monitored for leaks. Timing out or pushing STOP ends 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 pump 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 on Pump 2. 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. Select whether to continue thawing when timed out.
3. Calibrate the temperature.
4. Set the target thawing temperature. The Alarm temperature is 1.0C above the target temperature.
5. Select the signal when thawing is done (continuous or pulsed).
6. Adjust the massaging timing.

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. There is a covered THERMOMETER WELL on the left side of the control panel. Rotate the cover bar to expose the thermometer well. Place your thermometer into the THERMOMETER WELL. The thermometer stem should be at least 15 cm. (6") long. 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.

**Adjust the massaging.** Pump 1 fills the outer tubes of the BLADDER. Pump 2 fills the center tube BLADDER. Pump 1 is on constantly when thawing, but at a lower pressure. Pump 2 then controls the massaging action:.

1. **Pump 2 ON** time pressurizes the center tube and pushes the plasma towards the outside tubes.
2. **Pump 2 OFF** time lowers the pressure of the center tube and allows plasma to be pushed to the center.

You can observe the action and adjust the Pump 2 times to change the massaging action. The preset times have been tested to work very well.

## 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# CD4-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.
Bag leaked, but does not trigger alarm and "LEAK" message..	Lift front of RACK. Clean the stainless steel nuts exposed on the front of the RACK with alcohol. Clean the stainless steel springs that protrude from the BATH with alcohol and bend out the bottom of the spring so that it is 1.2 cm. (.5") from the BATH wall. If there is still a problem, contact CytoTherm.
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.

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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.

**CLOSE LID** indicates that the lid is not closed. If the lid is closed, check if there is a magnet imbedded in the LID on the front right side. If the magnet is there, then the magnetic sensor (reed relay) may have failed. Have technician check the sensor and its connections. If the sensor and the connections are OK then the PC board should be replaced.

**LOW WATER** First make sure that a pinch ( 0.01 gr) of salt was added if deionized water was used. Then remove RACK to add water. Lift up the top layer of the bladders to let the water in the BLADDER drain down into the BATH. Lift the front of the RACK and disconnect the RACK TUBING. Lift the RACK and put it aside. Pour water into the BATH to the water label.

**LEAK** is an audible and written alarm that indicates that a plasma bag or BLADDER leaked.

## **MAINTENANCE**

Daily: Wipe off the unit.

Every 3 months:

### **Replace the bladders and clean the bath.**

1. Unplug the unit.
2. Remove and discard the BLADDERS by first lifting the top of the BLADDERS up to drain out as much of its internal water as possible. Remove the INLET and OUTLET FITTINGS by holding the FITTINGS and twisting them as you pull up.
3. Lift the front of the RACK and disconnect the RACK TUBING from the RACK, lift up the Rack and place aside.
4. Drain the bath by attaching the provided tubing to the DRAIN valve. Most of the water will drain out. Tilt the bath to drain more of the water.
5. Wipe the BATH and RACK with bleach towelettes or a 10% bleach solution. Use only water and bleach towelettes or a 10% bleach solutions for cleaning. DO NOT USE CONCENTRATED BLEACH. Use alcohol for removing oil or grease. Rinse off the bleach with water.
6. Close the DRAIN valve. Fill the bath with water to the water label. Place the RACK on the BATH. Do not connect the RACK TUBING. Plug the unit in, turn it on and start a thawing cycle. Let the unit run for a few minutes so that the water passes through and rinses the pumps.
7. Remove the RACK, and drain out the water. 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. Do not use saline solution. Add 3 ml. of Algicide Part #ALG240 (1.0 ml. per 4 liter of water available in contiguous USA only) to the water. Any other bath clearing agent can also be used.
8. Connect the RACK TUBING and position the RACK in place.
9. Mount new BLADDERS in the RACK .

**Replace the air filter.** Unscrew the filter cover, discard the old filter and mount the new filter. Screw on the filter cover.

**Stainless Steel Springs.** The two stainless steel spring rods that push against the rack act as connectors to the leak sensors in the RACK. Bend them out so that the bottom of the spring is 1.2 cm (.5”) from the BATH wall. In the very unlikely event that the spring breaks, please contact CytoTherm and we will rush you a new spring with mounting instructions. The unit will work, but will not detect leaks, with a broken spring until you install the new spring. Wipe the stainless steel springs and the stainless steel nuts on the front of the RACK with alcohol to remove any oil or grease.

**Leak Test** Turn the unit ON. Take a slightly moist piece of a paper towel and touch it to both of the stainless steel studs inside the front of the RACK. The alarm should sound and the display should say LEAK. If it does not, contact CytoTherm.

**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.

**BLADDER Maintenance.** The bladder does not require periodic maintenance. In case of a plasma bag leak, remove the BLADDER, rinse the BLADDER under running water and wipe with bleach towelettes or a 10% bleach solution. Rinse off the bleach.

## PARTS LIST CT-D4

CD4-MPL	Pump, Magnetic	DP-SW	Switch, 2-pole
14-77	Heater (2 needed)	C-TH	Safety Thermostat
CT4-PC	Printed Circuit Board	CD4-DISP	Display
CD4-BTH	Bath Section	CD4-BL	Bladder ( 2 needed)
CD4-RK	Rack for Dry Thaw	CD4-PM	Program Module
C4-TS	Temperature Sensor	CD4-Y	"Y" Accelerator (use 4)
C4-TR	Transformer 120V	CD4-LID	Lid for Rack
CD4-TR2	Transformer 240V	C-VLVF	Drain Valve Twist Female
C4-FILT	Air Filter. Per 4 pack	C-VLVM	Drain Valve Twist Male
14-77J	Heater 100V (Japan only)	ALG240	Algicide
CD4-TRJ	Transformer Dual (Japan)		

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 8A for 120Vac and 5A for 240Vac AG3 fuses. Correct the cause of the blown fuse.

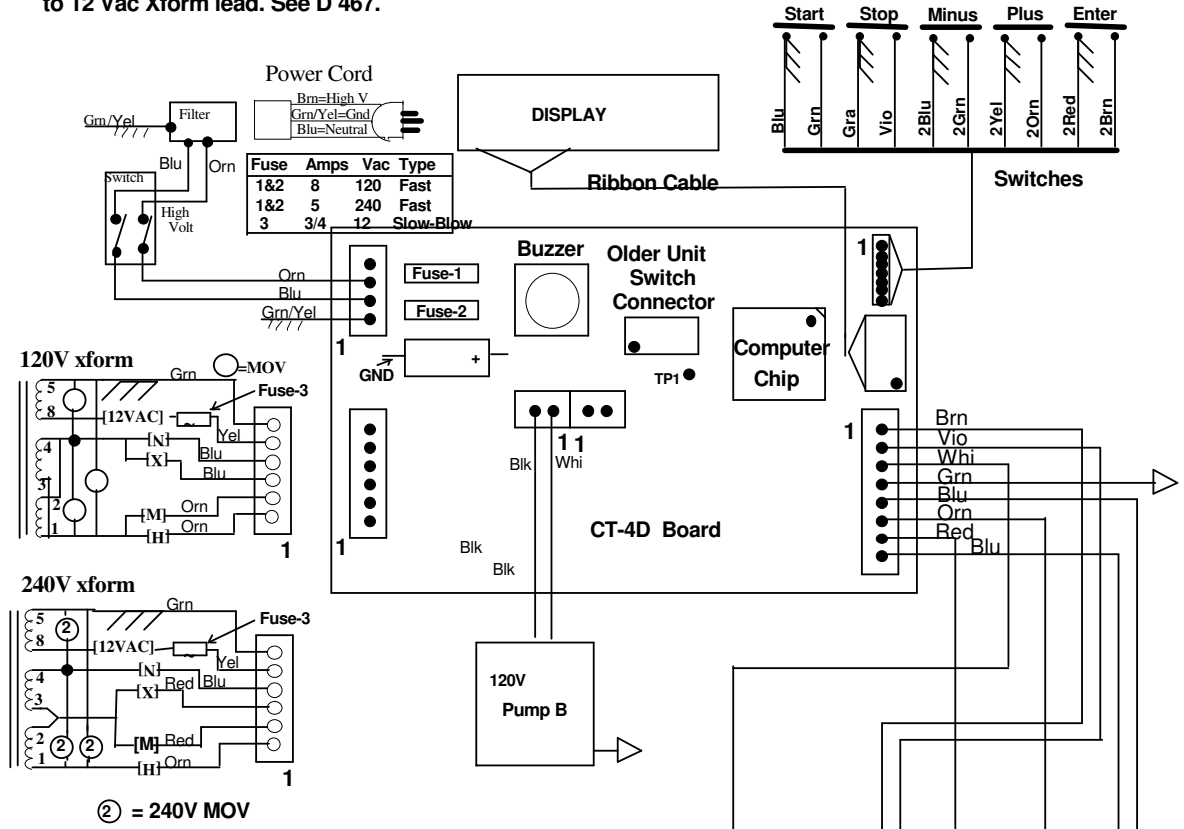
The transformer has a ¾ Amp slow blow fuse (Fuse-3) on the wires of the 12 Vac winding used to supply the 5 Vdc supply.

### **ISOLATION**

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

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Rev 20 June 06. Fuse table & TP1  
 Rev 5 June 04 add 3/4A slow blow fuse  
 to 12 Vac Xform lead. See D 467.



## Wiring CT-D4 & CT-D2

### Dwg # 434

15 Apr 04 Change dwg to move Switches  
 Connector to right corner. Change  
 started with board ver.G.  
 Add D2  
 May 2003 New

Ground is Green with Yellow stripe

⚡ & → Ground  
 ⊙ Wire Nut

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

