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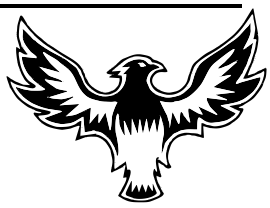

Instructions for use of the CW-5000 laser chiller

WARNINGS:

- Make sure to apply the correct power. Some chillers use 110 VAC, others need 220VAC.
- The chiller must be filled with coolant before the power is turned on. Operating the pump without a coolant can damage the impeller bushings and seals.
- The air bubbles should be purged from the coolant tubes. The bubbles may represent a significant lack of coolant. A reduced volume of coolant will affect the chiller's ability to maintain cooler temperatures.
- Do NOT put chlorine, bleach, ammonia, or other corrosive chemicals into the coolant tank. The corrosive chemicals will damage the tank linings, rust the fittings, and contaminate the laser tube.

The chiller should be equipped with a mini computer control system. The control system works independently from the laser machine. The chiller contains the basic parts of: water pump, flow sensor, safety relay, refrigerant pump, refrigerant cold coils, refrigerant hot coils and fins, air flow fan, power switch, power indicator, and temperature controller. The combination of these parts ensures the operation is simple, safe, and well reactive to temperature change needs.

The operating conditions:

1. Air Temperature: 5℃-35℃ The chiller needs to push heat into the air in order to cool the fluid.
2. Humidity:≤95% and non-condensing Condensation can damage the electronics of the controller.
3. Temperature of coolant: 5℃-35℃. Temperatures that are too high indicate that the chiller cannot support the demands of the system to be cooled. Temperatures that are too low could cause ice to form inside the machine or split connectors.
4. Either 120VAC or 220VAC power source. The chiller must be matched with the proper power source. The wrong voltage will cause the electronic components to be destroyed. Replacing the compressor would often be not cost worthy.
5. Chiller should be place near the laser machine at a position that is dry, has good air flow, and the air maintains low temperature.

- Failure to abide by these warnings and operating conditions will void all warranties.
- We recommend using diluted RV antifreeze or de-ionized water as coolant fluid. The RV antifreeze provides many benefits. 1)Lubricates the pump, 2)Is designed to increase fluid flow, 3)Resists the growth of bacteria or bugs, 4)Designed for heat transfer, 5)Color is nice to see the presence of fluid, 6)Does not contain components that will separate and deposit onto the laser tube (calcium) 7)Is more friendly to the environment.

Typical function of the chiller:

1. Operation: When the temperature of water arrives to the temperature set up (ts), the compressor will stop pumping. The fan may continue to blow air. As the coolant temperature goes back to the Temperature Setpoint(ts) plus the difference in temperature(td), the compressor start working again.
2. The protect mode for compressor: The compressor may be programmed to have a delayed start. This delay time of compressor can be set up by the controller's parameters. When the compressor stops pumping, it starts to count the time for the .
3. When the chiller machine starts, it will display the temperature controller's firmware version number. After 6 seconds of displaying the edition, the chiller machine will display the temperature and enter normal condition.

4. Using the buttons to program the temperature controller:
   a. Setting Mode: After open the machine, pressing set for 3 seconds to enter the "setup" mode. The display will show "ts" and the "set" light will glow. Press ▲ or ▼ in this mode to select the parameter code: Parameter codes include: TS,TD,HS,LS,AU,AL,AD,AC,OT,OU.
   b. Display or change the parameter: After choosing the parameter code, press set to display parameter. Then press ▲ to increment the value or press ▼ to decrement the value. You can hold the button depressed for some time to increase or decrease automatically. When the parameter is as desired, then press set button to store the value. After saving the value to the code, the display will return to the menu to show the next code. To exit the parameters and exit, choose parameter "OU" and then press set . The temperature controller display will leave the "Setup" and return to the normal mode.
   c. In the "Setup" mode, if the user does not press any button within 15 seconds, then the temperature controller will exit the mode, save the parameter, and return to normal mode. The display will show the current temperature.
5. Displaying the highest and lowest temperature: when the temperature arrives at the set temperature, start to make record of the highest or lowest temperature ever reached. Please press Log button to see the highest or lowest temperature ever reached, if keep pressing Log button for 5 seconds, the record will become the temperature of cool water and make record again.
6. Quick Setting: The operator can amend the set temperature(ts) with few simple steps, as follows:
   1) Press ▼ for 3 seconds to enter setting mode, at this moment the set light will glow.
   2) Press ▲ or ▼ to amend the temperature.
   3) When the temperature is as desired, press Set or without pressing any button within 5 seconds, the system will save the new temperature and come back to the normal condition.
7. Locking the parameters:
   a. Press Set and ▼ at the same time for two seconds. If the display shows "LC", then the parameter is locked.
   b. If you want to unlock the parameter, then Press Set and ▼ at the same time for two seconds. The display shows "UL" to indicate parameter is unlocked.
8. Resetting all parameters to the factory values:
   a. Pressing Set and ▼ at the same time then turn on the electricity. The temperature controller will start up come back with the original parameter values. The display will show "rS". After 2 seconds, the controller will restart automatically.
9. The LED light and warning codes:
   1) "Comp" Is glowing when the compressor moves. Is off when the compressor is stopped. Is blinking when the compressor is in delay mode.
   2) "Defr" Is glowing when the mode of taking off the frost.
   3) "Alarm" Is glowing when there is a fault or warning.
   4) "Set" Is glowing when in the "Setup" mode.
   5) "bfaults" code(when is bellow saturation, the compressor will run 15 minutes and stop 15 minutes)
   6) "EO" Identifies revise temperature sensor may be damaged.(send back to be repaired)
   7) "E1" Identifies the water sensor may be damaged (Check the sensor wires to see they are contacted, make sure water is actually flowing.)
   8) "EE" Identifies the value that was set into the memory parameter was invalid. (Reset the electricity again or change the parameter according to the factory original value)
   9) The following warning codes will reset after the temperature reaches the set-point temperature for the first time.
   a) "UA" The temperature of cool water exceeds the limited temperature.
   b) "LA" The temperature is below the lowest temperature.
   c) Warning output:(output is on one second/off one second)
   d) When the warning delay time arrives, the warning output will turn on. The operator can press ▼ to mute the warning output temporarily. Pressing this button again will toggle the warning output back on.