

**Laboratorios Jael
Automation Division**

**HyThSoft V. 2.0
User Manual**

**Tapachula de Córdoba y Ordóñez
December 2007**

INDEX

INDEX	2
INTRODUCTION	3
HOT WATER TREATMENT	3
SOFTWARE	4
ALARMS, ERRORS & PROBLEMS	10
PROPELLER & BOILERS	11
CONTACT & INFORMATION	11

INTRODUCCIÓN

HyThSoft, was developed as a powerful tool to consent with the "WORK PLAN FOR THE MEXICAN MANGO TREATMENT AND PRECLEARENCE PROGRAM" developed jointly by the United States Department of Agriculture, Animal and Plant Health Inspection Service, International Services (USDA/APHIS) and the Secretaria de Agricultura Ganadería y Desarrollo Rural Pesca y Alimentación (SAGARPA) and with norm NOM-075-FITO-1997. This software is designed to take temperature signals and control up to 6 treatment tanks. The software also contains logical functions which facilitate the work of the exporters and USDA/APHIS personal. Although this software was developed for treatment tanks that have each one, an independent boiler, it can also be use with a single boiler for all the tanks (dependent equipment), just by changing its operational parameters.

HOT WATER TREATMENT

The following section includes the steps that are followed by a mango packer in a typical work day on a hot water treatment facility.

- **Preheating**

A reliable person should turn on the propeller motor of the tank, the boiler, and the control system. Also, he/she should activate the *control* switch of each and every one of the tanks that are going to work in that day. The switches are situated in the *Main Window* of the program. This will cause the control system to increase the temperature of the water to the desired temperature. It must take the necessary time to preheat the tanks before the work start.

- **Calibration**

In the main window of the control system, the operator should activate the switches *Read Data* and *Printer*. After 2 temperature readings (4 minutes), and with a constant temperature, the sensors of each tank should be calibrated. In order to do so, the USDA inspector must access the calibration code, to gain access to the sensor calibration section and introduce the real temperature of each and every sensor.

The operator should have a process diary in which he/she has to register the following: Date and start/end time of each treatment, number of treatment, calibration adjustments, total treatment time, total treatment time with temperatures between 113.7°C and 114.9°C, type of mango, range of weight of the fruit and the expected treatment time. The program obtains each of RTD's errors, and it's recommended that they are written in the diary for preventive maintenance reasons of the control system.

The operator has the option of activating the desired graphic manipulation, desired temperature, real control temperature sensor, minimal temperature and alarm temperature through time; in order to do this, he/she should press the *Graph* button in the main window and the Graph Window would appear, in it the *Graph* switch turn on or off the graph.

For the control of the temperature of each treatment tank, the following sensors are used: S01(Tank #1), S03(Tank #2), S05(Tank #3), S07(Tank #4), S09(Tank #5) and S11(Tank #6). The sensors: S02(Tank #1), S04(Tank #2), S06(Tank #3), S08(Tank #4), S10(Tank #5) and S12(Tank #6), serve as a reference and backup of the control sensors, so it can be shown that the values are between operational margins.

- **Starting a Treatment Process**

The operator should be informed of the weight ranges of the basket in order to select the treatment time of the control system treatment. Once the USDA/APHIS personal have given their approval to start the treatments the crane operator must use the crane in order to introduce the basket with the mango into the hot water and watch the microswitch activate. The operator must register in the diary the start of the treatment and notice that the printer registers the entry. The entry should be marked with a marker. The *main window* should also show the treatment start time, the expected end time, as well as the time left to finish the process of the treatment tank.

According to the Certification of Approval, the process should repeat itself, introducing other basket in the next treatment tank, at the approval waiting time.

- **Ending the First Treatment Process**

Once the treatment has finished, the crane operator should take out the basket of the treatment tank and introduce it into a cooling tank (if the facility has that type of equipment). The operator must write in the diary the data of the outgoing treatment basket and wait for the temperature to reach its set point before starting the following treatment.

- **Ending the Daily Activities**

Once all the treatments have been completed, the operator must deactivate the control switch (of each treatment tank), *Read Data* and *Printer* switch close the program, turn off the control system, boilers, and the propeller motors. He/she should also obtain the printed papers, gather them together, staple them and archive them for future revisions.

SOFTWARE

When you start the computer program HyThSoft V. 2.0, you will see the splash screen with information regarding to the program and a password text field (Image 1).

The system password is: **XXXXXXXXX**. (Each software has its own, constant password that cannot be changed)

Once the password is typed, the Enter button will enable and it must be pressed by the operator. The program will now show the *Main Control Window* (Image 2).

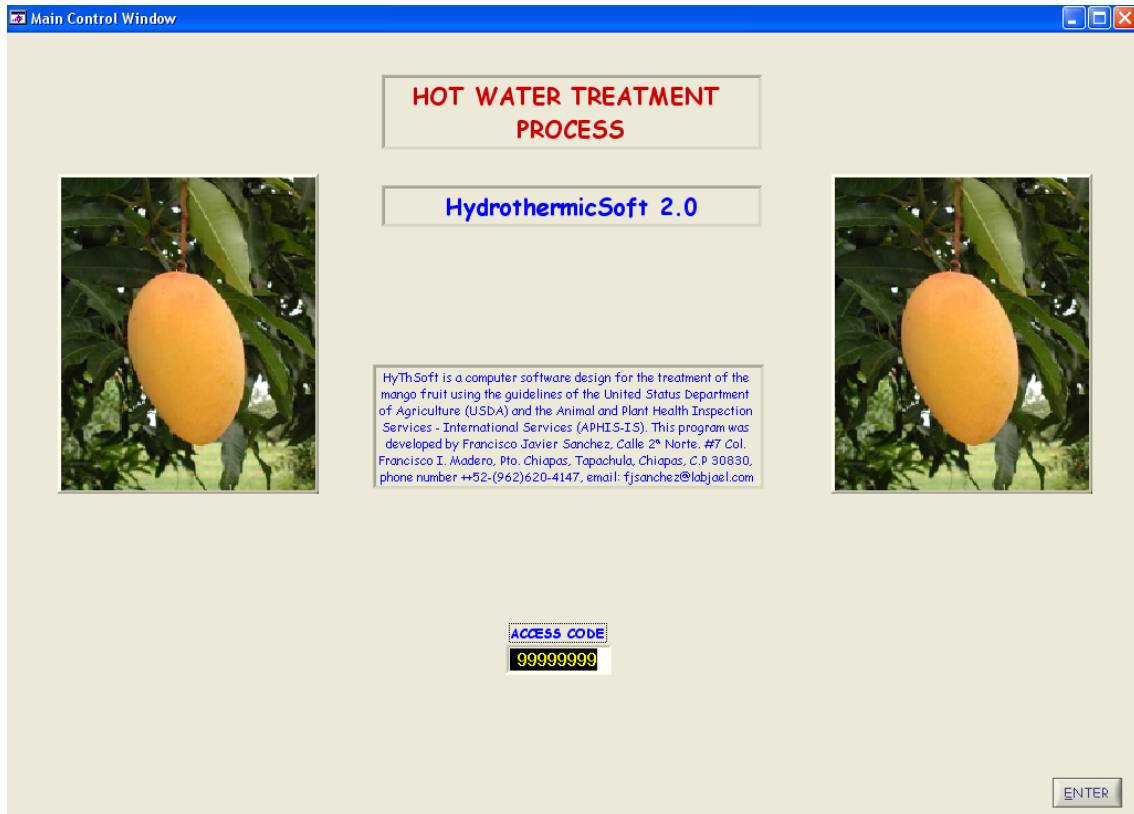


Image 1. Splash Screen.

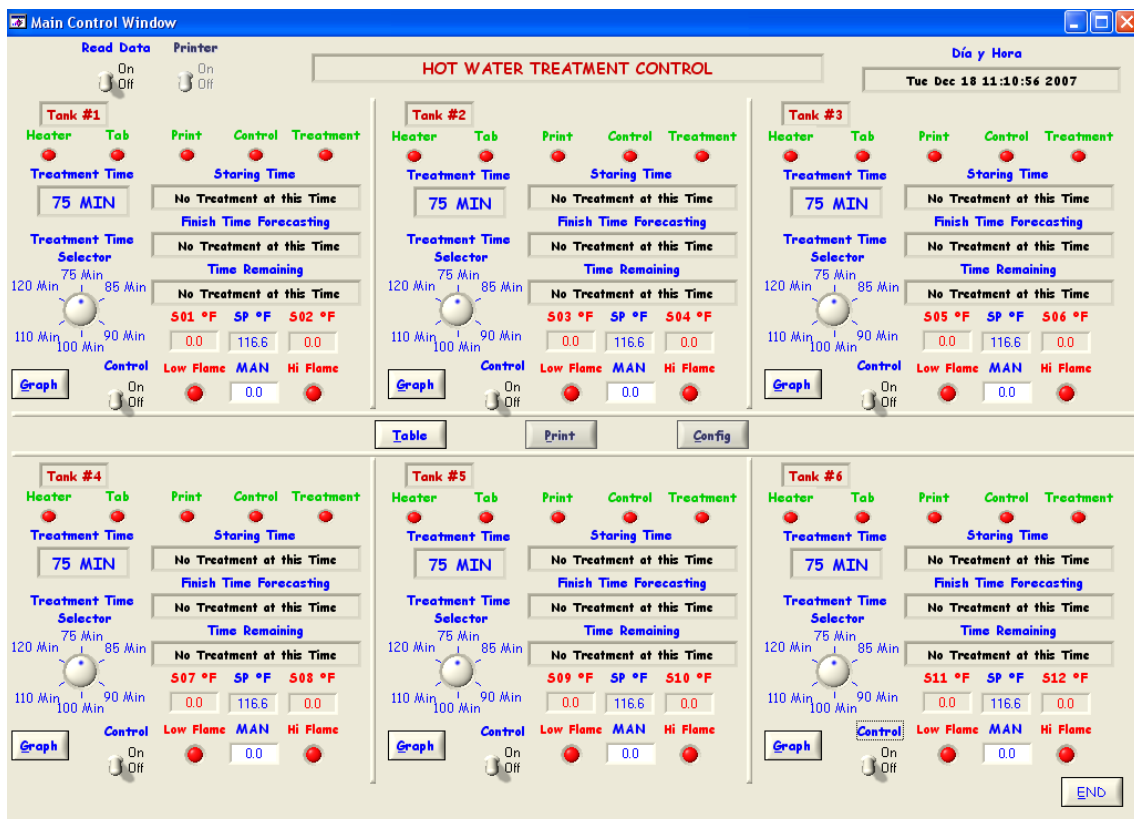


Image 2. Main Control Window.

The section of each tank, the *Read Data* (That print the values of time/date and temperature in a table) and *Printer* (Print the data in the printer) switches are shown in the *Main Control Window*. Also, the software shows the current date and time in the upper right corner.

In the middle of the screen there are three buttons. The *Table* button, opens the window (Image 3) where the sensors data and Date/Time values are stored in a defined period of time. It also registers the calibration lectures of each sensor, the on/off of the printer, the beginning and end of a treatment and the total time of the treatment.

Each time the table is full with historical temperatures readings, a BMP image file is created, with the date and time of the last reading as the name of the file in **c:/Respaldo de Tratamientos/**, that serves as a backup of the paper print data.

The *Print* button, prints in the table and in paper (when the Printer switch is on) the values of each sensor in that particular moment.

The *Config* button opens the *Configuration Window* (Image 4), where the sensors are calibrated, and the values of the software logic and control could be modified.

Please notice that in order to gain access to the calibration and logic/control sensor, a code must be introduced for each section. It's not recommended for the USDA/APHIS personal to change the password often. Also, each calibration modification that it is made would be registered in the table and by the printer.

In order to calibrate the sensors the Operator should introduce the temperature value given by the third external thermometer. The thermometer should be placed near the sensor that has been calibrated in order to minimize errors. A designated person along the USDA/APHIS personal should read the thermometer and inform the Operator so the data can be transferred to the software.

A sensor should be replaced, whenever the margin of error is considerably high or low. This is due to the fact that the greater the error, the greater the risk of bad data and it could produce bad treatment efficiency or bad fruit quality.

In order to close the program, the *Read Data* switch should be put in an off position in order to gain access to the END button.

Image 3. Temperature Table.

Image 4. Configuration Window.

Each tank has its own section to adjust its parameters. The Image #5 shows the Tank #1 section.

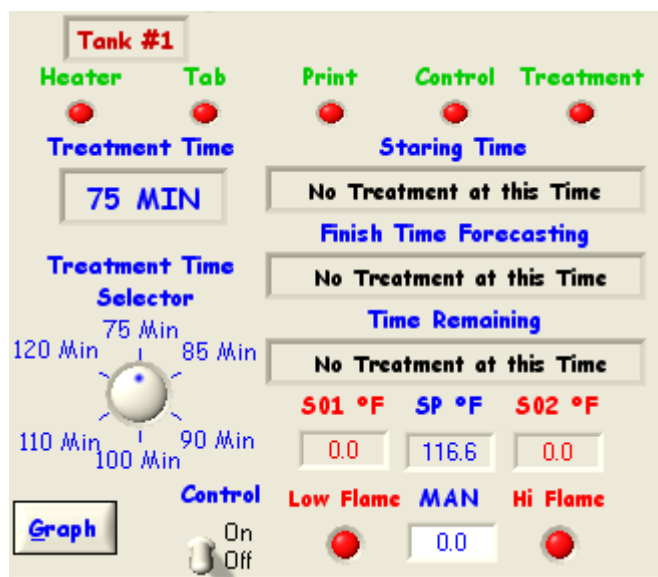


Image 5. Tank #1 Section.

In the upper section there are 5 Led's that shown the state of the Boiler and the Control System. The *Heater* indicates that the Heater Ignition is on. The *Tab* shows if the *Read Data* switch is activated (And the tabulation of the data is being kept), the *Print* indicates if the printer is on, The *Control* Led indicates if the Software is controlling the temperature and the *Treatment* shows if there is a treatment at that particular moment. In order to have an accepted treatment, the values of the sensors must be in the set point value (After Calibration) and the *Heater*, *Tab*, *Print* and *Control* Led's must be in green. Ones the treatment has started the *Treatment* Led will all so be turn to green, the introduction of the basket should also be register in the table and by the printer and the *Staring Time*, *Finish Time Forecasting* and *Time Remaining* will shown in their respective sections.

In order to enable the control of the temperature by the software, the *Control* switch must be on and the Led would become green. If the *Control* switch is in the off position it could be operated manually introducing values in the range of 0 to 100 to the *Man* case (the case would be dimmed if the Control switch is on).

The Tank #1 section presents the values of the two temperature sensors (S01 y S02) and the desired temperature also known as set point. Please notice that the software could be configured to use two set points. The first one can be used at the beginning of the process and the second one for the remaining time. This could be programmed in the *Configuration Window*.

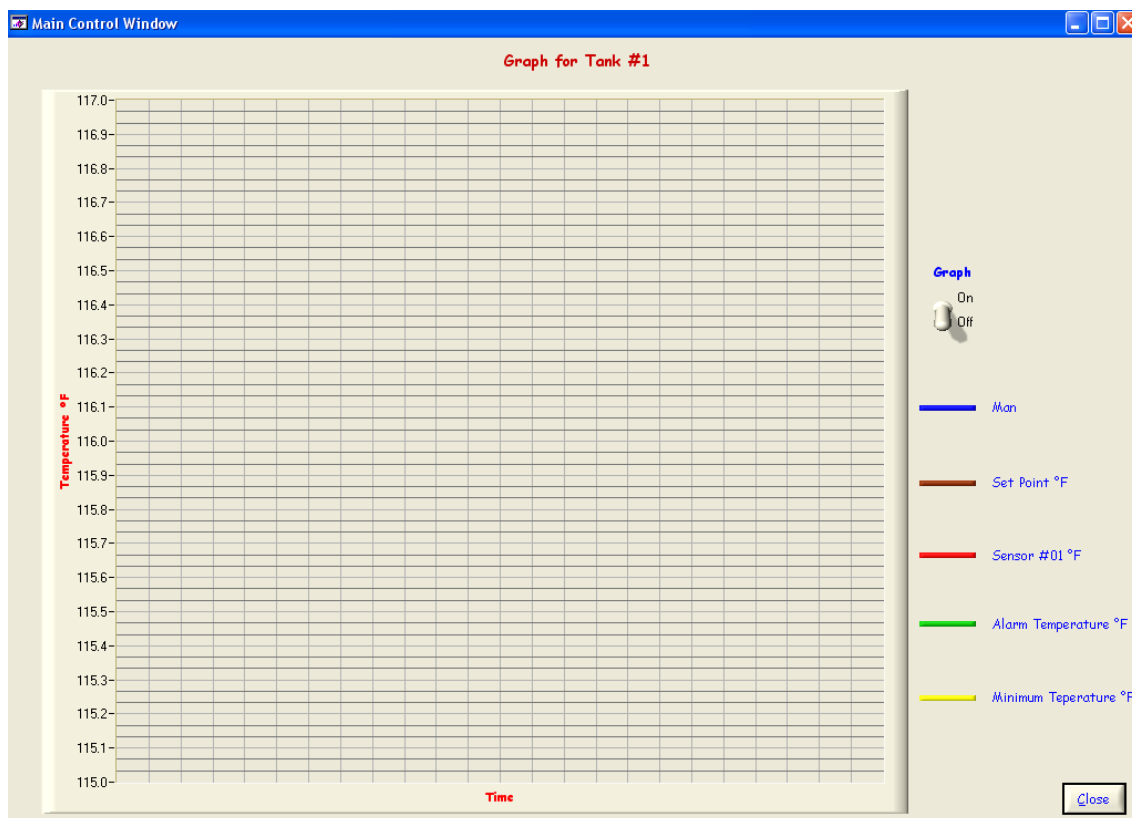


Image 6. Tank #1 Graph.

In the lower left of the Tank #1 section there is the *Graph* button, this button opens the *Graph Window* of that tank (Image 6). In this window, you can see the Graph switch, that activates or deactivates the graph with the values of Man, Control Sensor value, Set Point, Minimum Temperature and Alarm Temperature. When the S01 sensor hits the alarm Temperature, it will give the operator enough time to solve the problem in order to avoid reaching the minimum temperature value.

The *Treatment Time Selector* is located above the *Graph* button. The operator must select the desired treatment time for each treatment before the treatment start moving the selector with the mouse. The desire treatment time will appear in treatment time case.

The software sends a signal to the boiler to ignite or not depending of the values of the control temperature sensor and the set point value. It can be seen two led's: *Low Flame* and **Hi Flame**. When both are in red it means that only the ignition system is on, when Low is on green and the Hi in Red the gas valve is half part open, when both are in green the gas valve is totally open, and the boiler is working at full capacity.

All the above instructions are the same for each and every one of the treatment tanks.

ALARMS, ERRORS & PROBLEMS

The Image 7 presents the five alarms windows that the software will activate when the Control System or Boiler present a problem.

It's very important that the Operator is aware of the computer monitor, because when the software detects a problem it could quickly be resolved. Beside the messages that the software displays on the monitor, an alarm will go off. This is the reason why the speakers of the computer should always be on and should not be used for any other reason (music, videos, etc...)

All the error windows (except the Output Signal Error) have led's that show which tanks is presenting the problem, so it can be more easily to solve the malfunction.

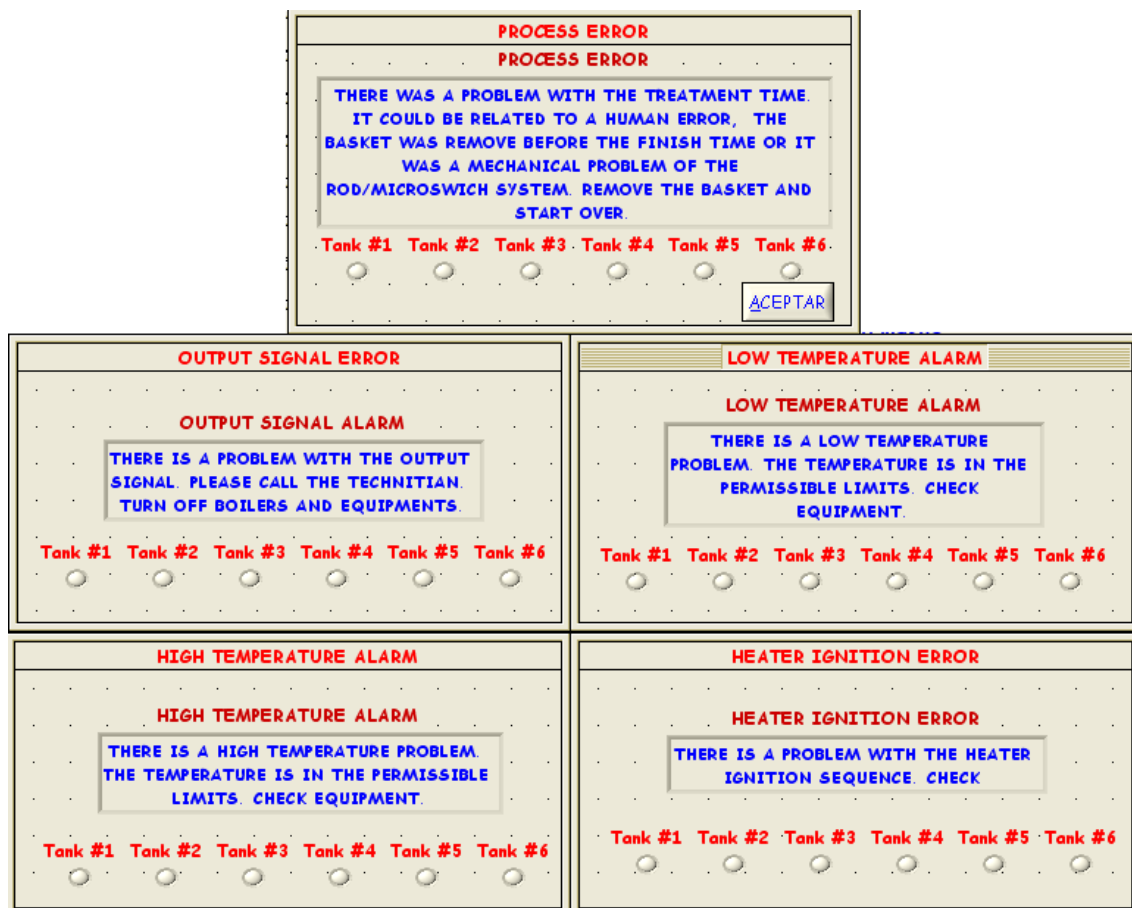


Image 7. Alarm Windows.

Below is the description of each error window.

- **Process Error:** This problem appears when the software detects that the basket was removed from the treatment tank before the treatment time period. The Operator must find what went wrong with the equipment or determine if it was human error.
- **Heater Ignition Error:** The boiler is not sending an on signal. This could be because the boiler ran out of gas.

- **High Temperature Alarm:** There is a high temperature signal of one of the sensors; this could affect the quality of the fruit or damage the equipment or facility.
- **Low Temperature Alarm:** There is a low temperature signal of one of the sensors; if the temperature continues the down fall, the treatment could be cancel.
- **Output Signal Alarm:** There is no communication between the boiler and the control system, the software is sending the signal to open the valves when it should not.

PROPELLER & BOILERS

The boiler pump should always be in service. To do this the switch located in the boiler should be in the on state (this device is located near the electrical section of the boiler).

Although the boiler pump creates a flow of water to mix the temperatures in the interior of the treatment tank, it's not enough, that's why a propeller with an electrical motor is required. This motor is activated inside the control room by a relay with thermal protection. The Operator should confirm that the propeller is working properly and that there are no leaks in the seals of the rod that moves the propeller. If there are leaks, the seals must be changed as soon as possible.

If the thermal protection of the motor stops the propeller, the motor is using more amperes, creating a potential hazard for the motor, check the lubrication of the entire motor/propeller system.

CONTACT & INFORMATION

Contact: M.C. Francisco Javier Sánchez Careaga

Address: Calle 2ª Norte #7, Parque Industrial Francisco I. Madero, Puerto Chiapas, Tapachula, Chiapas, Mexico C.P. 30830.

Mailing Address: Francisco González Juaristi #3, Col. Los Laureles II, Tapachula, Chiapas, Mexico C.P. 30780

Phone. (962)620-4147

Fax. (962)620-4148

email: fjsanchez@labjael.com