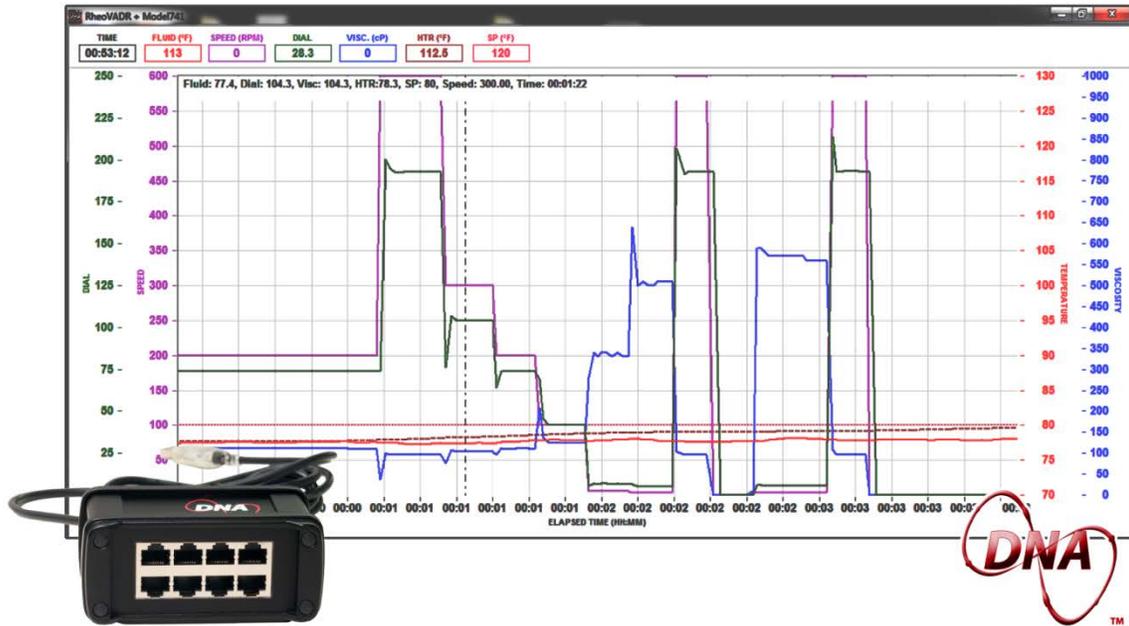


Data Network Adapter (DNA™) System

Instruction Manual



Manual No. D00981262, Revision A

Instrument No. 102410489

DNA™ System Instruction Manual

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Houston, Texas, USA

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Table of Contents

1	Introduction	5
1.1	Fann Equipment Compatible with DNA [™] System	5
1.2	Document Conventions	6
2	Safety	7
3	Features and Specifications	8
3.1	System Features	8
3.2	DNA [™] Software	9
4	Installation	16
4.1	Installing the Software	16
4.2	Connecting the DNA [™] Box to Computer	17
4.3	Connecting the DNA [™] Box to Fann Machines	17
4.4	Collecting Communication Addresses	17
4.5	Configuring the DNA [™] Box	19
4.6	Changing Default Settings	21
4.7	Updating the Software	22
4.8	Configuring the Instruments	25
5	Test Programming and Editing	33
5.1	Basic Profiles	33
5.2	Saved Profiles	34
5.3	Heat Profiles	34
5.4	Rheology Profiles	35
5.5	Multiple Profiles	36
5.6	Starting a Test	37
6	Test Analysis	39
7	Troubleshooting and Maintenance	40
8	Parts List	41
9	Warranty and Returns	42
9.1	Warranty	42
9.2	Returns	42

List of Figures

Figure 3-1 DNA [™] System Example Setup.....	8
Figure 4-1 DNA [™] System with RheoVADR [®] s and Temperature Controllers.....	16
Figure 6-1 Graphical Results	39
Figure 8-1 DNA [™] Box	41

List of Tables

Table 3-1 Main Screen Menus and Functions.....	10
Table 3-2 Profile Screen Functions.....	12
Table 7-1 Troubleshooting Guide.....	40
Table 8-1 Data Network Adapter Assembly, P/N 102410489.....	41

1 Introduction

Fann[®] Data Network Adapter System is a proprietary hardware and software system that adds capabilities to Fann instruments by connecting them to a computer operating Fann's exclusive Data Acquisition and Control software. The software facilitates communication, control, and data collecting for up to eight machines. Multiple units can be joined to act as an integrated system (e.g., RheoVADR[®] Rheometer with Model 741 Temperature Controller).

This system is ideal for users who want to

- automate several tests simultaneously and collect data for every test
- combine several machines to perform individual complex tests

1.1 Fann Equipment Compatible with DNA[™] System

The DNA[™] System works with RheoVADR[®] Rheometer, Model 741 Temperature Controller, and HT4700 HPHT Filter Press. In the future, more Fann instruments will be available for connecting to DNA[™] System.

1.2 Document Conventions

The following icons are used as necessary in this instruction manual.



NOTE. Notes emphasize additional information that may be useful to the reader.



CAUTION. Describes a situation or practice that requires operator awareness or action in order to avoid undesirable consequences.



MANDATORY ACTION. Gives directions that, if not observed, could result in loss of data or in damage to equipment.



WARNING! Describes an unsafe condition or practice that if not corrected, could result in personal injury or threat to health.



ELECTRICITY WARNING! Alerts the operator that there is risk of electric shock.



HOT SURFACE! Alerts the operator that there is a hot surface and that there is risk of getting burned if the surface is touched.



EXPLOSION RISK! Alerts the operator that there is risk of explosion.

2 Safety

Safe laboratory practices and procedures should be observed while operating and maintaining the DNA[™] system. This section lists some precautions to follow.



Before running a test, review the safety precautions of connected equipment (e.g., RheoVADR[®] Rheometer, Model 741 Temperature Controller, and HT4700 Heating Jacket.).



DNA[™] should always be used on a grounded circuit.



Electrical connections to and from the DNA[™] box should be properly insulated and must not be compromised.

3 Features and Specifications

The DNA[™] System includes the DNA[™] box (USB to RJ45) with USB computer connector, software, and two 10-ft CAT5 RJ45 cables.

The box has ports for connecting eight individual machines or combinations of machines (up to eight, maximum).

The DNA[™] System works with RheoVADR[®] Rheometer, Model 741 Temperature Controller, and HT4700 HPHT Filter Press. In the future, more DNA[™] compatible instruments will be available from Fann.

Refer to Figure 3-1 for a typical setup:

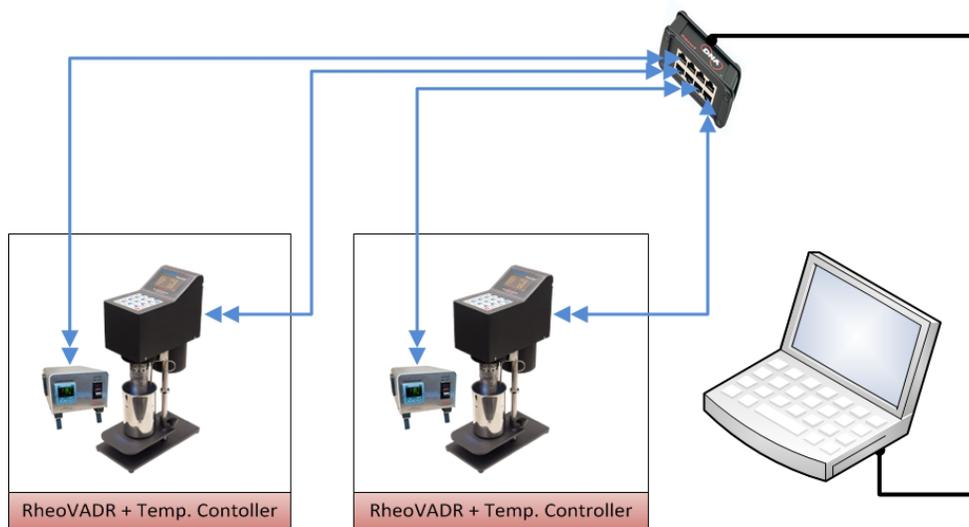


Figure 3-1 DNA[™] System Example Setup

3.1 System Features

- Combines units to act as one, increasing overall capabilities
- Schedules for time, temperature, speed, and data rate
- Provides temperature ramping
- Saves test profiles and combines profiles to run complex schedules

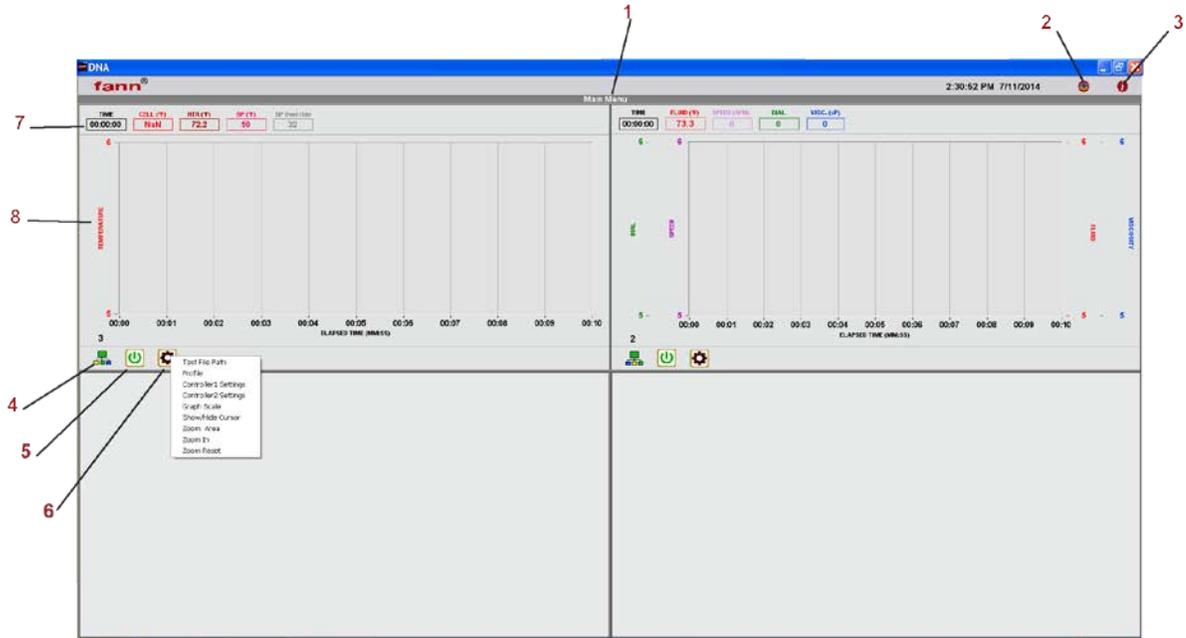
3.2 DNA™ Software

The DNA™ software offers the following features:

- Collects data from various instruments
- Controls several unique instruments
- Graphical display of set points, real-time values, elapsed time and more variables
- Records data at 100 ms, 500 ms, 1 s, 2 s, 5 s, 10 s
- Audible alerts for end of test, temperature set point, and other important steps or events
- Compatible with Fann Data Manager for organizing and printing data or exporting it to a spreadsheet
- System updates available
- Operating system— Microsoft® Windows® 7

3.2.1 Main Screen

These menu items are described in detail in following sections.



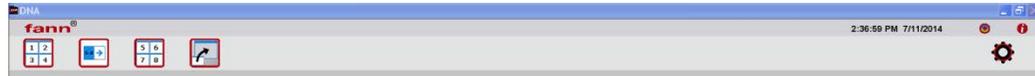
Main Screen

Table 3-1 Main Screen Menus and Functions

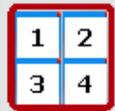
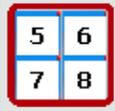
1 Main Menu	Click to show more options	
2 Updates	Check for software updates	
3 Information	Displays software version	
4 Connection Status	Green = connected Red = disconnected or an error	
5 Start/Stop	Click to start (green) or stop (red).	
6 Machine Settings	Test File Path	Location where files saved on your computer
	Profile	Design test using steps, temperature, recording rate, and speed
	Settings	Specify settings for each connected machine
	Graph Scale	Adjust graph scale
	Show/Hide Cursor	Place cursor (vertical dotted line) on graph to see values
	Zoom Area	Set area on graph to view
	Zoom In	Increase view
	Zoom Reset	Change view to normal
7 Indicators	Displays real-time test data	
8 Graph	Real-time graph displays while test in progress	

3.2.2 Main Menu Expanded

Click **Main Menu** to see the display options.



Main Menu Expanded View

-  shows machine windows 1, 2, 3, and 4.
-  switches between display options – windows 1 to 4 or 5 to 8
-  shows machine windows 5, 6, 7, 8.
-  expands the selected window for closer view.
-  opens **Settings** (discussed in Section 4).
- Click the gray area to close the expanded view of the main menu.

3.2.3 System Updates

Click the update icon to check for new software versions. Then follow the instructions shown to complete the update (Section 4).

3.2.4 Profile Screen

Click **Machine Settings** gear (drop down). Select **Profile**.

Each machine has its own profile template. These illustrations show templates for RheoVADR[®] Rheometer and HT4700 Filter Press.

Instructions for creating profiles are provided in Section 5.



RheoVADR[®] Profile



HT4700 Profile

Table 3-2 Profile Screen Functions

Step Type	Click the + to choose step type
Time	Set time in hours, minutes, and seconds for step
Speed	Set speed (rpm); range 0.01 to 999.9 rpm
Record Interval	Enter recording rate: 100, 200 & 500 ms; 1, 5, & 10 sec
Temperature	Enter set point temperature (degrees F or C)
Repeat	Enter number of repeats for the profile
Open	Open to select saved profiles
Save	Save profiles for reuse
Clear	Erase entries
Alarm	Click alarm icon to turn ON; click X to turn OFF

3.2.5 Settings Tabs

Machine

Assign a unique identification to each machine in the **Machine ID** box. Then, select the model from the dropdown menu (Model 741 Temperature Controller, RheoVADR[®] Rheometer, or HT4700 HPHT Filter Press).

To activate communication between the DNA[™] system and the machines, configure each machine.

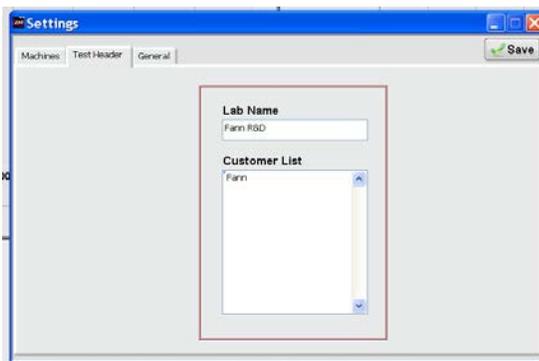
Click the configuration gear (**Config**) and follow the instructions. Detailed configuration instructions are given in Section 4.



Settings→ Machine

Test Header

This section contains frequently used information— lab name and customer names. The software will automatically fill (or prompt) certain fields when you set up your tests. The lab name only needs to be entered once. During test setup, the software will show this list of customers. New customer names are added to the bottom of the list and sorted alphabetically when the **OK** button is clicked.



Settings→Test Header

General



The illustration below shows default settings. Refer to Section 4 for completing the General tab for different machines.

Temperature Settings

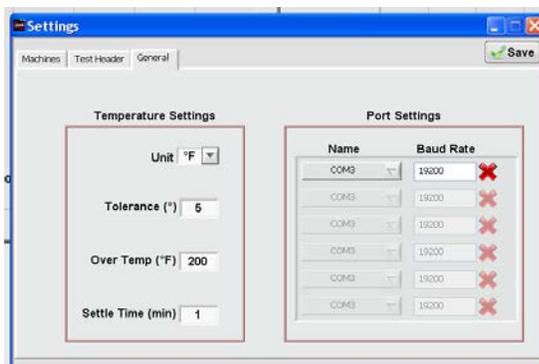
Set the preferred units (degrees Celsius or Fahrenheit) and test parameters in this section.



The temperature units entered in Temperature Settings should match the units selected on the machine. For example, if you select Celsius in the software, then you need to select Celsius on the RheoVADR[®] Rheometer.

Port Settings

- Select the DNA[™] box(es) to be activated— COMS(*number*). The COMS number will be given when you activate the DNA[™] box.
- Baud Rate is always 19200.



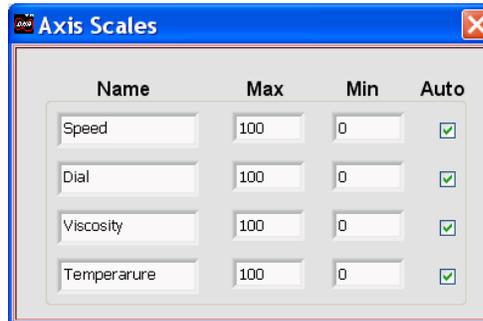
Settings→General

3.2.6 Graph Settings

Graph Scale

(Machine Settings gear > Graph Scale)

- To change the axes scale range, enter the desired values.



Graph Scale: Axis Scales

Show/Hide Cursor

- The cursor is a vertical line that can be moved to any location on the graph by using the mouse.
- Place the cursor anywhere on the graph to display values in the indicators section (main screen).

Zoom Area

- Draw a rectangle around the area of the graph you want to enlarge.

Zoom In

- This feature increases the selected rectangular area. The x/y axes rescale to display this area.

Zoom Reset

- This option changes the graph to full scale view.

4 Installation

The DNA[™] and connected equipment can generally be arranged to suit the available space and the desires of the lab personnel, consistent with any established work processes. Some environments encourage a right-to-left flow, while others a left-to-right flow.

An example setup is shown below.

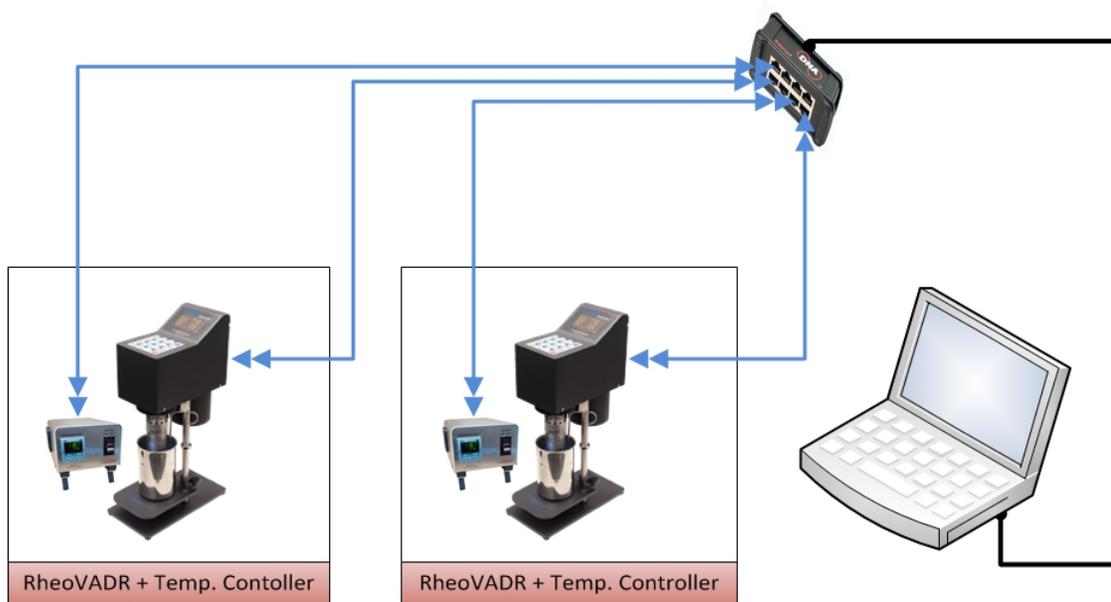


Figure 4-1 DNA[™] System with RheoVADR[®]s and Temperature Controllers

4.1 Installing the Software

A computer that operates on Windows[®] 7 is required. The DNA[™] assembly does not include a computer and monitor.

1. Insert the software USB flash drive (included).
2. If the installation process does not automatically begin, click **Start**, and then **Run**. Browse to find the setup program. Select the setup program, and then click to open.
3. When the setup program appears in the **Run** dialog box, select **OK**.
4. Wait for the software to install.

5. Select where you want to install the software.
6. Continue with the installation process, following the prompts, and clicking **Next** when required.
7. When the software installation is complete, click **Finish**.



The DNA[™] box can now be connected and the software can be started by clicking on the DNA[™] software desktop icon. (screen capture of icon)

4.2 Connecting the DNA[™] Box to Computer

Connect DNA[™] cable to USB port on the computer.

4.3 Connecting the DNA[™] Box to Fann Machines

Connect the RJ485 cable from the instrument port (labeled RS485 or Data) to a port on the DNA[™] box.

4.4 Collecting Communication Addresses

Each instrument must be assigned a unique address.

RheoVADR[®] Communication Address



```
SETUP
1 Temp. °F
2 Temp. Cal
3 Sensor Cal
4 Address 001
STOP->Exit (fn)->More
```

Communication Address on RheoVADR[®] Rheometer

- To enter **SETUP** mode, press and hold STOP, and then turn on the power.
- Wait for the **SETUP** menu to appear.
- Press the blue key 4 to enter the address in the number range 001 to 255. RheoVADR[®] units come with the address set to 110 in manufacturing. Each RheoVADR[®] connected to the DNA[™] will need a unique address.

Model 741 Communication Address



Eurotherm Display

- Hold the **Page** button (~ six seconds) until **Level 3** appears.
- Quickly press the **Raise** (up arrow) button until **Config** appears, and then wait until **Code** appears.
- Use the up or down arrows to set the **Code** to 7. Wait until **Config** appears.
- Press the **Page** button multiple times until **Comms** appears.
- Press the **Scroll** button until **id** appears. Then set the id to **rs485** using the arrow keys.
- Press the **Scroll** button until **ADDR** appears. Then set the desired address using the arrow keys.
- Press the **Scroll** button until **BAUD** appears. Then set the baud rate to 19.20 using the arrow keys.
- Press and hold the **Page** button until **Config GOTO** appears. Then press the arrow keys to go to **Level 1**.
- Wait for the Eurotherm display to return to the main screen (shown above).

HT4700 Communication Address



Advance Key Infinity Key Up & Down Keys

Watlow Display

- Hold both arrow keys at the same time until **Set** appears.
- Scroll using the down arrow until **CoM** appears.
- Press the **Advance Key** until **Pcol** appears.
- Scroll using the down arrow until **Mod** appears if necessary.
- Press the **Advance Key** until **Ad.M** appears.
- Scroll using the down arrow to change the address if necessary.
- Press the **Advance Key** until **baud** appears.
- Scroll using the down arrow to change the baud rate to 19.2 if necessary
- Press the **Infinity Key** (∞) twice to return to the main display.

4.5 Configuring the DNA[™] Box



A DNA[™] box needs to be configured only once before using for the first time.

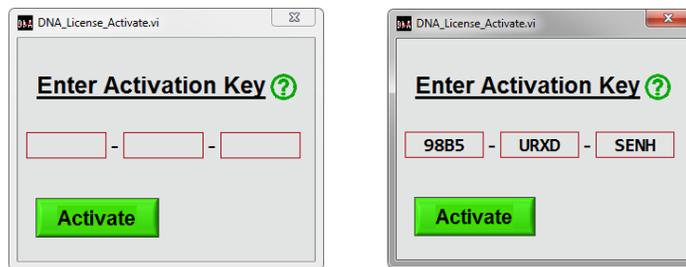
Start the DNA[™] software by clicking on the icon on your desktop. Or browse to find the Fann folder on your computer and then click on the DNA[™] icon.



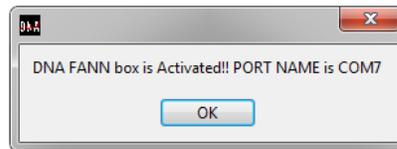
Wait for the startup screen to appear.



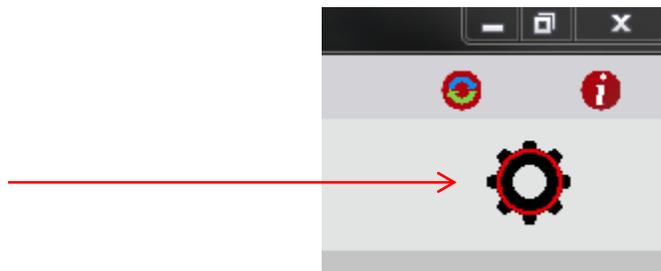
On the bottom of the DNA[™] box, you will find its activation key. Enter the key as shown in the example.



Press **Activate**. The software will confirm that the DNA[™] box is activated and will provide the port name (example below).

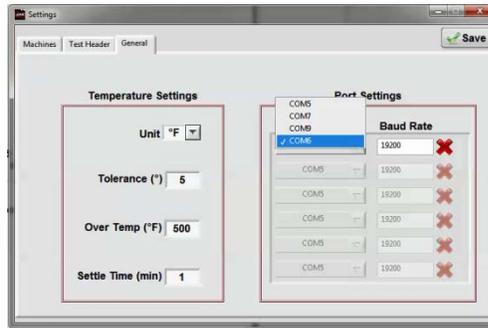


From the **Main Menu**, click the Settings icon in the upper right corner.



A pop up for **Settings** will appear.

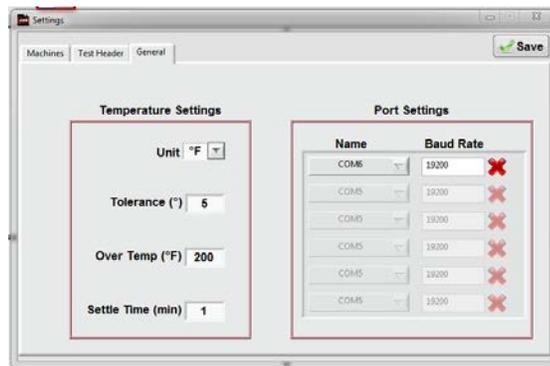
On the **General** tab, select the port name from the drop down menu in **Port Settings**.



If you have activated multiple DNA[™] boxes on a single computer, the display will show a list of all port addresses for those DNA[™] boxes. You must select the port address for the specific DNA[™] box you wish to use

4.6 Changing Default Settings

The settings shown below can be changed to fit your test requirements.



Temperature Unit

Choose degrees Celsius or Fahrenheit.



Make sure the temp. units match the settings on the machines the DNA[™] is connected to. specific DNA[™] box you wish to use.

Tolerance

Each test consists of profiles that contain steps. When the tolerance is set to 5, the software will go to the next step when the temperature is within 5 degrees of the set point temperature. For example, if the set point is 120°F, the next step will begin when the temperature increases to 115°F.

Over Temp

Over Temp is a global setting that applies to all machines configured in the DNA[™] system. Each machine has a safe temperature setting, which the user cannot set temperature above. Ensure that the machine is set to a safe temperature setting when running a test to avoid the Over Temp from stopping the test from reaching the maximum temperature setting.

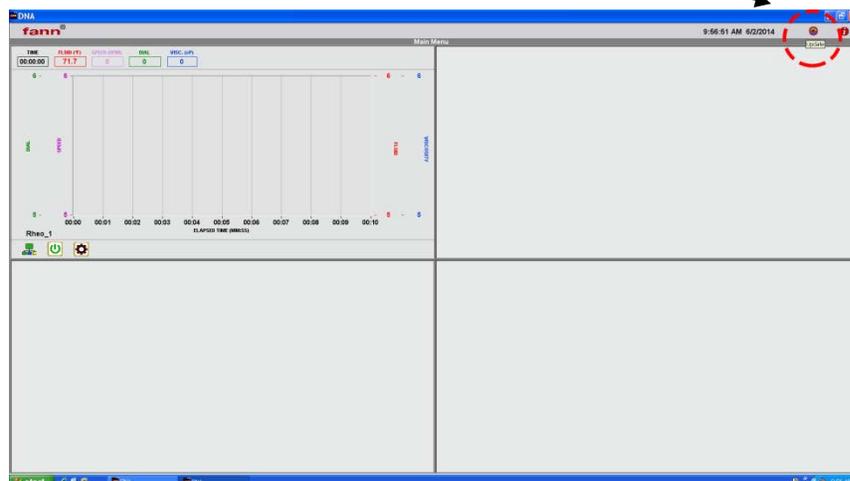
- DNA[™] machines have safety settings of 300°F and will not run tests above this temperature.
- Fann Thermocups have safety setting of 190°F to prevent overheating.

Settle Time

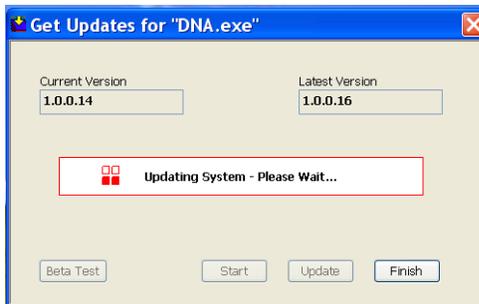
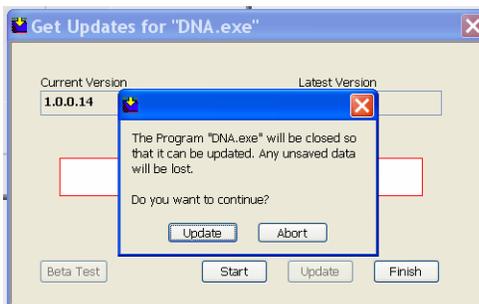
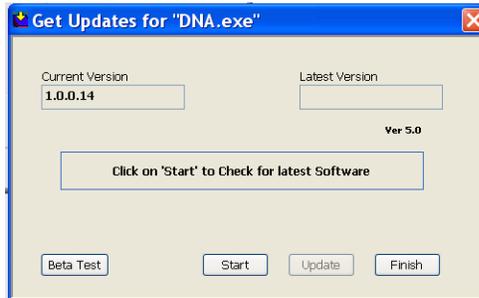
This time (in minutes) defines how long the temperature remains stable within the tolerance limit before the system proceeds to the next step.

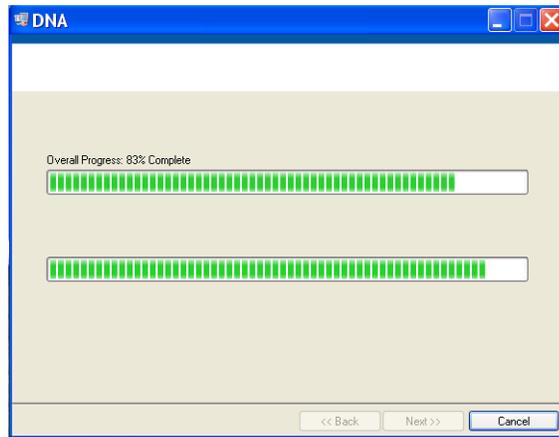
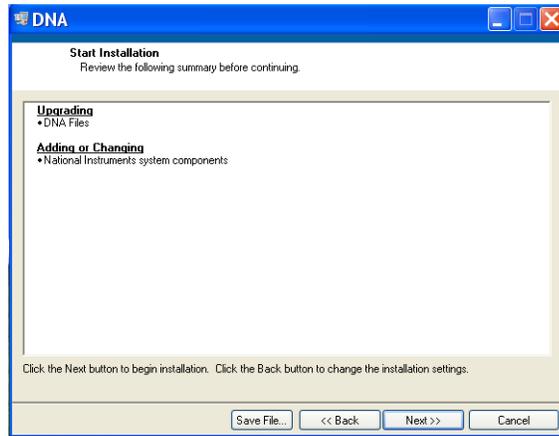
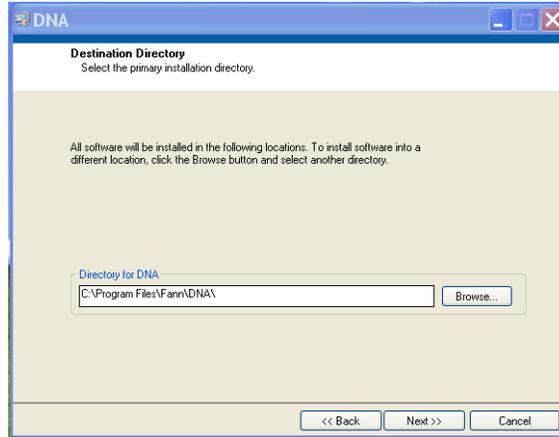
4.7 Updating the Software

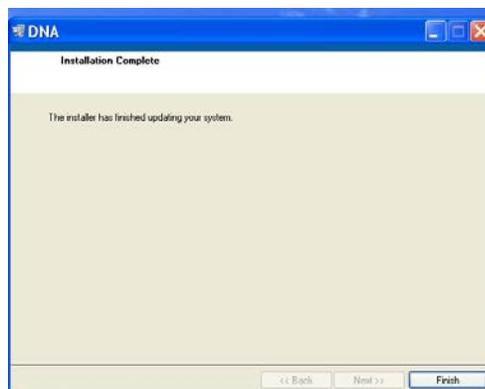
Click the **Update** button on the **Main Menu**.



Follow the instructions shown on the screens until the update is complete.





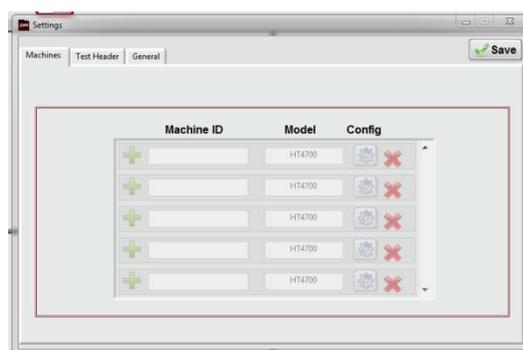


4.8 Configuring the Instruments



Each machine must have a unique address. For example, if four rheometers and four temperature controllers are connected, the addresses could be set to 1 to 4 for the rheometers and 5 to 8 for the temperature controllers.

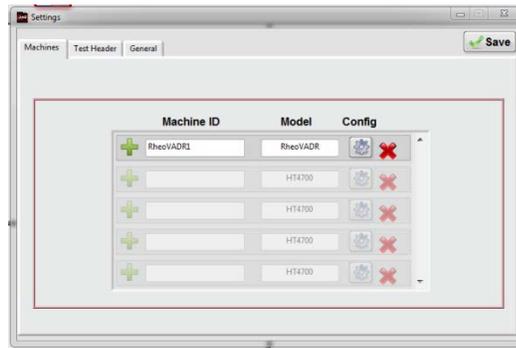
- To start the configuration for each machine, click the gear (located at top of expanded main screen).
- Go to **Machine** tab (shown below).
- Then configure each machine according to the instructions in the next sections.



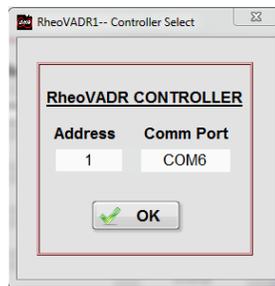
4.8.1 RheoVADR[®] Configuration

- Click the + symbol to enter the name. The example below shows *RheoVADR1*. If another rheometer is connected, it could be named *RheoVADR2*.

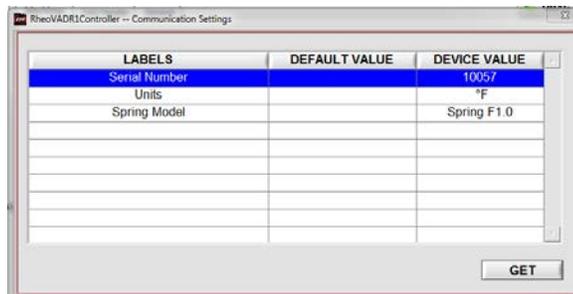
- For the Model, select **RheoVADR** from the dropdown.



- Click the **Config** gear to open the next window. Enter the **Address** for that RheoVADR[®] and **Comm Port** for that DNA[™] box (communications port).
- Press **OK**.



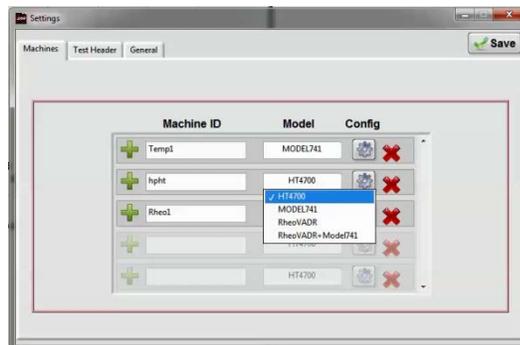
- This table will appear. No changes are required. To close this screen, click the **X** (top right corner).



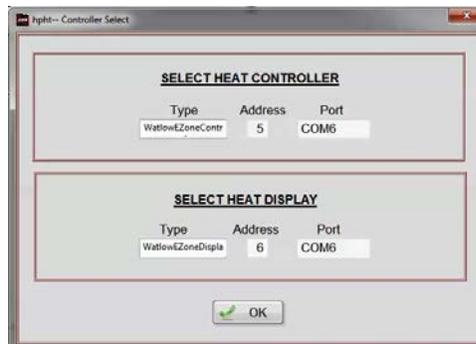
If no communication between the DNA[™] and the machine, verify the address and Comm Port are correct and that the machine is connected to the DNA[™] box, and press the **Get** button.

4.8.2 HT4700 Configuration

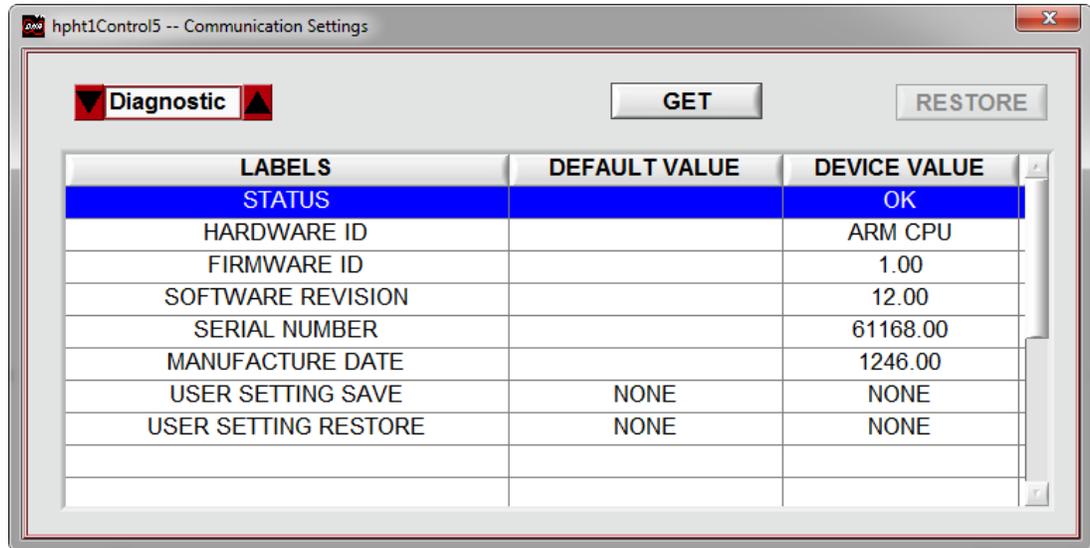
- Click the + symbol to enter the name. The example below shows *hpht* in **Machine ID** field.
- For the **Model**, select **HT4700** from the dropdown.



- Click the **Config** gear to open the next window. Enter the **Address** and **Comm Port** (communications port). The filter press has two temperature controllers and requires two addresses. The address for the temp controller labeled “Heater Temp” on the HT4700 should be entered into the field labeled “Heat Controller” in the DNA[™] software. The address for the temp controller labeled “Cell Temp” should be entered into the field labeled “Heat Display” in the software.
- Press **OK**.

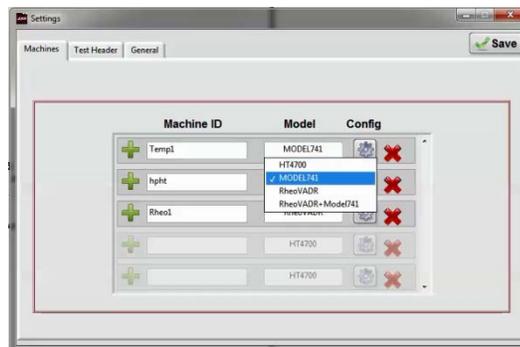


- This table will appear. No changes are required. To close this screen, click the **X** (top right corner).

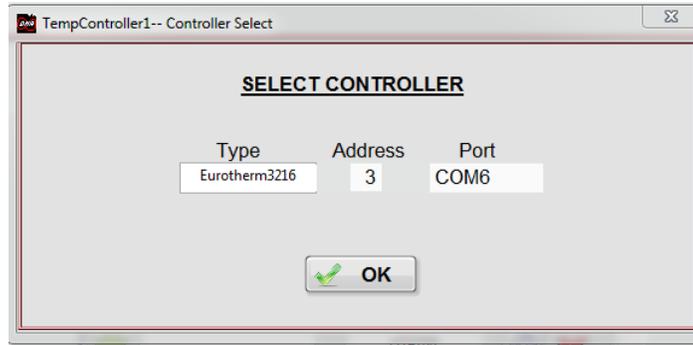


4.8.3 Temperature Controller Configuration

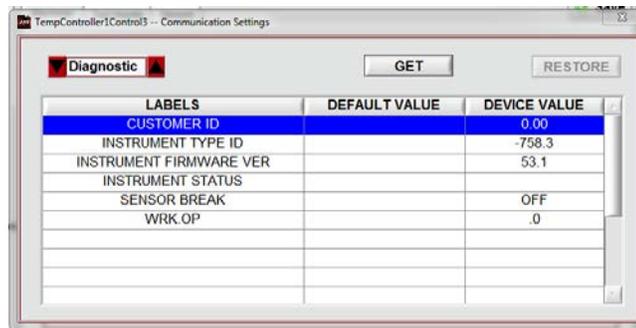
- Click the + symbol to enter the name. The example below shows *Temp1* in **Machine ID** field.
- For the **Model**, select **Model 741** from the dropdown.



- Click the **Config** gear to open the next window. Enter the **Address** and **Comm Port** (communications port).
- Press **OK**.



- This table will appear. No changes are required. To close this screen, click the **X** (top right corner).



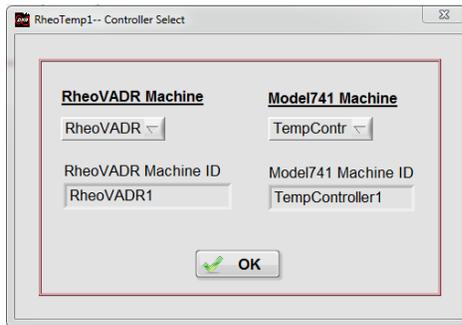
4.8.4 RheoVADR[®] and Temperature Controller

- Click the + symbols to enter the names for the paired unit. The example below shows *RheoTemp1* in **Machine ID** field.
- For the **Model**, select **RheoVADR[®] + Model 741** from the dropdown.



- Click the **Config** gear to open the next window. Click the RheoVADR dropdown and select the Machine ID you wish to activate. Repeat this for the model 741 dropdown.

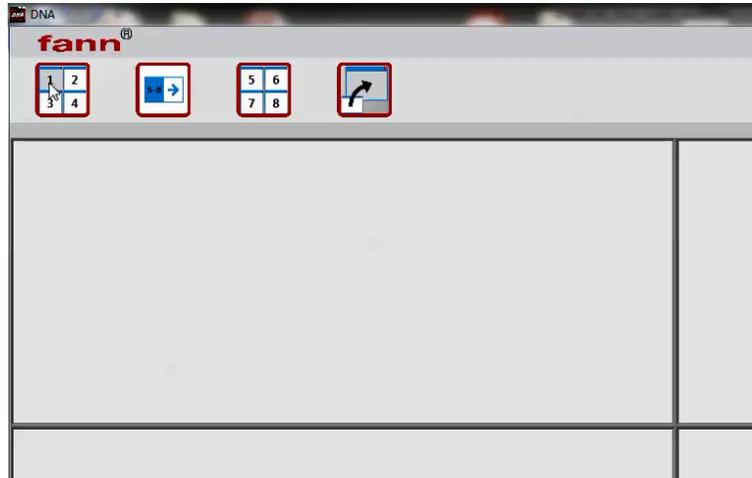
- Press **OK**.



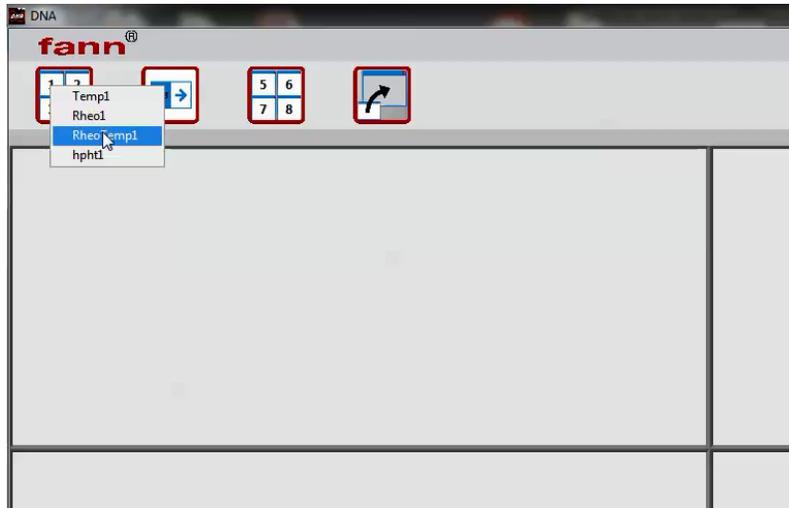
4.8.5 Machine Activation

Once the machines have been configured within the DNA[™] software they can be activated to create profiles and run tests. To activate a machine follow these steps.

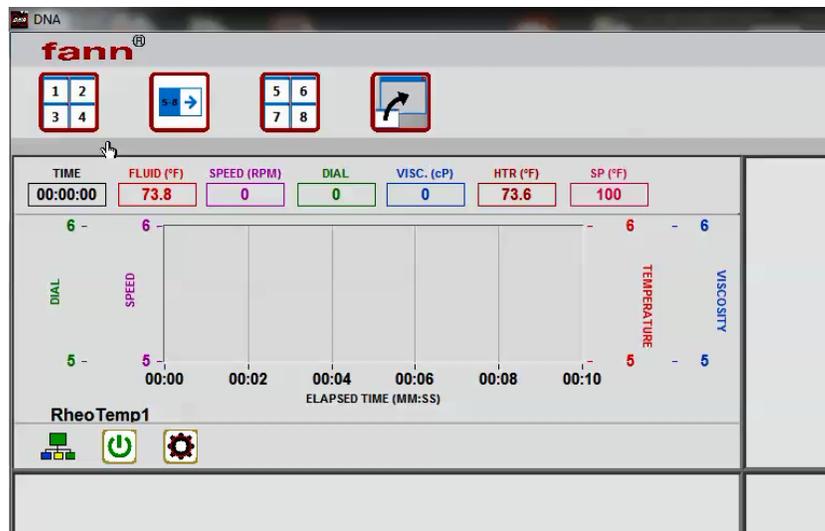
- On the Main Menu place the cursor over the window number you would like to activate. In this example Window 1 will be activated.



- Click this window and select the machine you would like to activate from the dropdown. In this example the RheoVADR[®] +Temperature Controller combination named RheoTemp 1 will be activated.

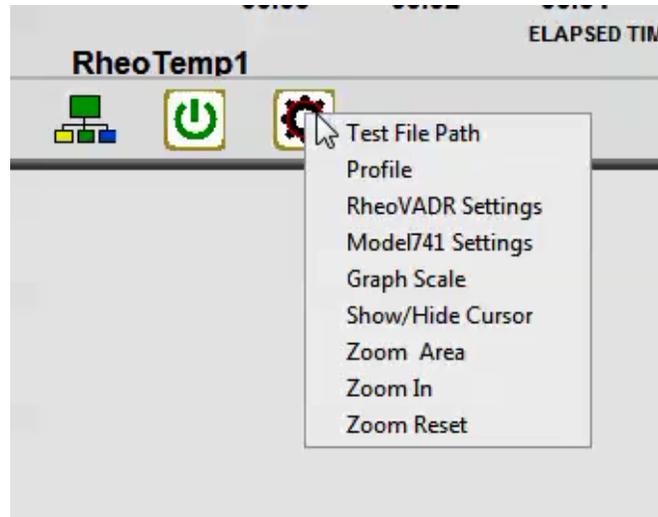


- Click the machine name and RheoTemp1 will be activated in window 1. The green icon in the lower left of the window indicates successful communication between the DNA™ software and the machine. The ID of the activated machine will also appear in the lower left of the window.



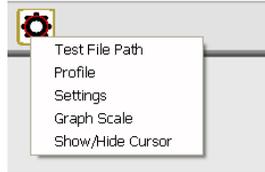
- Repeat this process to activate other machines for use in other windows

A machine that is active in one window cannot be activated in another window concurrently. Note that up to 8 individual machines or combination of machines can be active at one time in the DNA[™] software. Once a machine is activated the user can open, create, or edit profiles, view machine settings, adjust the graph scales, and zoom in our out of the graph by clicking on the gear in the lower left of the window and selecting the desired action from the dropdown.



5 Test Programming and Editing

From the **Active Window**, click the gear and select **Profile**.



5.1 Basic Profiles

The profile editing sections are similar.



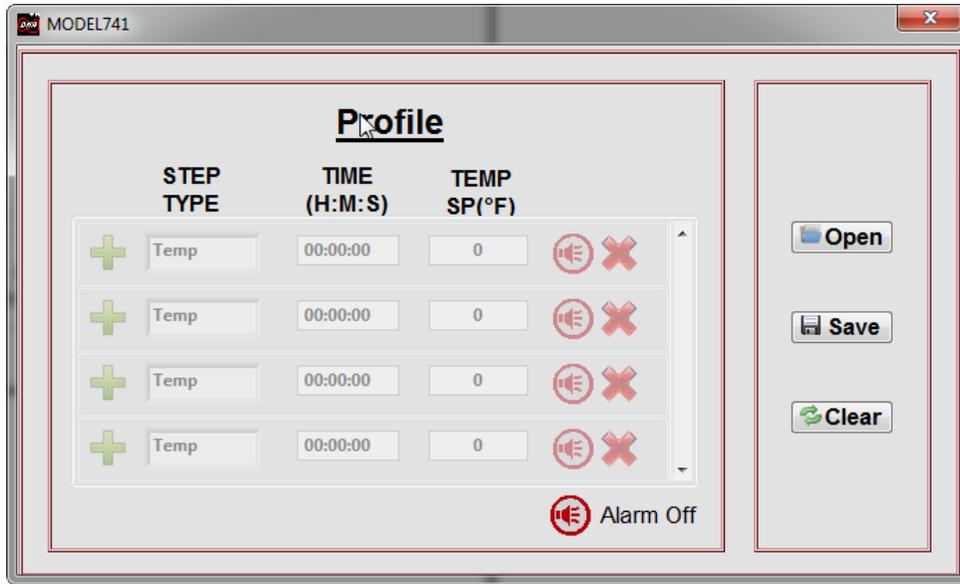
When setting the record interval be aware that the graph on the active screen will refresh/update at the same rate as the record interval.



RheoVADR[®] Profile



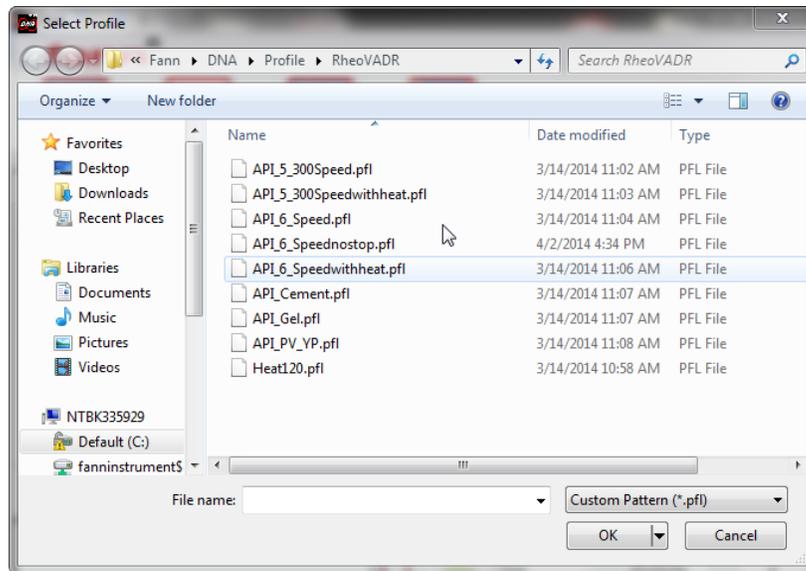
HT4700 Profile



Model 741 Profile

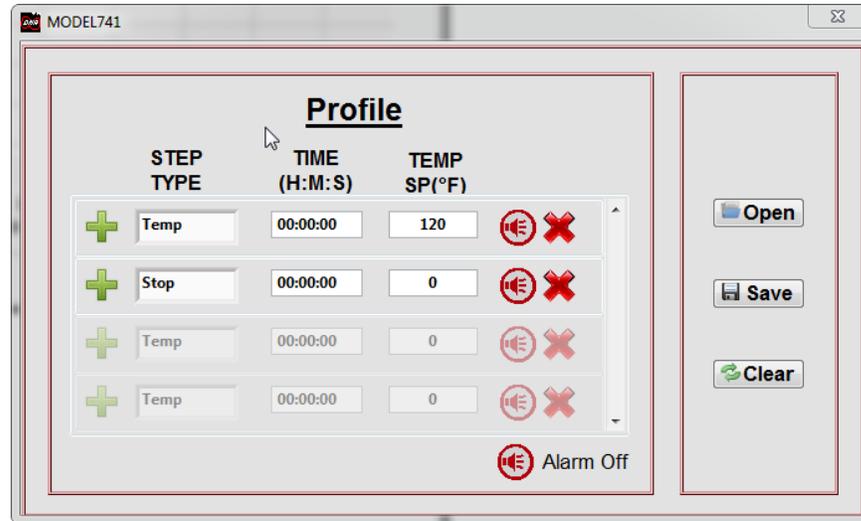
5.2 Saved Profiles

Click **OPEN** on the right hand side of the Profile screen to view previously created profiles. This example shows a list of RheoVADR[®] profiles.



5.3 Heat Profiles

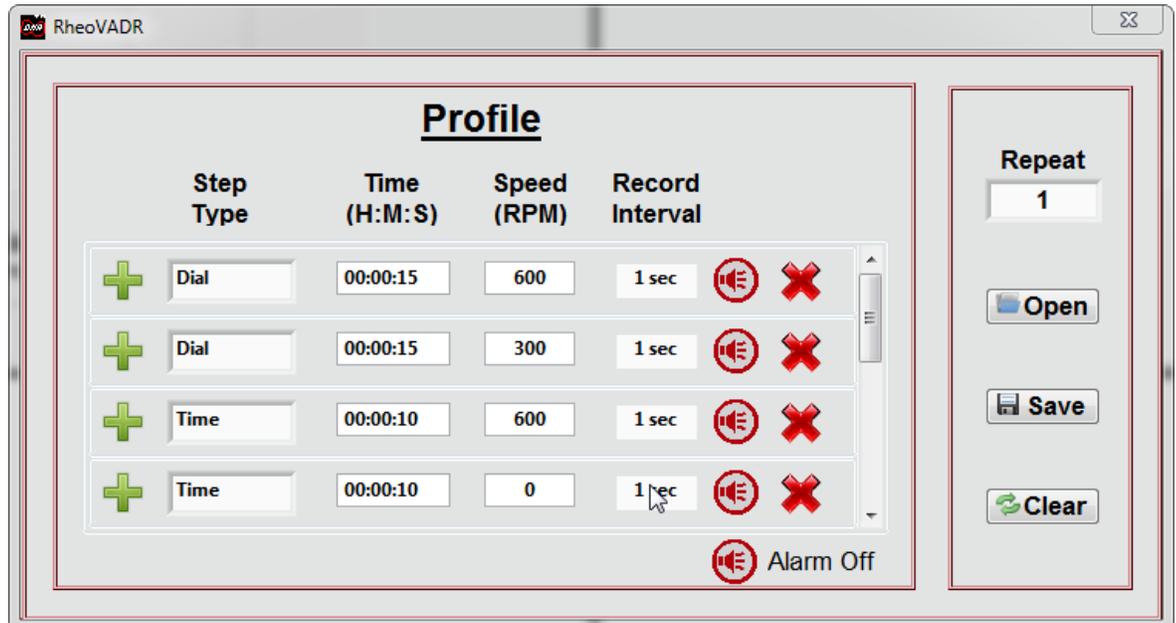
Below is an example of a simple heat profile for the Model 741.



This is a simple profile that will instruct the temp controller to heat the device connected to it to 120 degrees and then stop heating. It is not necessary to enter a time value as the temp controller will not ramp to temp in a specified time. A heat profile should always end in a stop step to insure that it does not continue heating beyond the specified time. The **Step Types** can be either **Time, Temp, or Stop**.

5.4 Rheology Profiles

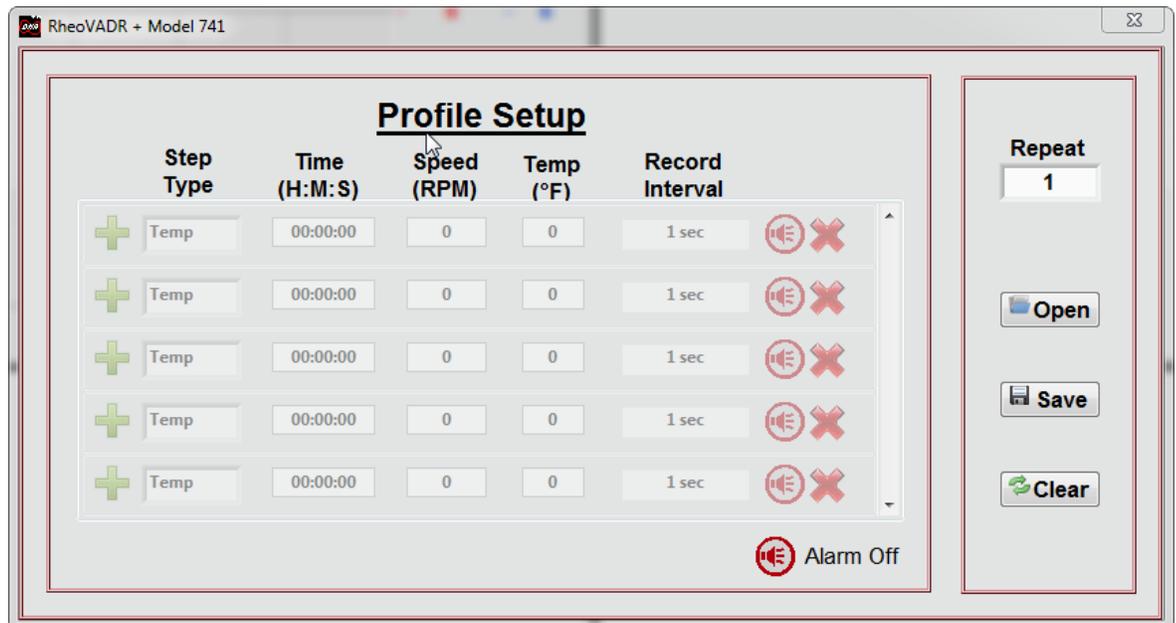
Below is an example of a simple RheoVADR[®] profile.



This profile allows the user to specify the step type (**Dial**, **Time**, or **Stop**) depending on the test. The user can also set the Time, speed, and record interval, and set an alarm for a specific step if desired.

5.5 Multiple Profiles

Below is the profile template for a RheoVADR[®] paired with a Model 741 temperature controller.



This template allows the user to define the step type (**Dial**, **Temp**, **Time**, or **Stop**), set the time, speed, temp, and record interval, and set an alarm for a specific step if desired.



For any of the profile templates the user can enter -1 for a Temp setpoint. This will instruct the software to use the Temp setpoint from the previous step. If running a test using multiple profiles setting -1 as the Temp setpoint in a profile will instruct the software to use the temp setpoint from the previous profile.

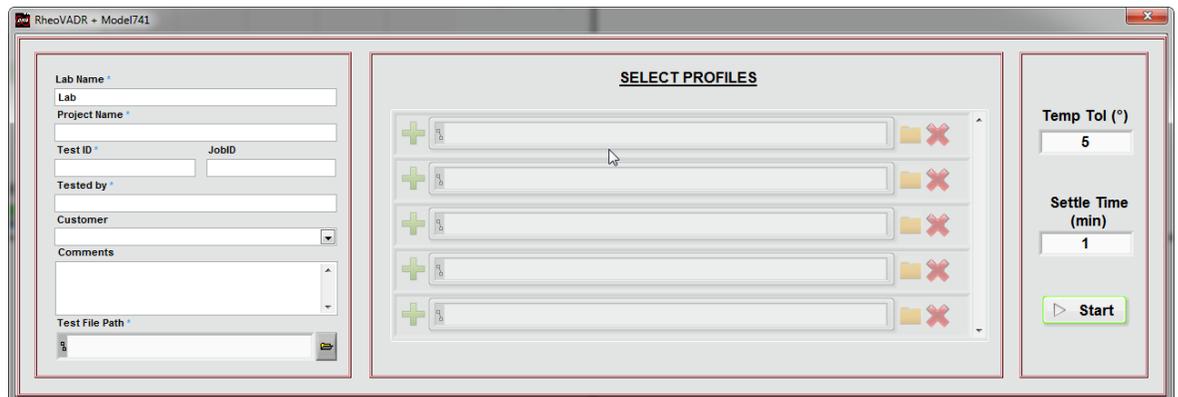
5.6 Starting a Test

- To start a test begin by clicking on the start button on the lower

left of the active window



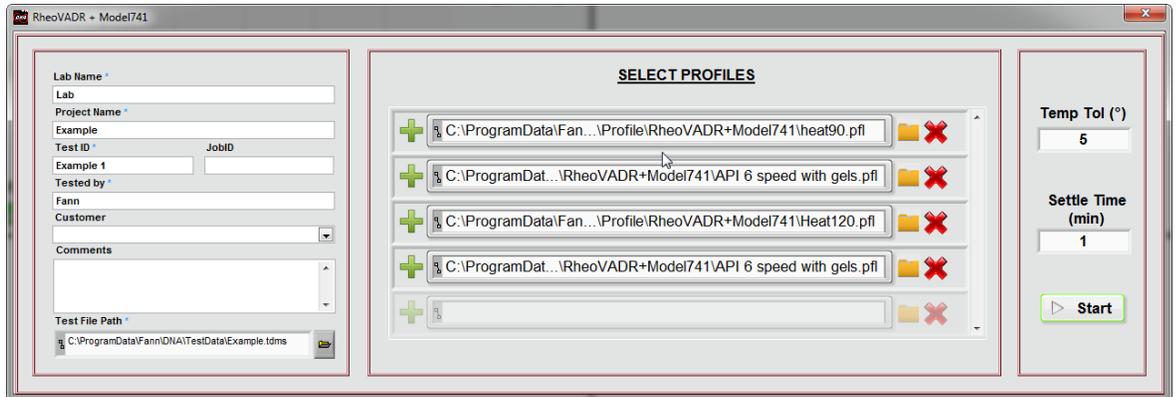
- The test setup box will appear.



On the left side of the box are fields for entering in data relative to the test. Fields identified with a blue asterisk must be filled in before a test can be run. The center section is where the desired profile/profiles can be selected by clicking on the folder icon and selecting from the previously saved profiles. The right section allows the user to set the temperature tolerance, settle time, and to start the selected tests.



If multiple profiles are selected, they will be run in order from top to bottom. The next profile in order will begin immediately after the previous profile has been concluded.



This example shows multiple profiles which will run consecutively. The first profile labeled Heat 90 instructs the Model 741 Temp controller to heat the fluid to 90°F. Once the fluid temperature has reached within 5°F of 90°F (as set by the temp tol on the right side of the box) the software will proceed to the next profile labeled API 6 speed with gels. At the completion of this profile the software will proceed to the profile labeled Heat 120, heat the sample to within 5°F of 120°F, and then proceed to the final profile labeled API 6 speed with gels. Setting up a test in this manner allows the user to combine several simple heat and rheology profiles to evaluate rheology over a wide range of temperatures rather than programming in a much longer more complex single rheology profile that contains all of the desired temps in a single profile.

6 Test Analysis

Sample test results are shown below. The user has multiple options to view or display the data. The window can be enlarged to full screen. The user can zoom in or out on specific areas of the window. The user can activate a cursor to show the values for specific points on the graph. The saved test data can also be opened in Data Manager for further analysis and report preparation.



Figure 6-1 Graphical Results

7 Troubleshooting and Maintenance

Troubleshooting and regular maintenance procedures are described in this section. If more extensive maintenance or service of the instrument is required, please contact Fann Instrument Company.

Table 7-1 Troubleshooting Guide

Problem or Symptom	Possible Cause	Corrective Action
Unable to connect to a machine	Machine not connected	Check all cables and that machine is turned on
	Machine address incorrect	Verify machine addresses
	COMS port incorrect	Verify COMS port
NaN appears in data boxes in active window	Machine not connected	Verify connection
	Machine not turned on	Turn machine on
	Thermocouple unplugged	Check thermocouple connection

8 Parts List

Table 8-1 Data Network Adapter, P/N 102410489

Part No.	Quantity	Description
102374768	1	DNA BOX WITH USB COMPUTER CONNECTOR AND EIGHT RS485 PORTS
102411541	1	SOFTWARE
205533*	2	CABLE CAT5 RJ45 10FT LG
D00981262	1	INSTRUCTION MANUAL, DNA SYSTEM

*Additional CAT5 Cables are sold separately.



Figure 8-1 DNA™ Box

9 Warranty and Returns

9.1 Warranty

Fann Instrument Company warrants only title to the equipment, products and materials supplied and that the same are free from defects in workmanship and materials for one year from date of delivery. **THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED OF MERCHANTABILITY, FITNESS OR OTHERWISE BEYOND THOSE STATED IN THE IMMEDIATELY PRECEDING SENTENCE.** Fann's sole liability and Customer's exclusive remedy in any cause of action (whether in contract, tort, breach of warranty or otherwise) arising out of the sale, lease or use of any equipment, products or materials is expressly limited to the replacement of such on their return to Fann or, at Fann's option, to the allowance to Customer of credit for the cost of such items. In no event shall Fann be liable for special, incidental, indirect, consequential or punitive damages. Notwithstanding any specification or description in its catalogs, literature or brochures of materials used in the manufacture of its products, Fann reserves the right to substitute other materials without notice. Fann does not warrant in any way equipment, products, and material not manufactured by Fann, and such will be sold only with the warranties, if any, that are given by the manufacturer thereof. Fann will only pass through to Customer the warranty granted to it by the manufacturer of such items.

9.2 Returns

For your protection, items being returned must be carefully packed to prevent damage in shipment and insured against possible damage or loss. Fann will not be responsible for damage resulting from careless or insufficient packing.

Before returning items for any reason, authorization must be obtained from Fann Instrument Company. When applying for authorization, please include information regarding the reason the items are to be returned.

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Toll Free: 800-347-0450

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