



AlcoTest-RI®

Users' Manual Rev D

Software V1.1.3.0 and above

## Table of Contents

<b>1</b>	<b>Introduction .....</b>	<b>5</b>
<b>2</b>	<b>Safety Considerations .....</b>	<b>7</b>
<b>3</b>	<b>Unpacking your new Rudolph AlcoTest®.....</b>	<b>12</b>
3.1	Items Supplied .....	12
<b>4</b>	<b>Optional and Spare Parts .....</b>	<b>20</b>
<b>5</b>	<b>Setting up the Instrument .....</b>	<b>25</b>
5.1	Basic Set Up .....	25
5.2	Setting up the Optics Box .....	28
5.2.1	Unpacking and Connecting the OBM .....	28
5.2.2	Parts Guide AlcoTest® Optics Box Module .....	28
5.2.3	OBM Connections .....	29
5.3	Adding Peripherals; Bar Code Scanner, Keyboard, Printer .....	29
5.4	Turning On – Menu Basics .....	30
5.5	The Main Menu .....	33
5.5.1	System Information .....	33
5.6	Starting a Measurement.....	35
<b>6</b>	<b>Getting Started: Factory Methods &amp; Their Customization .....</b>	<b>39</b>
6.1	Selection of a Factory Method .....	39
6.2	Customizing a Factory Method .....	44
6.2.1	Editing the Measurement Parameters .....	44
6.2.2	Editing the Display Parameters .....	49
6.2.3	Method Editing .....	53
6.2.4	Configuring the Display .....	55
6.3	Creating/Adding a New “Custom” Method .....	55
6.3.1	Adding a New Method .....	55
6.4	Customizing the AlcoTest®.....	60
6.5	Adding a Custom Polynomial into the AlcoTest®.....	60
6.6	Adding a Custom Offset into the AlcoTest®.....	63
6.6.1	Setting a Custom Offset .....	63
6.7	AlcoCalc®.....	65
6.7.1	Dilution by Volume TTB – AlcoCalc® .....	67
6.7.2	Dilution by Weight TTB.....	68
<b>7</b>	<b>Measurements – Manual Injections Using a Syringe.....</b>	<b>69</b>
7.1	Method and Measurement Conditions .....	69

7.2	Manual Measurement Using a Syringe .....	69
7.2.1	Loading the VideoView™ .....	70
7.2.2	Loading the OBM .....	73
7.3	Measurement Result Management .....	76
7.3.1	Printing .....	76
7.3.2	Printer Results Selection .....	80
7.3.3	Exporting .....	83
7.3.4	Detailed Export Settings .....	84
7.3.5	Saving Results .....	86
<b>8</b>	<b>Cleaning and Drying the Sample VideoView™ .....</b>	<b>90</b>
8.1	Routine Cleaning in-between samples.....	90
8.2	Cleaning and Drying Prior to an Adjustment and/or Calibration .....	92
8.3	Special Problem Cleaning Methods .....	92
8.3.1	Four methods for problem cleaning: .....	93
<b>9</b>	<b>Calibration; Checking and Adjusting .....</b>	<b>96</b>
9.1	Definitions .....	96
9.2	Calibration Checks – Verification .....	96
9.3	Two-Point Calibration Adjustment.....	99
9.4	Temperature Calibration Verification & Adjustment .....	103
9.4.1	Temperature Verification .....	103
9.4.2	Temperature Calibration Adjustment.....	105
9.5	Viscosity Calibration Adjustment.....	107
9.6	Calibrating the Refractometer .....	109
9.6.1	Menu Functions.....	109
9.6.2	Calibration .....	114
9.6.3	Menu - Calibration .....	115
<b>10</b>	<b>Printers and Network Connections.....</b>	<b>121</b>
10.1	Basic Steps required for Printer or Network Configuration .....	121
10.1.1	Basic Steps: .....	121
10.2	Installing Plug-n-Play Local Printers .....	127
10.3	For a Local Printer which is not Plug-n-Play .....	129
10.3.1	Loading a custom or older Printer Driver.....	129
10.4	Serial Printers .....	134
10.5	Print to a TCP/IP Printer Attached to a Network .....	139
10.6	Access Network Drives.....	147
10.7	Importing/Exporting the Configuration Settings .....	154
10.7.1	Exporting the Configuration Settings.....	154
10.7.2	10.5.2 Restoring the Configuration Settings.....	158
10.8	Importing/Exporting the Database Settings .....	161

10.8.1	Exporting the Configuration Settings.....	161
10.8.2	Configuring the Database Backup Folder .....	164
10.8.3	Backing up the Database .....	166
10.8.4	Setting up the Auto Backup Schedule for the Database .....	166
10.8.5	Restoring the Database .....	167
<b>11</b>	<b>Factory Testing – QC – Electronic Copy of Manual .....</b>	<b>170</b>
11.1	System Information.....	170
11.2	QC Procedure at Factory IQ/OQ/PQ .....	171
11.3	Electronic Copy of User's Manual (HELP) .....	171
<b>12</b>	<b>Understanding Density and Specific Gravity.....</b>	<b>175</b>
12.1	Definitions.....	175
12.2	The Mechanical Oscillation Principle – A Brief Explanation.....	177
<b>13</b>	<b>Rudolph Automation.....</b>	<b>179</b>
13.1	Access to Optional Automation in the AlcoTest® .....	179
13.2	Automation Options for the AlcoTest®.....	180
13.2.1	The ECS Automation Option.....	180
13.2.2	The Peristaltic Pump Option .....	182
13.2.3	Connecting the Peristaltic Pump: .....	182
13.2.4	Direction of Pump Flow: .....	183
13.2.5	Peristaltic Pump Settings: .....	185
13.2.6	Performing a Measurement with the Peri-Pump.....	186
13.2.7	Pressure Fill .....	187
13.2.8	AutoFill® Option .....	188
13.2.9	Full Automation with various Lab Instruments in Tandem .....	194
13.3	Connections from AlcoTest® to Automation and/or other Instruments 195	
<b>14</b>	<b>Operator Safety and Proper Equipment Operation .....</b>	<b>197</b>
14.1	OSHA Standards .....	197
14.2	Chemicals & Test Liquids .....	197
14.3	Eye protection.....	199
14.4	Electrical Protection .....	199
14.5	Skin/Hand and Personal Protection .....	199
14.6	Static Electrical Discharge .....	200
14.7	Heat and Hot Surfaces .....	200
14.8	Internal Components .....	200
14.9	Liquid Spills and Cleaning .....	200
14.10	Flammable Liquids.....	201
14.11	Explosion Proof Standards .....	201
14.12	Bio Hazards .....	202



<b>Appendix A – Technical Specifications .....</b>	<b>203</b>
<b>15    Appendix B – Water Density Table .....</b>	<b>204</b>
<b>16    Appendix C – Air Density Table .....</b>	<b>211</b>
<b>17    Appendix D – Printers Supported by Windows Embedded.....</b>	<b>213</b>
<b>18    Table of Figures .....</b>	<b>219</b>

## 1 Introduction

Thank you for the confidence you have placed in Rudolph Research Analytical and for the purchase of our precision AlcoTest® system. The AlcoTest® is designed to provide accurate measurement of alcohol content in both obscured and unobscured liquids.

Rudolph's AlcoTest® units are the world's most advanced, with many exclusive features which include:

- Windows Embedded Operating System Maximizes Flexibility and Features
  - With the AlcoTest®, the display, the printout, and the saving of measurement results are completely flexible and may be tailored to meet the end user's requirements. Any printer may be used, either some local printer sitting next to the AlcoTest® or some networked printer in a completely different building. The same is true for how and where the data is saved. And the AlcoTest®'s display is large, bright, and completely configurable. The AlcoTest® is capable of all the same flexibility and features that would be available to you with the use of a PC running in Windows® embedded. Embedded Windows means that your AlcoTest® is completely safe from all malware and viruses.
- Peripherals and Networking
  - The AlcoTest® has 5 USB ports, an Ethernet cable connection, one RS232 port and will communicate immediately with any USB external keyboard, mouse, bar code scanner, plug-and-play USB printers and any other USB devices.
- Easy Transfer of Data and Firmware Upgrades
  - The AlcoTest® can either use a flash memory stick or exchange information directly from the Internet. Special formulas or tables required for an application may be downloaded directly from the Rudolph Research Analytical web site to the AlcoTest® instrument in your lab. The same is true for any required software or firmware upgrades via the use of a preloaded desktop sharing utility.
- Virtually Unlimited Resources Available

- With its 32 GB memory, the AlcoTest® has virtually an unlimited number of special tables, formulas, methods, and also customized calibration checks and adjustments available for use.
- Remote Troubleshooting and Diagnostics
  - Using a desktop sharing program, Rudolph's Service Department and RRA Authorized Trained Personnel may connect to your equipment from thousands of miles away and provide immediate assistance to the end user in the most convenient manner.
- Touch Screen User Interface
  - The AlcoTest®'s display is large (10.4" diagonal), bright, colorful, and completely configurable.
- The Graphic User Interface is Very User Friendly
  - All functions required for measurements and daily operations are directly available to you on the main screen; no need to go into other menus or submenus. The AlcoTest® is the most user friendly, intuitive precision alcohol testing system in the world.

## 2 Safety Considerations

No manual can address all the various hazards which may be possible in each laboratory's environment especially when considering the vast array of different chemicals which may be present. It is ultimately the user's responsibility to establish the appropriate health and safety regulations. The following are basic guidelines which apply to most all laboratory instrumentation.

Read the manual before using your Rudolph AlcoTest® and contact Rudolph Research Analytical directly with any questions or concerns. Do not install the AlcoTest® until completely familiar with this instrument and its functions.

Always ensure that the power source to the instrument is properly grounded.

Switch the AlcoTest® unit off and unplug the power cable before doing any authorized maintenance to the AlcoTest®.

Only technicians trained by Rudolph Research Analytical are permitted to perform any necessary repairs or service. Any and all parts used for this service and any software used must be specified by Rudolph Research Analytical.

The AlcoTest® has been designed with operator safety in mind. Toward that end operators are advised to follow best practices and operating procedures as recommended by OSHA for their particular laboratory environment and for laboratory safety in general. The relevant specifications are referenced in detail in chapter 13 of this document. As a brief summary the following points should be observed.

- The AlcoTest® operation manual is a reference for the safe operation of this equipment. It is not intended to be either comprehensive or exhaustive. When in doubt the local processes and procedures should be construed as to supersede the safety practices recommended in this manual.
- It is highly recommended that operators of this equipment read the manual in its entirety and be familiar with the operation of this unit prior to use.

- Rudolph Research Analytical provides a comprehensive warranty on this equipment. For warranty details please consult your enclosed documentation. Please note that this warranty may be compromised if alterations have been made to the unit's mechanical or electrical parts or software.
- The AlcoTest® unit is a precision piece of equipment. Please take care to follow all instructions, warnings and tips to ensure the safe operation of this equipment.

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*Note: In the event that a situation arises that is not covered in the manual or the documentation please consult directly with an authorized representative of Rudolph Research prior to attempting the desired operation.*

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- Please do not use the equipment in a manner that is proscribed within the manual. Rudolph Research will not be liable for damages to customer premises or personnel in the event that the unit is used in a proscribed or incorrect manner.
- Rudolph Research approved accessories that are shipped with the unit, and/or purchased subsequently for use with the equipment are the only devices which may be employed. Using unapproved devices within the equipment is prohibited and may affect your warranty.
- AlcoTest® units consist of a display base and an Optics Box Module. Both components are designed to be easy to install and maintain. Please note that only an approved installer and or approved maintenance personnel should attempt to either install or maintain the AlcoTest® unit.
- The AlcoTest® unit should not be operated if any damage or malfunction is suspected. In the event that a unit has become suspect in its operation please disconnect the unit from the mains power source and contact a Rudolph Research Approved support outlet for further instructions.
- The AlcoTest® is not designed to meet the UL1230 Explosion Proof Equipment standard. (See chapter 13 for further details). Please do not operate the equipment in an environment which requires machinery to meet this standard.
- Any and all required service or maintenance on this equipment **MUST** be performed by authorized Rudolph Research Service personnel. This does

not include regular cleaning but does include any operation where the external covers of the unit are opened.

- It is very important that all operators are fully trained in the operation of the equipment prior to use.

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*Note: Due to the nature of precision measurement, results may be influenced by environmental factors or other local conditions. In the event that your AlcoTest® unit is not functioning to the specifications that are expected please contact Rudolph Research prior to taking any action.*

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### Flammable Liquids

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*NOTE: When using inflammable liquids near the equipment or for testing or cleaning purposes please follow the following precautions.*

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- Do not store flammable material near the equipment. This includes materials which may contribute to the severity of an incident, such as lab coats, packing material or papers.
- Do not leave flammable sample containers or solvent containers uncovered.
- Spillage of flammable solvents, samples and or cleaning materials should be addressed immediately. Please do not operate the equipment in the event of a nearby flammable liquid spillage.
- Ensure adequate ventilation if the AlcoTest® is to be used with noxious and/or flammable liquids, vapors or solvents.
- Follow best practices with regards to the connection of this equipment to the mains power when used with flammable liquids. It is recommended that the local fire safety ordinances be consulted and that all required fire safety inspections be conducted prior to operation of the equipment in a flammable liquid environment.
- Fire extinguishing equipment and/or fire suppression equipment, as required by local ordinances or fire safety codes, should be installed and operators should be familiar with their operation prior to using this equipment in a flammable liquid environment.



- Never leave the equipment unattended when it is operated in an environment where flammable liquids are present.

Follow all warnings and instruction in this manual.

Do not work in any hazardous area. Work in a fume hood when measuring any materials which are inflammable, toxic, or corrosive. As previously mentioned - the AlcoTest® is **NOT** explosion proof. Comply with all usual regulations when working with materials which could ignite or explode from a spark.

Use caution when using the liquid density standards. Be sure to read and understand the Material Safety Data Sheets which are supplied with these items.

Do not operate the AlcoTest® if any malfunctions are suspected or detected. Please contact Rudolph Research Analytical.

Be sure all operators of the AlcoTest® have been properly trained.



Only use the accessories and auto-sampling devices supplied or approved by Rudolph Research Analytical.




### 3 Unpacking your new Rudolph AlcoTest®



#### 3.1 Items Supplied



Your new Rudolph AlcoTest® system has been packed and inspected thoroughly prior to shipment. However, please inspect the box for damage prior to opening. Photograph if possible the condition of the box if any damage is evident and report this to the transportation company as well as your Rudolph Research Analytical representative. Keep all packing material for inspection.

Standard Items supplied for each AlcoTest® are as follows:




Item	Pcs.	Description & P/N
	1	AlcoTest® 2911 Plus – P/N A25593 AlcoTest® 2911 – P/N A25591 AlcoTest® 2910 – P/N A25590 AlcoTest® 2909 – P/N A27146
The No Charge Kit supplied includes all the following items:		
	1	Power Supply 85 to 220vac; 48 to 62 Hz input DC, 12V 10A, 150W MAX output P/N P23274




	1	<p>Power Cord 6' 3 X 18AWG 2.5A/125VAC P/N P23275</p>
	1	<p>Plug Adapter IEC C14 Plug to IEC CS P/N P23722</p> <p>May be required to permit the power supply to be compatible internationally</p>
	1	<p>Optics Box Module (shown with Presser) – detail is view of the Sapphire Prism sample stage of the OBM</p>

	1	<p>Back of the OBM showing connections to the Display Base and to the Presser Head unit.</p>
	1	<p>Factory IQ/OQ Documentation P/N CD00137</p> <p>In addition to this hardcopy an electronic version is also stored as a Read Only File within the AlcoTest®'s Memory</p>

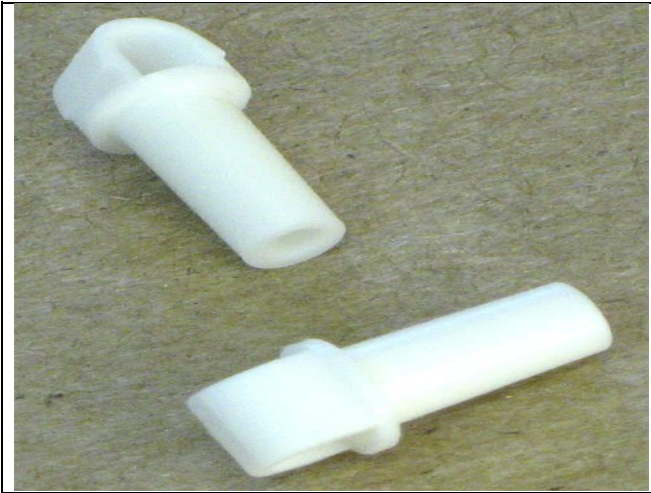


	<p>1</p>	<p>Users' Manual – Hard Copy P/N MD00367</p> <p>An Electronic Copy is also stored in Alcotest®'s memory</p>
	<p>1</p>	<p>Lab Manager's Password</p> <p>P/N CD00135</p> <p>Unique password for each unit provides Manager's level of security</p>





	1	<p>Waste Collection Jar, 500ml Polypropylene P/N A22357</p>
	6	<p>3 ml Luer Slip tip Syringes, With Elastomeric tipped plunger P/N P23016 – Sterile (as shown) P/N P28283 – Not Sterile</p> <p>Suitable for use with Acetone but will be attacked by Toluene, Heptane, Xylene, and similar solvents.</p>
	6	<p>3 ml Luer Slip Tip Syringes, All plastics P/N P23438</p> <p>Suitable for use with most solvents and petroleum applications.</p>

	<p>2 each</p>	<p>Top: Female Luer to 1/4"-28 thread The inlet nozzle comes supplied with this part as standard ETFE - P/N 25571</p> <p>Bottom: Female Luer Lok to 1/4"-28 thread ETFE - P/N P21850</p>
	<p>2</p>	<p>Barbed to 1/4"-28 thread, UNF Outlet Nozzle for waste hose ETFE - P/N P23225</p>
	<p>1</p>	<p>6 feet of Silicone Tubing 1/8" ID x 3/16" OD Waste hose and Air Drying Hose P/N P23279</p>






	2	<p>Plug, Male Luer</p> <p>P/N P21799</p>
	4	<p>Hose Barbed to Male Luer</p> <p>1/8" Polypropylene</p> <p>P/N P23095</p>
	2	<p>Fill Nozzle, PTFE</p> <p>P/N 25583</p>

	1	<p>Nozzle Repair Tool P/N A25649</p> <p>For re-shaping the tip of the above Fill Nozzle should it become bent or damaged</p>
	1	<p>Screw Driver, Phillips head P/N P23280</p>



*Figure 3-1 - Items Supplied with the Instrument*





Please check and make sure all the above items are received. Contact your Rudolph Research Analytical representative if any of the above items are missing. Also, confirm all line items are received per your packing slip.

## 4 Optional and Spare Parts

Item	Pcs.	Description & P/N
	100	3 ml Luer Slip Tip Syringes, with elastomeric tipped Plungers - P/N P23016, Box of 100 pcs, Sterile or 3 ml Luer Slip Tip Syringes with elastomeric tipped plungers – P/N P28283, bag of 100pcs – Not Sterile
	100	3 ml Luer Slip Tip Syringes, all plastic, non-sterile Sold in lots of 100pcs. P/N P23438
	1	Syringe Needles, Non Sterile Blunt Tipped Sold in a bag of 50 pcs. P/N P23897



	<p>1</p>	<p>Top: Female Luer to 1/4"-28 thread The inlet nozzle comes supplied with this part as standard ETFE - P/N 25571</p> <p>Bottom: Female Luer Lok to 1/4"-28 thread ETFE - P/N P21850</p>
	<p>1</p>	<p>Barbed to 1/4"-28 thread, UNF ETFE</p> <p>P/N P23225</p>
		<p>Rinse Bottles</p> <p>Ethanol Rinse Bottle P/N 26367</p> <p>Water Rinse Bottle P/N 26368</p> <p>Acetone Rinse Bottle P/N 27183</p>

	1	<p>USB Mouse (If delivered, may vary in its model)</p> <p>P/N P23282</p>
	1	<p>USB Bar Code Scanner (If delivered, may vary in its model)</p> <p>P/N P21776</p>
	1	<p>USB Keyboard (If delivered, may vary in its model)</p> <p>P/N P23283</p>
	1	<p>USB Laser Printer Kit P/N A23284</p> <p>Consisting of: B/W Laser Printer, P/N P22078 USB Cable, P/N P23022</p>

	<p>1</p>	<p>USB Ink Jet Printer Kit P/N A23535</p> <p>Consisting of: Inkjet Printer, P11787 USB Cable, P23022</p>
	<p>1</p>	<p>Serial Printer Kit – P/N A26292 (includes ink &amp; paper)</p> <p>Serial Printer sans ink &amp; paper P/N A22185</p>
	<p>1</p>	<p>Fluke Hart Thermometer Kit P/N A23459</p> <p>Consisting of: P/N P23460 1523 Handheld P/N P23461 5622-10 Temp. Probe &amp; 1923-10 Probe Calibration</p>



	1	<p>USB 4 Port Expansion Hub P/N P23463</p> <p>Model May Vary</p>
	1	<p>Automation/Manual Feed Kit P/N A22792</p> <p>Consisting of:</p> <p>2pcs. P/N P22386 – Fitting, Female Luer, 1/4" – 28 male, Stainless Steel</p> <p>2pcs. P/N A22727 – Quick Connect, Modified, Luer Lock, 1/4"-28 female</p> <p>Threads are sealed using Teflon tape</p>

Figure 4-1 Optional and Spare Parts



## 5 Setting up the Instrument

### 5.1 Basic Set Up

The AlcoTest®'s power supply may be plugged into any electrical outlet which provides 85 to 260 volts at 48 to 62 Hz. The power supply's output is 12 volts, 150 watts. This power supply and the power cord are both found inside the cardboard accessory box. The On/Off switch for the AlcoTest® is also in the back near where the power cord plugs in. Once turned on, it will take a few moments for the software to boot-up. See the Back View of the instrument, Figure 5.1 below.



*Figure 5-1 - Back View of RRA AlcoTest®*

The AlcoTest® is best to be at the ambient temperature prior to turning on. Normally a warm-up time of 15 to 20 minutes is best for accurate measurements.



HINT

*After shipment, it is advisable to check the instrument's accuracy with air and water prior to making other measurements. If required, do a Two Point Air and Water Calibration Adjustment. Please see Chapter 9.3 on page 54 of this Manual for Complete Instructions.*

The filling nozzle, which comes pre-installed on the unit, will accept either a Luer Slip tipped syringe or a Luer Lok tipped syringe. See the Side View, Figures 5.2 and 5.3.

The connection between the glass VideoView™ and the nozzles must be air tight. This connection was checked at the factory prior to shipment. However, it is advisable to recheck these connections as follows: Close off the outlet hose barbed nozzles with your thumb. See Figure 5-4 on page 27. Then with an empty syringe push air into the nozzle using a moderate amount of force. Hold the syringe's plunger in for a few seconds. Then release the plunger on the syringe. If this connection was air tight, the pressure inside the VideoView™ will push the plunger back to the original position.



*Figure 5-2 - Side View of Drying Hose*



*Figure 5-3 - Side View of Filling Nozzles*



*Figure 5-4 - Checking the Filling Nozzles for Air Tightness*

## 5.2 Setting up the Optics Box

The AlcoTest® comes standard with a precision Optics Box Module (OBM) used for measuring the Refractive Index of the test fluids. The OBM should be connected to the Display Base of the AlcoTest® as shown below

### 5.2.1 Unpacking and Connecting the OBM

Carefully unpack the Optics Box Module and accessories from the packing carton. Save the carton for possible re-shipment of the unit. You should have:

- This user's guide
- The optical module with presser
- The refractometer power unit;
- A power cable

### 5.2.2 Parts Guide AlcoTest® Optics Box Module

1. Optical Base Module
2. Presser plate
3. Power Supply to AC cable
4. OBM-DBM cable
5. Manual



*Figure 5-5 - AlcoTest® Optics Box Module – shown with presser installed*

### 5.2.3 OBM Connections

The OBM should be connected to the AlcoTest® display base with the OBM to Display base cable (provided). The Presser should also be connected to the Optics Box base via its cable. The correct cabling is shown below.



*Figure 5-6 – OBM to Display Base (on right) and Optics Box to Presser cable (on left)*

## 5.3 Adding Peripherals; Bar Code Scanner, Keyboard, Printer

The 5 USB ports make possible the connection of optional peripherals. Barcode scanner, keyboard, mouse and any other USB devices will all be plug-n-play and installed just as one would install the same in any PC. Many printers will also be plug-n-play but if not the printer's universal driver may be installed in the same manner as with any other PC. You may use any of the five available USB ports for any peripheral. Three USB ports are located in the back of the AlcoTest® and 2 USB ports are on the front.

## 5.4 Turning On – Menu Basics

Connect the AlcoTest® unit to a mains power source and turn it on by placing the ON/OFF switch into the ON position. Wait while the unit loads its software program. Once the software load is complete (about 20-30 seconds) you will see the following Main Screen display.

There are several areas of note on the Main Screen of the instrument.

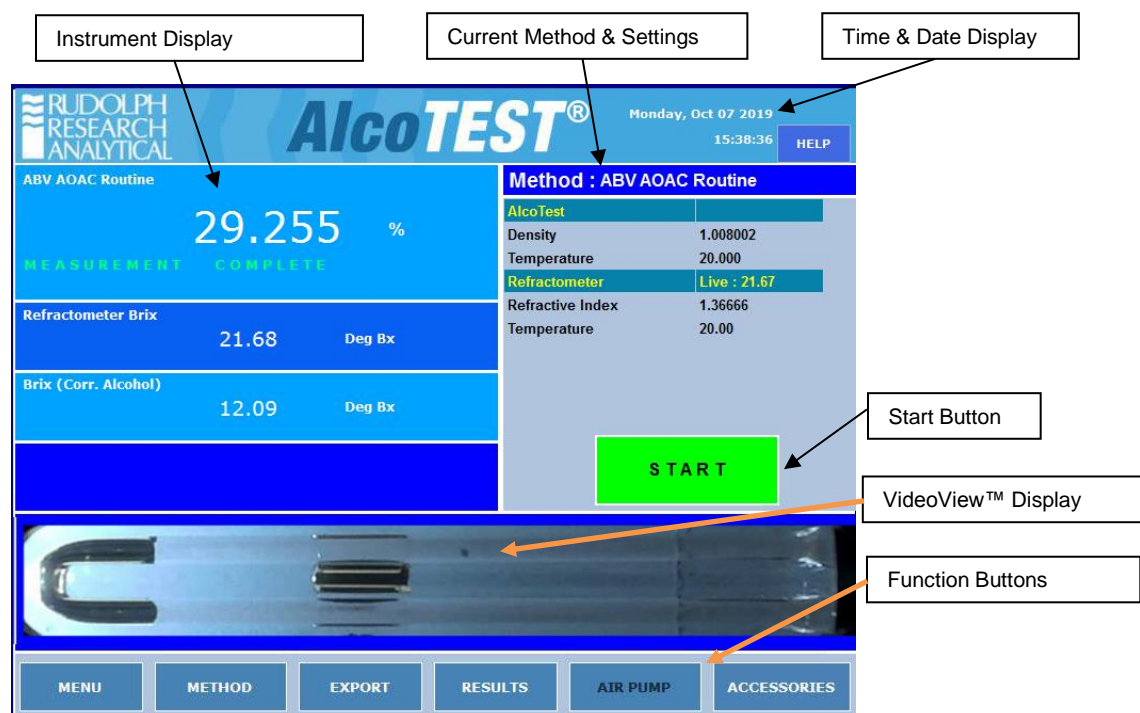


Figure 5-7 – Main Screen Features

Each of these is described below:

- **Instrument Display:** This area will show the Current Measurement Results
- **Current Method & Settings:** This area will show the currently selected method and any specific changes such as Cell Temp, Set Temp or Sample Id.
- **Time and Date Display:** This area will show the current Time and Date
- **Start Button:** This button will start the measurement using the currently selected method



- **Function Buttons:** These buttons allow the user to select the various functions and menus to configure the unit operation.
- **VideoView™ Video Display:** This area shows a real-time video image of the unit's VideoView™ sample measurement area to allow the user to see if the sample has been loaded correctly and verify that there are no air bubbles in the sample

The Main Menu of the AlcoTest® unit is accessed by clicking on the Menu button on the left-hand side of the Function Button Area.



Figure 5-8 Home - Main Screen - Access Menu

Press the Menu button. If enabled the password dialog box will open. The factory default password is '123'. This password can be changed or optionally turned either on or off by your administrator.



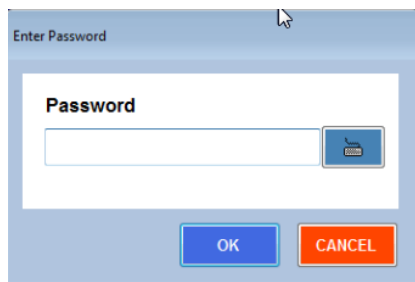



Figure 5-9 - Password Entry Dialog – Default Password is '123'



*TIP: If you do not have an external keyboard – press the  icon – this will launch an on-screen keyboard where you may use the touchscreen to enter in the password information.*

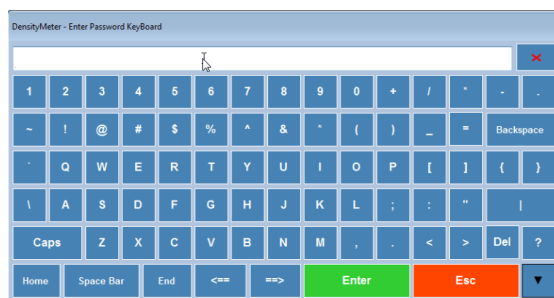


Figure 5-10 - Virtual Keyboard

Typing in the password, if required, will gain you access to the Main Menu, which looks like the windows shown below in Figure 5.8. See Chapter 6 for additional details.

If you wish to turn password protection on or off, please see the Lab Manager's Confidential Envelope – Document CD00135.

## 5.5 The Main Menu

The main menu provides the user with access to the configuration options and management options of the AlcoTest®. Each part of the menu has various sub-menus and dialogs that will be further explained below.

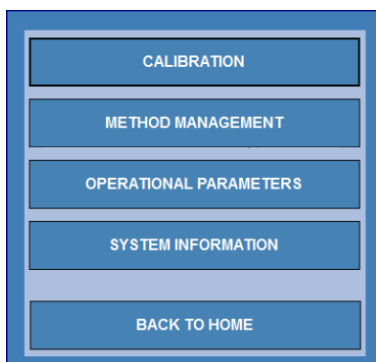


Figure 5-11 - Main Menu

### 5.5.1 System Information

Within the submenu “System Information”, you will find software and firmware version information, the system serial number as shown in Fig 5.12 – your information will likely not match the information shown below.

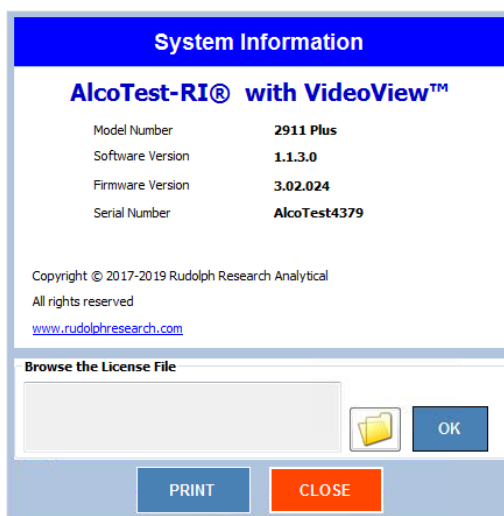


Figure 5-12 - System Information



## 5.6 Starting a Measurement

To start a measurement using the currently selected method simply press the green START button as illustrated in Figure 5-13 below.



Figure 5-13 - Starting a Measurement

A sample should be introduced into the VideoView™ as well as placed onto the prism of the Optics Box Module prior to pressing START. The details of this process are given in section 7 of this manual.

In the event that you wish to test the unit with an AIR sample, meaning an empty VideoView™ with only air inside and a clean prism, just press START without introducing any sample.

During the measurement the Start button turns into a red Stop button and an indication "Measuring [x] of [x]" is displayed.



To STOP the current measurement, press the button.



Figure 5-14 – Main Screen during Measurement

Pressing the STOP button will cause the below dialog to be displayed. The user is prompted to confirm the desire to abort the measurement.

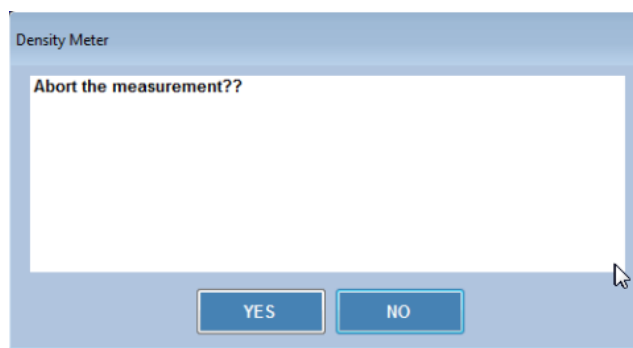


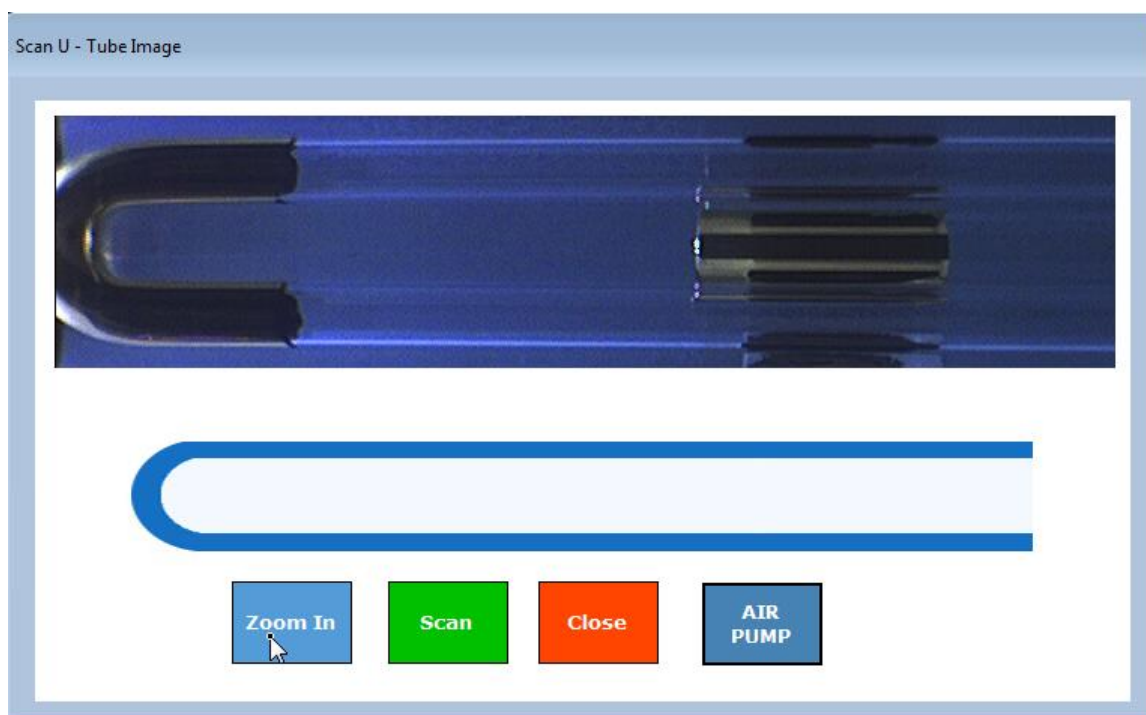
Figure 5-15 - Abort Measurement



*Figure 5-16 - View of VideoView™*

The patented VideoView™ feature allows the user to see a real-time video of the Sample Tube, allowing a magnified view. The magnification allows the operator to easily detect the presence of bubbles or incomplete sample filling in the Sample Tube.

Clicking on the image of the VideoView™ magnifies the image even further:



*Figure 5-17 - Magnified View of AlcoTest® VideoView™*

Here the user may easily zoom in more and scan the entire length of the VideoView™ to ensure that it is properly loaded with a sample and that the tube sample contains no bubbles that will affect the accuracy of the measurement.

## **6 Getting Started: Factory Methods & Their Customization**

Rudolph Research Analytical AlcoTest® is Method driven. This ensures reliability, repeatability and accuracy in measurement for a wide variety of materials. Your AlcoTest® unit has shipped with a list of pre-configured measurement Methods and custom scales from the factory. These Methods may be used as configured or copied and modified to suit your individual need.

---

*Note: Factory Methods may be modified and saved to a new Method. Factory Methods may not be deleted.*

---

### **6.1 Selection of a Factory Method**

The AlcoTest® has a list of twenty pre-loaded Factory Methods in the instrument's memory. This allows easy and immediate use for the most common applications. There are specialized Methods available for Beer, Beer Tabrie and Wine applications. All specialized Methods are available as protected Factory Methods but the user is free to copy these Methods and edit them to form Custom Methods as desired.

Select the Method which is closest to meeting your application. Method selection can be done from the Main Screen by touching the Method button.



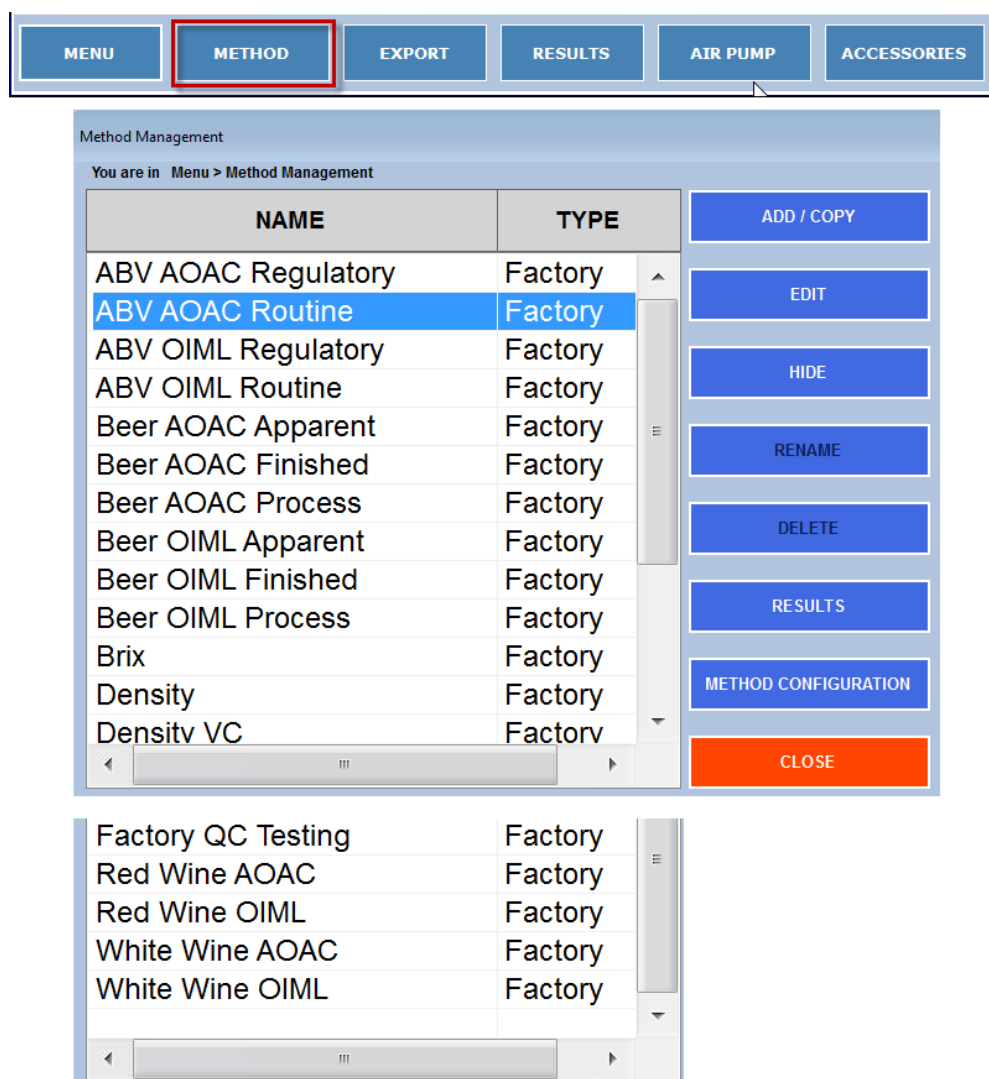


Figure 6-1 - Main Screen – Method Selection

Highlight the Method you wish to use and then touch the “Load” button. The loaded Method is displayed on the Main Screen.

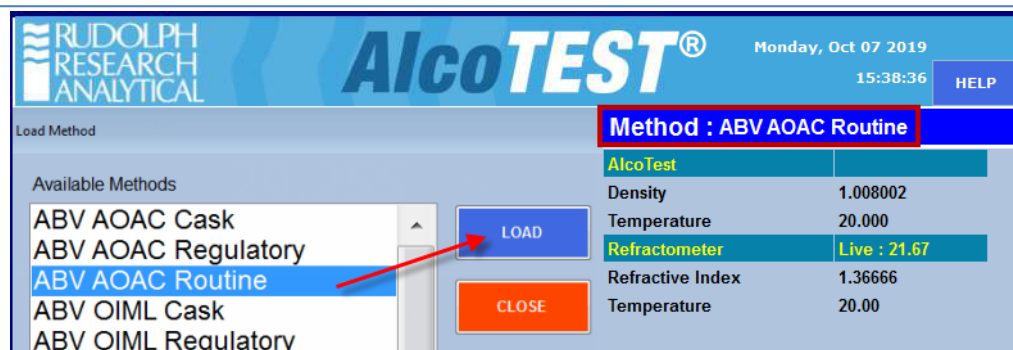


Figure 6-2 Load Method Screen



HINT

*The default for all the Factory Methods Set Temperature is 20 °C, the Measurement Determination is set to Normal, and the Measurement Mode is Single. An explanation of these settings and how to change them is fully covered in Chapter 6.2 “Customizing a Factory Method”.*

It is possible to Edit and/or Rename the Factory Methods, or to copy them as a basis for Custom Methods. Below are the default settings and descriptions as shipped:

**ABV AOAC Regulatory** - Concentration is determined in accordance with the AOAC Tables as percent by volume/volume calculated at 60°F but measured at 20°C. The display is configured to show the following: AOAC 60F by Vol at 20C, AOAC 60F by Proof at 20C, Density, and Specific Gravity at 20°C. “Regulatory” indicates that only Density information is used, as approved by TTB.

**ABV AOAC Routine** - Alcohol percentage by volume is calculated using a custom scale that accounts for obscuration that may occur if the sample contains dissolved solids (such as sugars) and other suspensions. “Routine” indicates that, Refractive Index information is also used, resulting in a more precise measurement. The display is configured to show ABV AOAC Routine, Alcohol ABW, Refractometer Brix, and Brix (Corr. Alcohol).

**ABV OIML Regulatory** – Concentration is derived in accordance with the International Organization of Legal Metrology (OIML) Tables as percent by volume/volume and also as percent weight/weight measured and calculated at 20°C. The display is configured to show the following: OIML % by vol, OIML % by wt, Density at 20°C, and Specific Gravity at 20°C.

**ABV OIML Routine** - Alcohol percentage by volume is calculated using a custom scale that accounts for obscuration that may occur if the sample contains dissolved solids (such as sugars) and other suspensions. The display is configured to show ABV OIML Routine, Refractometer Brix, and Brix (Corr. Alcohol)

**Brix** – Displays Brix, Density and Specific Gravity. Brix concentration is based upon NBS Table 113 and is the concentration of sucrose in percent by weight.

**Density** – Displays both Density and Specific Gravity results which have No Correction for the influence of the sample's viscosity.

**Density VC** – Displays both Density and Specific Gravity results which have been Viscosity Corrected for the influence of the sample's viscosity.

**Factory QC Testing** – This is not a user Method but shows the data collected during QC testing at the Factory. See Section 11.2 page 171 for complete details on this Read Only File.

The ten Factory Methods below are specific to different products at different stages of manufacture. 'Apparent' refers to the Apparent Extract and Apparent Degree of Fermentation parameters. These values are based on obscured measurements that have not been corrected for alcohol content and therefore only represent the 'apparent' value, not the 'real' or 'true'. 'Process' and 'Finished' refers to in-process and finished-product stages. AOAC and OIML refer to the standards followed by the corresponding Methods. The default Display Parameters for each of the Methods are as listed.

**Beer AOAC Apparent** – ABV AOAC Beer, Specific Gravity, Apparent Degree of Fermentation, Apparent Extract

**Beer AOAC Finished** – ABV AOAC Beer, Specific Gravity, Real Extract, Original Extract

**Beer AOAC Process** – ABV AOAC Beer, Specific Gravity, Real Degree of Fermentation, Apparent Degree of Fermentation

**Beer OIML Apparent** – ABV OIML Beer, Specific Gravity, Apparent Degree of Fermentation, Apparent Extract

**Beer OIML Finished** – ABV OIML Beer, Specific Gravity, Real Extract, Original Extract

**Beer OIML Process** – ABV OIML Beer, Specific Gravity, Real Degree of Fermentation, Apparent Degree of Fermentation

**Red Wine AOAC** – ABV AOAC Red Wine, Specific Gravity, Density, Real Extract

**Red Wine OIML** – ABV OIML Red Wine, Specific Gravity, Density, Real Extract

**White Wine AOAC** – ABV AOAC White Wine, Specific Gravity, Density, Real Extract

**White Wine OIML** – ABV OIML White Wine, Specific Gravity, Density, Real Extract

## 6.2 Customizing a Factory Method

All of the Factory's pre-installed factory Methods may be modified to meet the requirements of the user. To do so, touch the "Menu" button on the AlcoTest®'s main screen.

### 6.2.1 Editing the Measurement Parameters

Depending upon the instrument's current setting, entering the "Menu" may require a password. The factory default password is "123". See Chapter 5, Figures 5.6 and 5.7.

After entering the password, if required, the "Main Menu" will appear.



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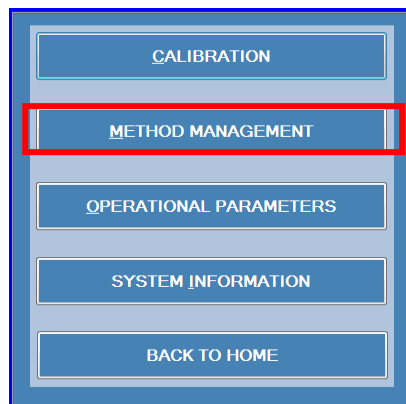
*Password may be turned off or edited using the Lab Manager's Password.*

---

There are only 5 choices:

- **Calibration** – For viewing history, doing verification, restoring, and performing an adjustment.
- **Method Management** – From here you may edit, copy, add, and modify existing Methods. Factory Methods cannot be deleted or renamed. These functions are only available for "Custom Methods" made by the end user. However, it is possible to Hide or un-Hide Factory Methods from the menu choices.
- **Operational Parameters** – Communication Settings and all Instrument Configuration is done within this menu option.
- **System Information** - You may View and/or Print the software and firmware versions, the instrument's serial number and Model number.
- **Back to Home** – As the menu suggests, this option takes you backwards to Main Menu

For customizing a Method we therefore would;  
Select/Touch the “Method Management” button.



*Figure 6-3 - Main Menu – Method Management*

Now select/touch to highlight the Method you wish to edit and then select/touch “Edit”. You may also add a new method – see Chapter 6.3.



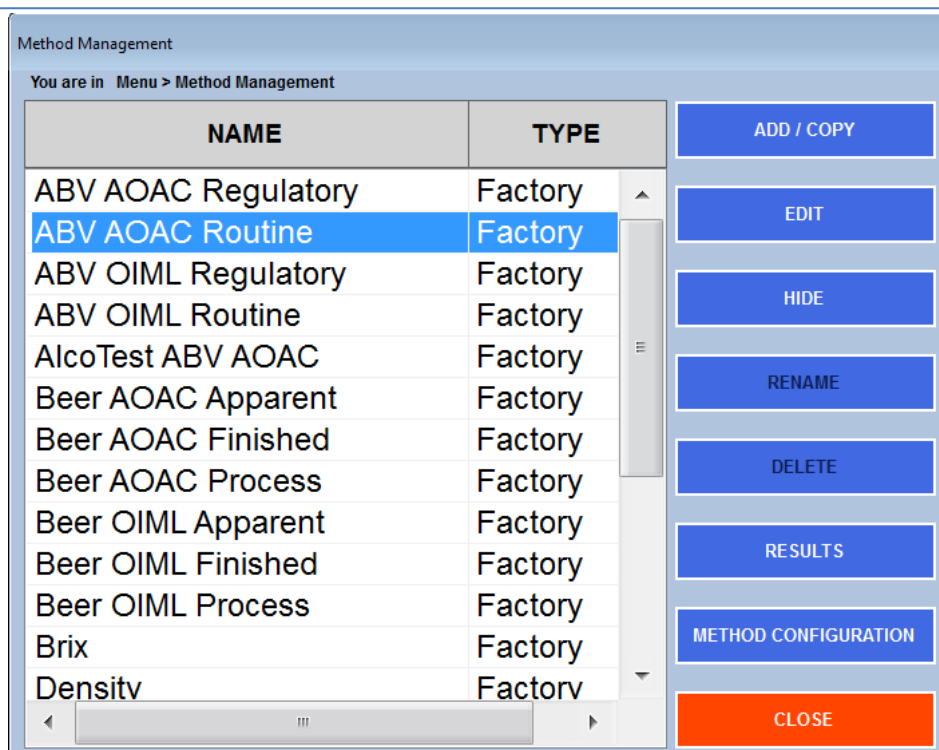


Figure 6-4 - Edit Method Button

After Selecting/Touching “Edit”, the following Window will appear:

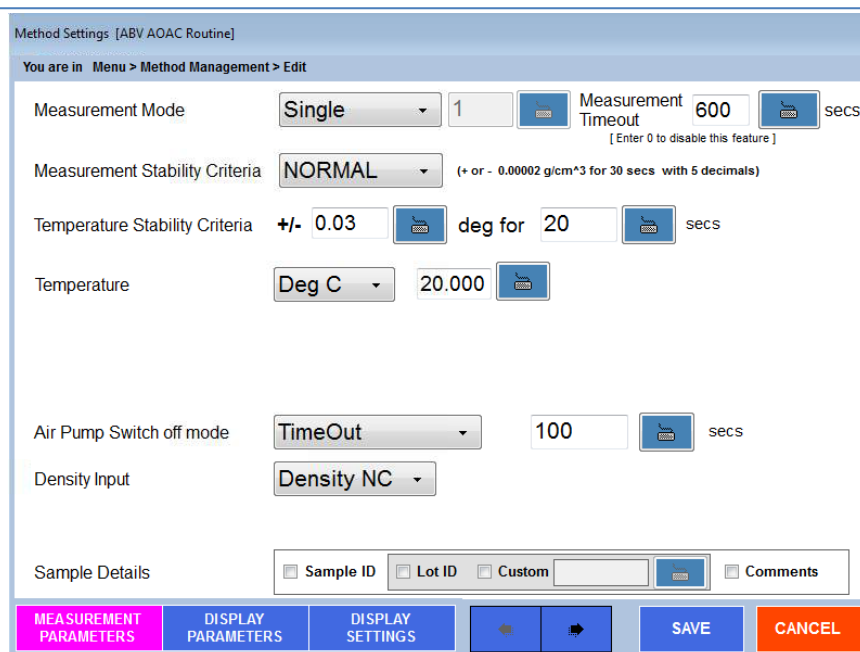


Figure 6-5 - Method Settings – Measurement Parameters

An Explanation of all the options within this “Method Management - Measurement Parameters - Edit” window follows:

**Measurement Mode** – Within this dropdown menu selection there are 2 choices:

- 1) “*Single*” measure mode is where once all the specified measurement conditions or criteria are reached, a density measurement will be made and the display value(s) are now frozen on the display screen until the next measurement is started by selecting/touching the “Start” button. This measurement mode is the factory default.
- 2) “*Multiple*” measurements are where the user may specify any number of measurements (N=X) and that number of measurements will be made and full statistical information for these measurements will be displayed.

**Measurement Stability Criteria** – There are three choices within this dropdown menu that determine when the measurement results are calculated:

- 1) “Full” will provide the user with the maximum accuracy which means that the measurement results will not be calculated until the measurement stability of the sample has met the criteria as defined to the right of this menu selection.

- 2) "Normal" is the optimum setting for the use of the density as per its accuracy specifications. Again, as above, defined to the right of this selection.
- 3) "Rapid" will provide a quicker measurement but with a slight loss of accuracy; accurate now only to the 4<sup>th</sup> decimal place.

**Temperature Stability Criteria** – It is possible to define how stable and for how long the temperature is needed to be prior to making a measurement.

**Temperature** – This is the instrument's "Set" temperature; the temperature that which the sample is controlled to for the measurement. It may be set in either °C or °F. The factory default is °C.

**Air Pump Switch Off Mode** – Here there are 3 choices for the air pump that is used for drying the VideoView™ after clean with the proper solvent(s):

- 1) **Auto** – The instrument continuously measures the density as the VideoView™ is drying. Once the dry is that of dry air the pump will automatically turn itself off. See Figure 6-6 on the next page for guidance on how to set turn-off conditions.
- 2) **Manual** – Pump is turned both On and Off manually.
- 3) **Time Out** – This is often the best choice for many applications. The pump will turn itself off after some pre-defined running time. This option ensures that the pump will not be turned on and forgotten and left running for excessively long periods of time. The factory default for Time Out is after 100 seconds. The best drying time depends on what solvent is used and that specific solvent's vapor pressure.

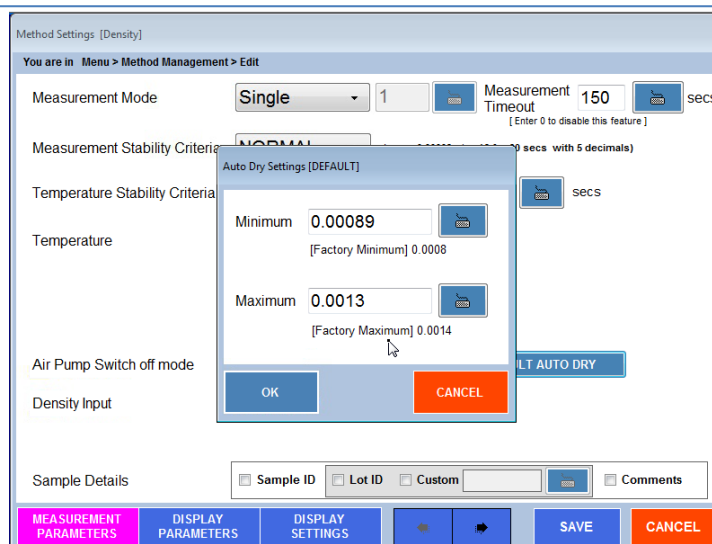


Figure 6-6 - Auto Dry Feature

**Density Input** – if the density results are needed for subsequent calculations this menu option permits the choice of either a density result which was corrected for the viscosity effect (VC) or non-viscosity corrected (NC) density to be used in this calculation. The factory default is “Density NC”.

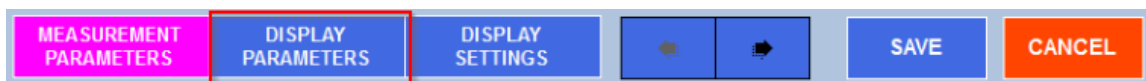
**Sample Details** – It is always possible to add Sample ID or Lot ID by means of an external keyboard, virtual keyboard in main screen or barcode reader. However, if the lab normally uses sample IDs it is possible to set the AlcoTest® to remind you to enter Sample ID and/or Lot ID. If you do not wish to use Sample IDs or Lot IDs, unselect those fields as is set by default. The field Lot ID is also able to be changed. You may customize this field to Operator ID or Tank #, etc. Comments may also be added to each measured sample.

## 6.2.2 Editing the Display Parameters

After Editing the Measurement Parameters as explained above in Chapter 6.2.1 it is next possible to edit the display to best meet your requirements.

The left side of the main screen allows up to 4 different measurement results to be displayed. The top position on this display is larger and is used for the value of greatest importance to the user. The three lower positions are slightly smaller

and are used for calculated results which are not as important to the user. The values displayed in all 5 of these positions are configurable by the user.



From the menu screen in Figure 6-5, Select/Touch the “Display Parameters” button. Select the Polynomial Group to see the specific calculations regarding Alcohol.

The following window will open:

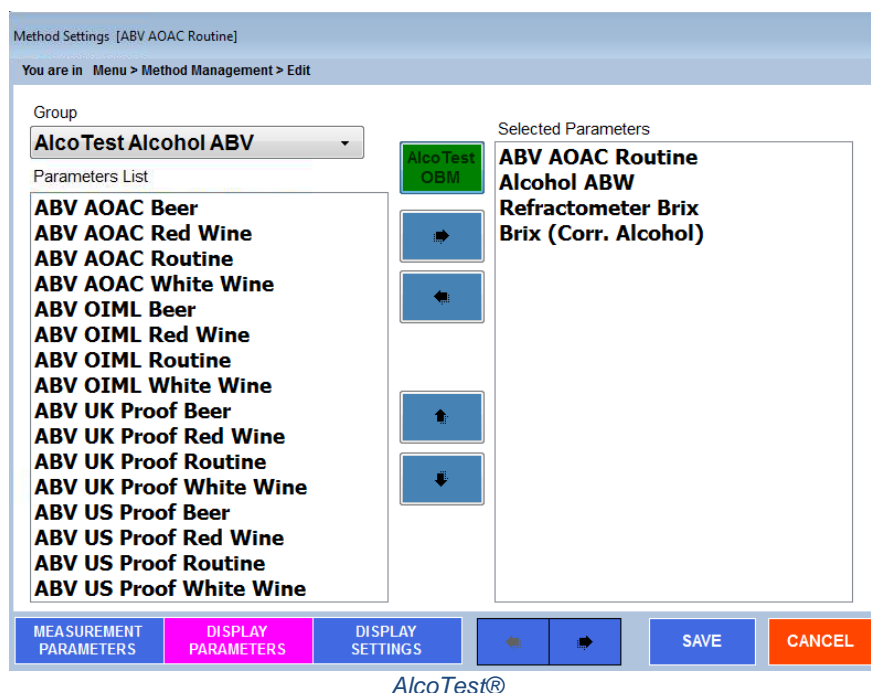


Figure 6-7 - Display Parameters – AlcoTest® ABV Group Selected



The keys will move selected parameters onto and off of the displayed list. Remember the TOP selection will be the largest one in the Main Display.



To modify the order of the displayed parameters, use the keys to move a selected display parameter up and down in the list.

As there are many different parameters that are possible to display, these various parameters have been broken into different “Groups” or categories so that they are easier to locate and manage.



---

*Note: Parameters can be based on Density measurements, Refractometer measurements and combined Density / Refractometer measurements. Each Parameter is given a different screen color to denote this as shown below:*

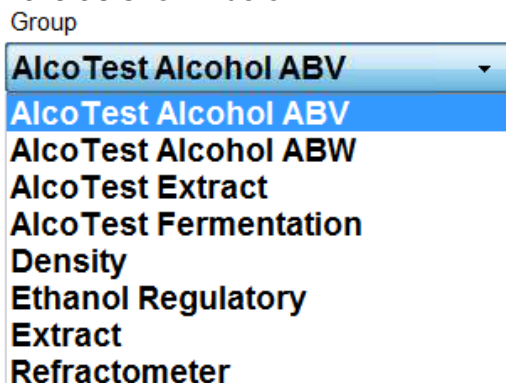
---

Alcohol UK Proof	<b>COMBINED</b>
Refractometer Brix	<b>Refractometer ONLY</b>
Brix (Corr. Alcohol)	
Ethanol In Water	<b>Density ONLY</b> % by wt

The color will change according to the parameter selected in the Method.

### 6.2.3 Method Editing

The Available “Groups” are as shown below:



*Figure 6-8 - Available Groups*

**AlcoTest® Scales** – The AlcoTest® Alcohol ABV and Alcohol ABW Group contains the specialized polynomials that are used by the AlcoTest to perform the various types of Alcohol Scale calculations on either a “by volume” and “by weight” basis.

AlcoTest® Extract – This Group contains Apparent, Original, and Real Extracts as well as Brix

AlcoTest® Fermentation – This Group contains Apparent and Real Degrees of Fermentation

**Density** – Within this Group List there are eighteen different choices: Density, Density VC, Specific Gravity, Specific Gravity (t1/t2), Specific Gravity VC, Specific Gravity VC (t1/t2), Relative Density, Relative Density (t1/t2), Relative Density VC, Relative Density VC (t1/t2), Apparent Density Brass, Apparent Density Steel, Apparent Specific Gravity, GB View Density, GB View Density VC, Baume, and Period of Oscillation.

It is possible to select between either Viscosity Corrected or non-corrected as well as defining the temperature of water in the denominator for Specific Gravities and Relative Density calculations. Also, it is possible for both Specific Gravity and Relative Density to define t1 and t2 per  $SG_{t_2}^{t_1}$ . t1 is always the

measurement temperature. t2 is set as per display settings within the Method Management's Display Settings menu.



**Ethanol** Regulatory – There are 18 different ethanol tables from which to choose. Units include %vol/vol, % wt/wt, and Proof using the AOAC, OIML, HM Customs, NBS, NTS, and the ABNT methods.



**Extract** – Brix, Plato and Balling are available within the Group.

**Refractometer** – This Group contains AOAC 60F % by Volume (or by Proof) with Obscuration, Refractive Index, Refractometer Brix, etc.

**Dilution by Volume/Weight TTB** – Optional group for the AlcoCalc® feature (Dilution Application) with Initial and Target Volume (Weight), Net Weight, Target Proof, and Water Volume (Weight) to be added

### 6.2.4 Configuring the Display

The first step in configuring your display is to find the various parameters within each “Group” you wish to display. As these parameters are shown in the “Parameter List”, highlight the parameter of interest and then use the  button to move this parameter into the “Selected Parameters” list. Parameters may also be removed for the “Selected Parameters” list by using the  button. You may select up to four different parameters that you wish to display, however, if you select more than the four possible to display parameters then the other additional parameters will be stored and recorded within the “Results”

Once you have selected and placed within the “Selected Parameters” listing other items you wish to display you may arrange the order in which they are displayed. The order in which the parameters are listed in this menu is the same order in which they will be displayed on the main screen. You may change their positions by highlighting the parameter you wish to move and then use the  or  buttons to move that parameter either up or down in this list.

## 6.3 Creating/Adding a New “Custom” Method

The AlcoTest® is supplied from the factory with eleven pre-loaded Factory Methods which will meet most users’ requirements. However, the AlcoTest® permits the addition of as many new methods as needed.

The procedure used to add a new customized method is almost identical to the procedure used above in Chapter 6.2.1 and 6.2.2 to customize an existing method.

### 6.3.1 Adding a New Method

Press or click the “Add” button and once you “Save” the new method you just created, you will be asked to give this new method a name. This new method will now appear in the “Methods” list. These steps are outlined below:

1. Go to the main **Menu**
2. Select Method Management

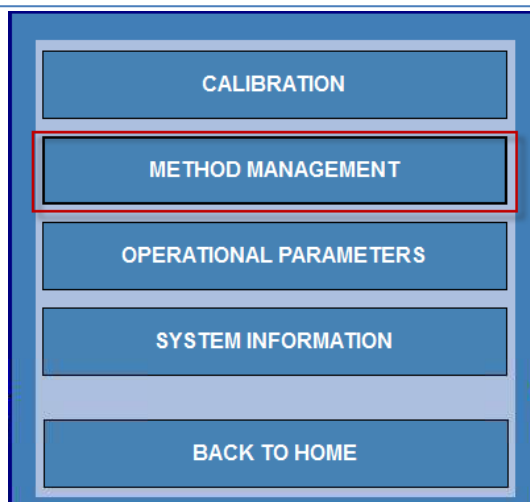


Figure 6-9 - Method Management Option

3. Then select **ADD/COPY** from the menu choices on the right.

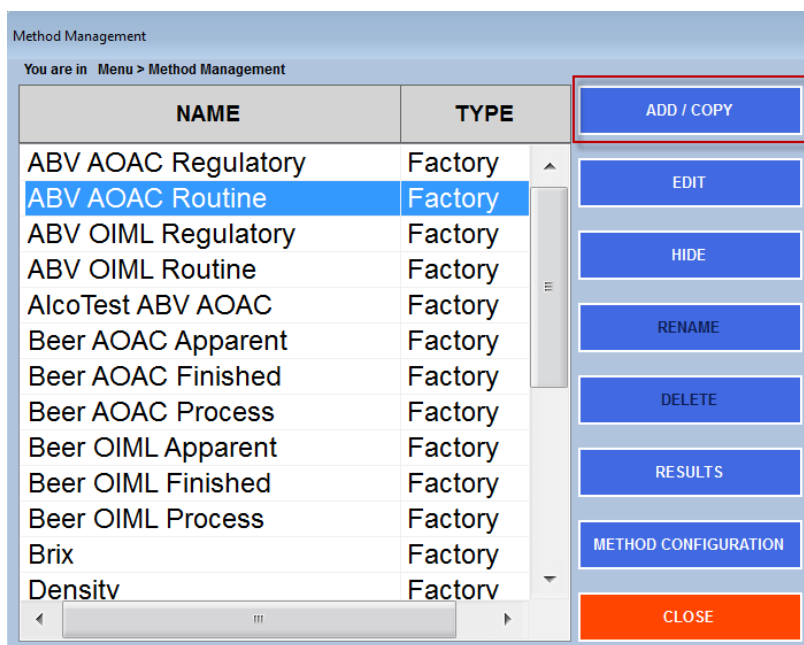
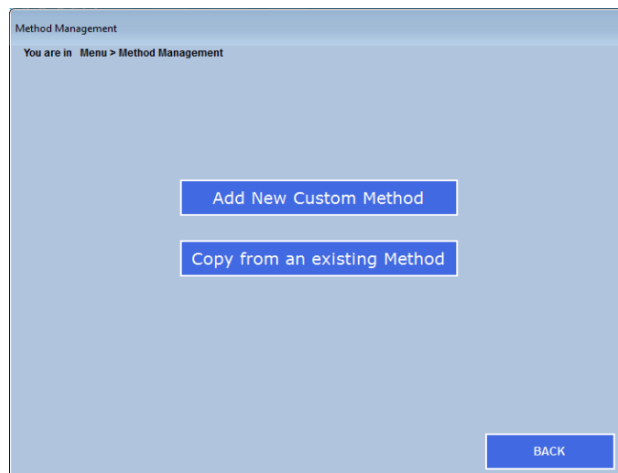



Figure 6-10 - Method Management – ADD a new Method

Choose **ADD A New Custom Method**



*Figure 6-11 - Add new Custom Method*

4. A new window opens; Method Settings [New Method] – enter the new Method Name in the space provided. The On-Screen keyboard  is available if needed.

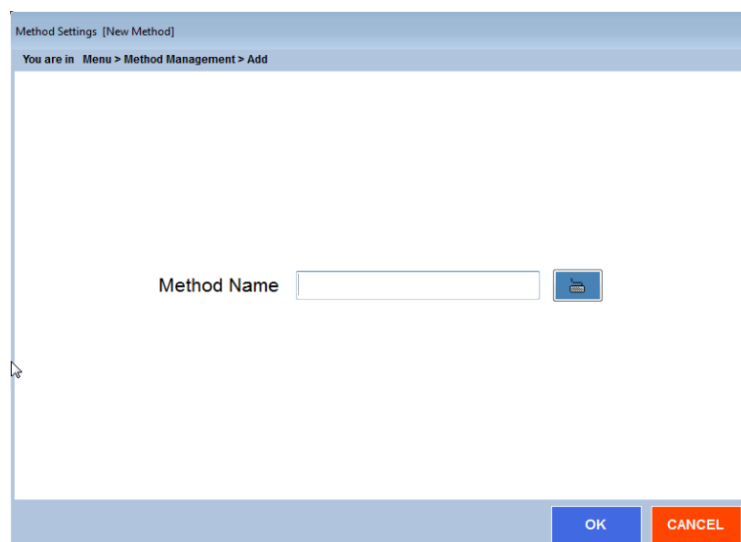




Figure 6-12 - Specify Method Name

5. The “**Measurement Parameters**” dialog will open.

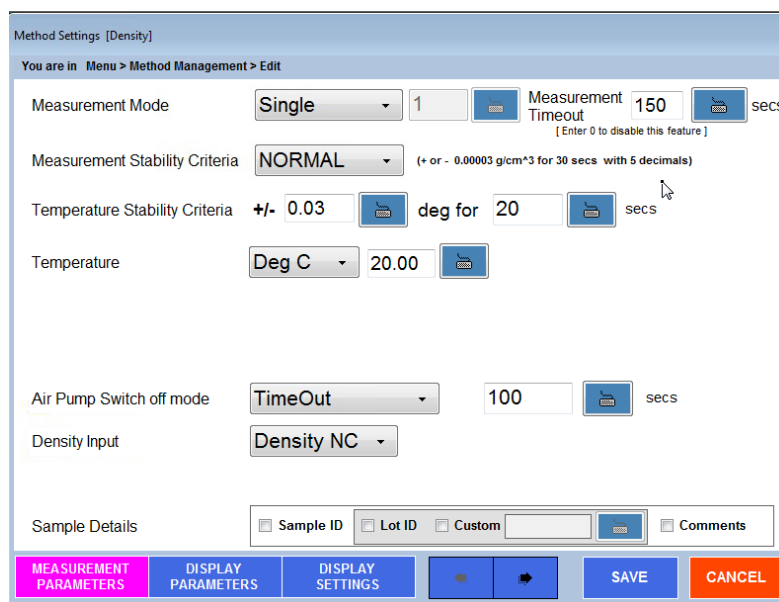




Figure 6-13 - Measurement Parameters screen

The new Method parameters may be set as desired; that is, Measurement Mode, Measurement Stability Criteria, Temperature, etc.



6. After setting all the **Measurement Parameters** now select at the bottom of the window, **Display Parameters**. A new window will open and you will see on the top left-hand side a drop-down menu called “**Group**”.

All the different items which may be displayed by the AlcoTest® are within these Groups. Select the Group of interest and highlight the first item within the Group that you wish to display.

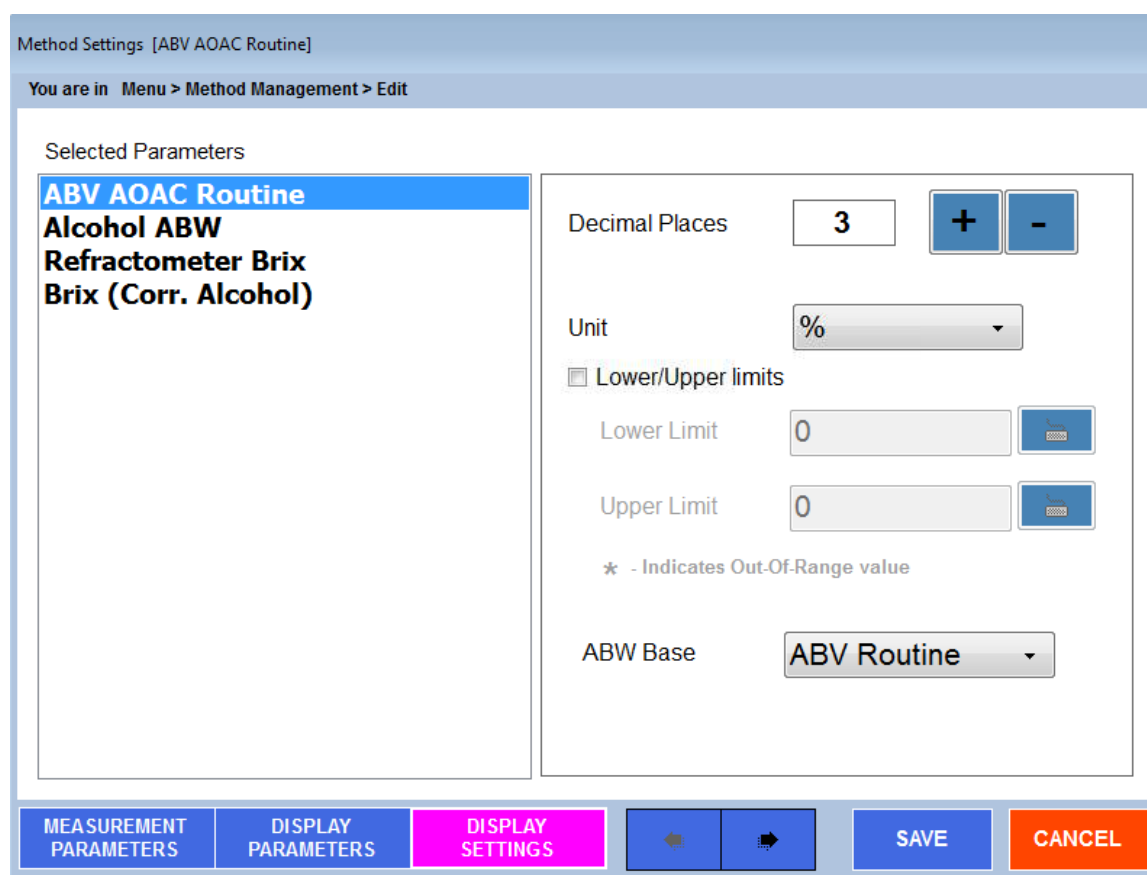
7. Now, with the first display parameters of interest highlighted, press the  arrow to move this parameter over to the right-hand column; “Selected Parameters”. If there are more items within this Group that you wish to display just repeat the process by highlighting that parameter and

again using the  arrow to move this parameter over also. Repeat as desired.

Up to four different parameters may be displayed simultaneously.

You may also, if so desired, use the  arrow or  arrow to move the position of the parameter within the display.

8. Next go to “**Display Settings**”. The dialog window below will open.



Method Settings [ABV AOAC Routine]

You are in Menu > Method Management > Edit

Selected Parameters

- ABV AOAC Routine
- Alcohol ABW
- Refractometer Brix
- Brix (Corr. Alcohol)

Decimal Places: 3

Unit: %

☐ Lower/Upper limits

Lower Limit: 0

Upper Limit: 0

\* - Indicates Out-Of-Range value


ABW Base: ABV Routine

MEASUREMENT PARAMETERS | DISPLAY PARAMETERS | **DISPLAY SETTINGS** | [Left Arrow] [Right Arrow] | SAVE | CANCEL

Figure 6-14 - Display Settings – Method ADD

Here you may select the proper number of decimal places to be displayed as well as the units (if applicable) and upper and lower limits. By default

the **Print Parameters** and the **Export Parameters** will be the same as the Displayed Parameters.

9. Once you finish with content within this new method you have just created push . Your new Method is ready for use and will be displayed in the available Methods list.



HINT

---

*Note: The new Method is not automatically Loaded. You must LOAD the method using the normal Method dialog as shown in section 6.1 of this manual.*

---

## 6.4 Customizing the AlcoTest®

Customization allows the user to provide information to the system to reflect their specific needs and/or their measurement processes. These customized tables, parameters or polynomials are then used for your specific requirements or needs.

## 6.5 Adding a Custom Polynomial into the AlcoTest®

Polynomials may be one dimensional (x,y) using just density or if a refractometer is also in use with density a two dimensional polynomial (x,y,z,) is able to be used.

From the Operational Parameters > Instrument Configuration>Concentrations submenu select Custom Polynomial Setup.

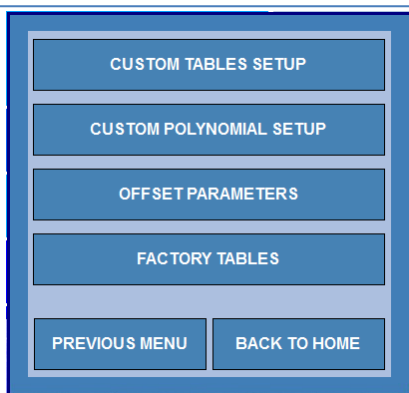


Figure 6-15 - Custom Polynomial Setup

The following dialog will be shown. Note that the AlcoTest® comes pre-configured from the factory with polynomial tables which allow the system to accurately calculate percentage alcohol in obscured liquids or in the presence of dissolved solids like sugars. The user may add his/her own Custom Polynomials for specialized purposes.

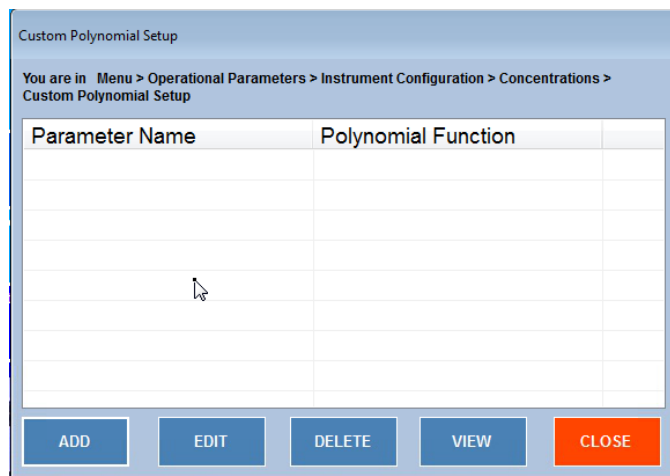
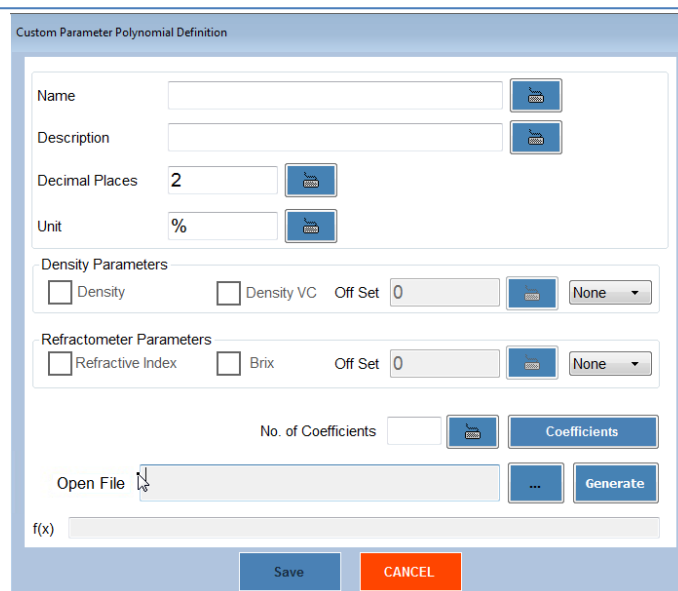


Figure 6-16 - Adding a Custom Polynomial

To make a new polynomial Click on the ADD button.



Custom Parameter Polynomial Definition

Name

Description

Decimal Places

Unit

Density Parameters

☐ Density ☐ Density VC Off Set

Refractometer Parameters

☐ Refractive Index ☐ Brix Off Set

No. of Coefficients

Open File

f(x)

Save CANCEL

*Figure 6-17 - Configuring the Custom Polynomial*

Should the end user wish more information regarding the additional of custom one or two-dimensional polynomials please contact Rudolph Research directly for complete details.

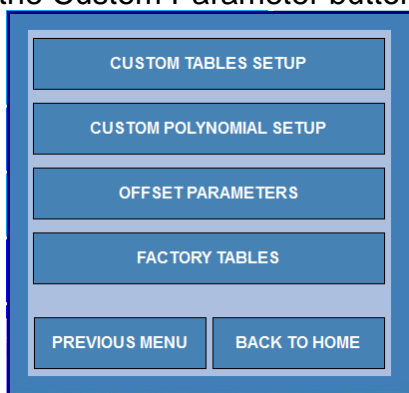
## 6.6 Adding a Custom Offset into the AlcoTest®

The AlcoTest® allows the user to add Custom Offsets to the system. A Custom Offset is based on a standard Parameter (such as Alcohol OIML ABV) and gives the user the ability to automatically apply an offset to the calculated polynomial result.

The function of the custom offset parameter is to allow the user to adjust the specific parameter to account of additional variations in a specific product. For example, if a specific type of rum consistently reports a slightly lower reading using the AlcoTest OIML polynomial the user merely has to enter in the current AlcoTest reading for that parameter and the expected reading. The offset is automatically calculated and applied. In addition, the custom parameter will appear in the Custom Parameters Group on the Display Parameters screen – allowing the user to select this parameter when displaying or reporting information.

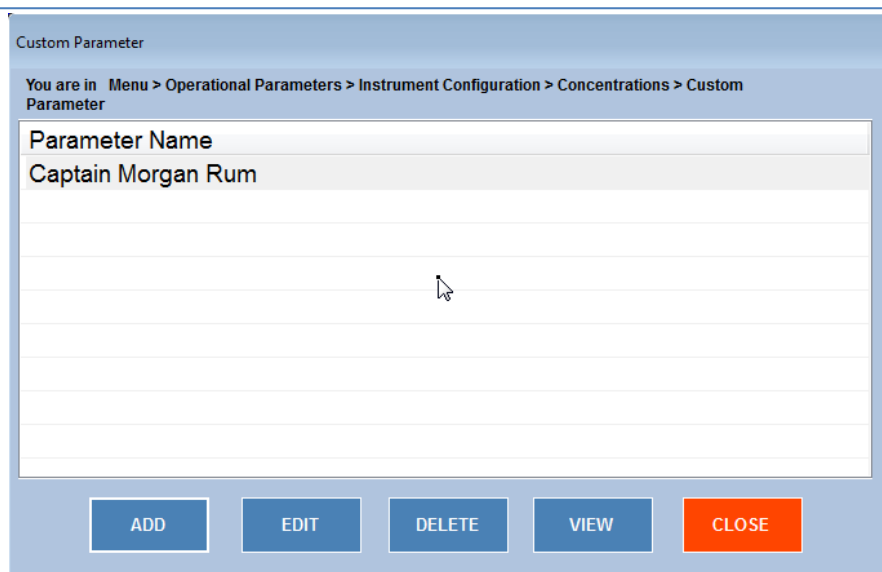
### 6.6.1 Setting a Custom Offset

Open the Menu and click the Custom Parameter button.



*Figure 6-18 - Offset Parameters*

The following screen will display:



Custom Parameter

You are in Menu > Operational Parameters > Instrument Configuration > Concentrations > Custom Parameter

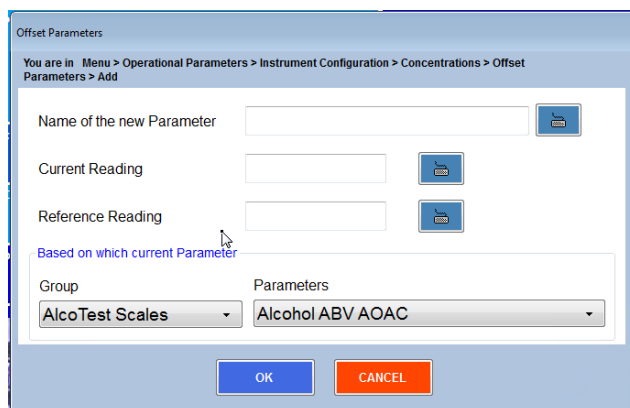
Parameter Name
Captain Morgan Rum

ADD EDIT DELETE VIEW CLOSE

Figure 6-19 - Custom Parameter screen

Any custom parameters which have been created will be displayed in this screen – you may also edit, delete or view a custom parameter here.

To ADD a new custom offset select the ADD button.



Offset Parameters

You are in Menu > Operational Parameters > Instrument Configuration > Concentrations > Offset Parameters > Add

Name of the new Parameter

Current Reading

Reference Reading

Based on which current Parameter

Group  Parameters

OK CANCEL

Figure 6-20 - Adding a Custom Parameter

The Custom Parameter name should be filled in as well as the current (calculated) reading and the expected or reference reading. The Group that the



custom parameter is based on may be selected in the Group dropdown box. Last the specific parameter that will be offset in the custom parameter must be chosen.

Click Save to save the new Custom Parameter. It will now appear as a choice in the Display Parameters Custom group as shown below.

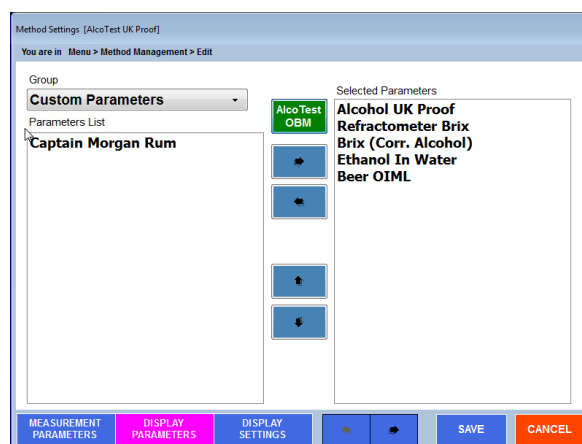


Figure 6-21 - Display Parameters selection of a Custom Parameter from the Custom Group

## 6.7 AlcoCalc®

The AlcoTest® system has a feature which facilitates the process of ‘down-proofing’ or diluting a distilled spirit prior to final bottling. This allows a high proof spirit to first be measured using the normal AlcoCalc® methods and then in one step gives the amount of water to be added (by either weight or volume) to reach a desired end proof result.

*Please note: These calculations are based on the TTB Gauging Manual – Table 6 (Volume) and Table 4 (Weight) and can **ONLY***

*be used with distilled spirits. They will not yield the proper result if used with obscured spirits or mixtures of spirit with any other base than pure water.*

AlcoCalc® is an optional feature and must be ordered as part of your system or purchased as an upgrade from your authorized RRA representative.

If AlcoCalc® is enabled for your system you will see two additional factory methods in the Methods List and two additional Display Groups as shown below.

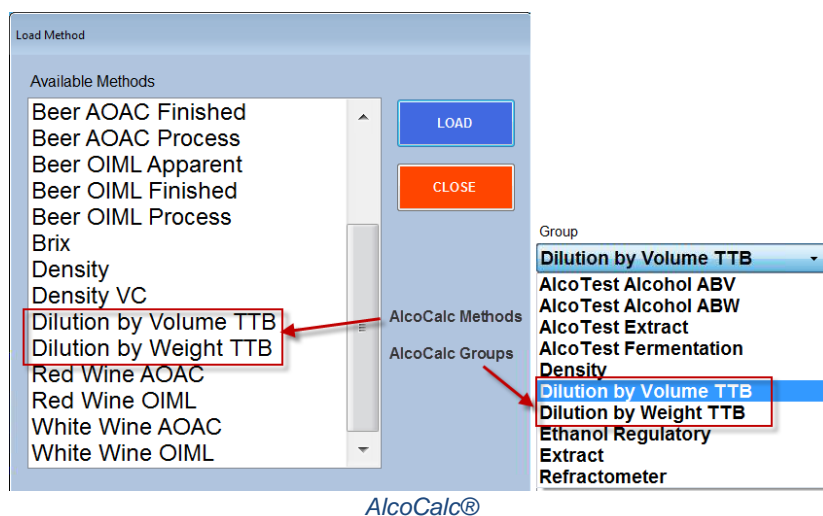
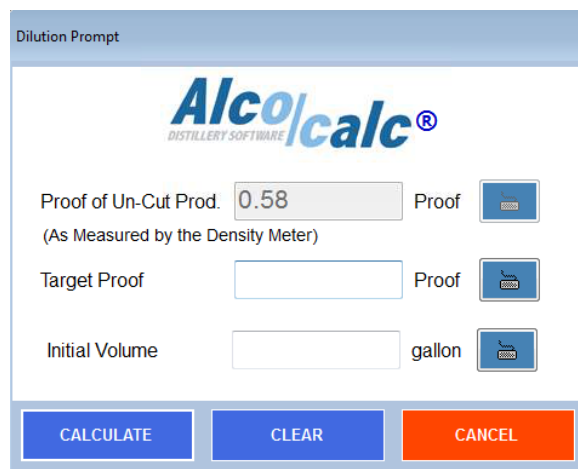


Figure 6-22 - AlcoCalc® Methods and Display Groups– optional

## 6.7.1 Dilution by Volume TTB – AlcoCalc®

Within Method Management the units for volume may be selected as Gallons or Liters. Select the Dilution by Volume TTB Method and click START. This will measure the uncut product to be diluted. Once the measurement has completed the following window will open.



The screenshot shows the 'Dilution Prompt' window of the AlcoCalc® software. It features the AlcoCalc® logo at the top. Below the logo, there are three input fields: 'Proof of Un-Cut Prod.' with a value of 0.58, 'Target Proof' which is empty, and 'Initial Volume' which is empty. Each input field has a 'Proof' button to its right. At the bottom of the window, there are three buttons: 'CALCULATE' (blue), 'CLEAR' (blue), and 'CANCEL' (red).

Figure 6-23 - Dilution by Volume Input screen

The result from the density meter automatically is transferred to this input box. Manually enter the Target Proof and the Initial Volume (starting) and press Calculate



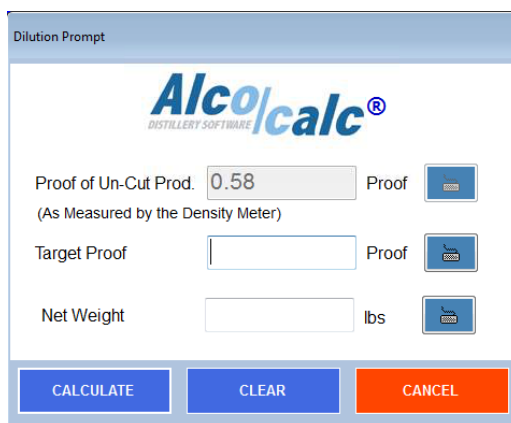
The screenshot shows the main interface of the AlcoCalc® software. On the left, there is a table with measurement data: 'Water Volume to be Added' (30.90 gallon), 'MEASUREMENT COMPLETE', 'AOAC 60F by Proof at 20C' (79.69 Proof), 'Target Proof Volume' (75.00 Proof), and 'Initial Volume' (488.50 gallon). On the right, there is a 'Method : Dilution by Volume TTB' section with 'Mode - Criteria' set to 'Single - NORMAL'. Below this, there are fields for 'Set Temp' (20.00 Deg C), 'Cell Temp' (20.00 Deg C), 'Sample ID', and 'Lot ID'. A green 'START' button is located below these fields. At the bottom, there is a 'Result' section with a large 'C' icon and a 'Result' label. The bottom of the screen has a navigation bar with buttons for 'MENU', 'METHOD', 'EXPORT', 'RESULTS', 'AIR PUMP', and 'ACCESSORIES'.

Figure 6-24 - Dilution by volume - result

30.90 gallons of water must be added to make this dilution.

## 6.7.2 Dilution by Weight TTB

Measure the uncut product to be diluted. Once the measurement has completed the following window will open.



The image shows a software window titled "Dilution Prompt" with the "Alco/calc" logo. It contains three input fields: "Proof of Un-Cut Prod." with a value of 0.58, "Target Proof" which is empty, and "Net Weight" which is empty. Each field has a "Proof" button next to it. At the bottom are three buttons: "CALCULATE", "CLEAR", and "CANCEL".

Figure 6-25 - Dilution by Weight – input screen

The result from the density meter automatically is transferred to this input box. Manually enter the Target Proof and the starting Net Weight and press Calculate



The image shows the main software interface. On the left, a table displays measurement data:

Water Weight to be Added	
MEASUREMENT	34.80 lbs
COMPLETE	
AOAC 60F by Proof at 20C	79.69 Proof
Target Proof	75.00 Proof
Net Weight	523.40 lbs

On the right, the "Method: Dilution by Weight TTB" section shows "Mode - Criteria: Single - NORMAL", "Set Temp: 20.00 Deg C", "Cell Temp: 20.00 Deg C", "Sample ID", and "Lot ID" fields. A green "START" button is below these fields. At the bottom is a navigation bar with buttons: MENU, METHOD, EXPORT, RESULTS, AIR PUMP, and ACCESSORIES.

Figure 6-26 - Dilution by weight - result

34.80 pounds of water must be added for this dilution.

## 7 Measurements – Manual Injections Using a Syringe

This Chapter only deals with the measurements made in a manual mode using a syringe. Automation is considered separately in Chapter 12.

### 7.1 Method and Measurement Conditions

Select the desired Method to be used for the measurement using the “**Method**” button on the bottom of the display screen. After pushing this button, the list of possible Methods will be shown in Figure 6.2



*The measurement conditions, such as, temperature, items displayed, results printed and/or saved, etc. are all defined and set within each Method. See Chapter 6 for complete details for changing and customizing all the various Method settings.*

After this selection, the AlcoTest® will configure itself to all the proper settings as defined by that Method.

### 7.2 Manual Measurement Using a Syringe

Check to be sure that the glass sample VideoView™ and the filling nozzles are empty, clean and dry. You may use the VideoView™ for visual confirmation, but it is also useful to look at the density value measured for this empty VideoView™. If the VideoView™ is completely empty, clean, and dry the measurement value should be that of air.

The measured value for clean, dry air is normally 0.0012 g/cm<sup>3</sup> at 20.00 °C and 25.00 °C. Slight variations of one or two counts in the fourth decimal place are possible due to changes in barometric pressure and/or relative humidity. However, if the air density is seen to be greater than 0.0013 g/cm<sup>3</sup>, (or whatever value prior experience has shown), please clean and dry the VideoView™ prior to continuing with this measurement.

See Chapter 8 for complete details for proper cleaning and drying of the sample VideoView™.



*NOTE: The wetted materials during a sample measurement are the borosilicate glass VideoView™, and the filling nozzles assemble (Teflon-PTFE and Halar-ECTFE), the polypropylene hose barbed adapter, and the connecting silicone tubing which leads to the waste container.*

*Please be sure that the sample materials being measured and the solvents used in cleaning and drying of the VideoView™ after a measurement are compatible with these materials.*

Sample ID and/or Sample Lot numbers may be optionally entered at this time. Use the “Sample ID” and/or the “Lot ID” buttons on the main screen. Once pushed, a keyboard will appear as below.

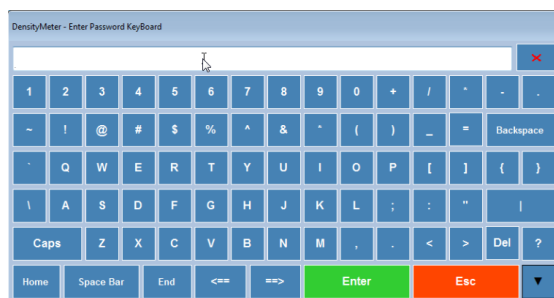


Figure 7-1 - Touch Panel On-Screen Keypad

### 7.2.1 Loading the VideoView™

Carefully fill a syringe with the sample to be measured. Inject the sample carefully into the front filling nozzle. The back nozzle uses a drain line that leads the used sample and rinse solutions into a waste container.

While filling the sample with the syringe, it is very important to use the VideoView™ feature to ensure that no bubbles are present in the sample. Bubbles, even very small ones can cause measurable errors.



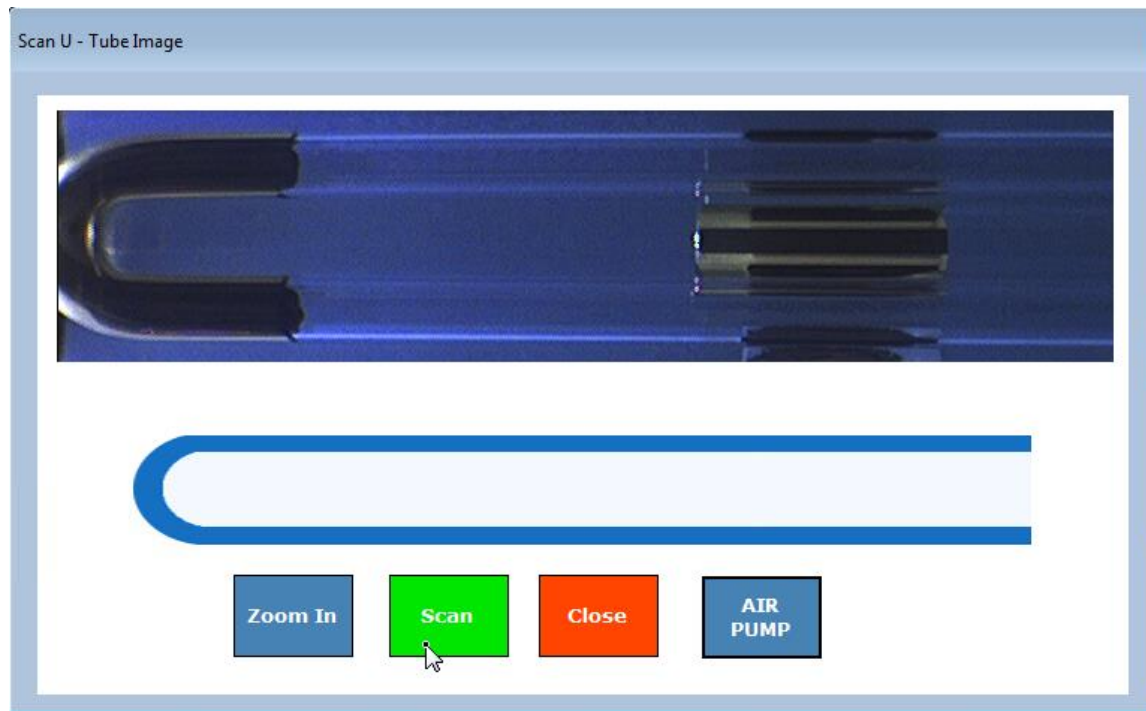
Press or click the image of the VideoView™ on the display screen.



VideoView™

Figure 7-2 - VideoView™ Display

The VideoView™ scan dialog will be displayed.




VideoView™

Figure 7-3 - VideoView™ Scan

The user may scan any part of the VideoView™ at magnification if desired. Pressing or clicking on the blue graphic of the tube will move the camera to that specific part of the VideoView™ Image.

Then watch as you are filling the glass VideoView™ . If you see a bubble go into the glass cell, continue push in more sample until you see that same bubble leave the cell. Leave the syringe in place to avoid leakage or siphoning of the sample back out of the VideoView™ .

The AlcoTest® also has the ability to pan/scan for bubbles in the sample.

Pressing or clicking the  button will initiate the auto scan / pan of the VideoView™ image. The user can easily see if there are any bubbles in the magnified scan as it passes thru the view window.

The AlcoTest® has three different modes for making a measurement. Two of these modes, **Single** measurement and **Multiple** measurement are available within most all Methods. The third mode, **Continuous** measurement has a method all its own.

### 7.2.2 Loading the OBM

Next a portion of the sample must be placed on the prism stage of the Optics Box Module. It is important that the prism be clean and dry prior to placing the sample.

Lift the Presser Head and clean the prism. If there is any leftover sample or residue be sure to use an appropriate solvent such as distilled water or acetone. Once the prism is clean wipe it carefully and allow it to dry thoroughly

Now place a small amount of sample onto the prism.

For all measurements, it is important to load the sample to be measured in the proper way. See below for an example of a correctly applied sample. Place the sample on the prism of the instrument as shown below:



*Figure 7-4 - Placing a sample on the Prism*



*Figure 7-5 - Sample Clean Prism*

*Sample not correctly applied*

*Sample Correctly applied*

Methods can be configured such that they will automatically examine the quality of the sample applied and block measurement if the Sample Quality does not exceed a predetermined amount. When the sample is loaded the Live Reading display should change accordingly.

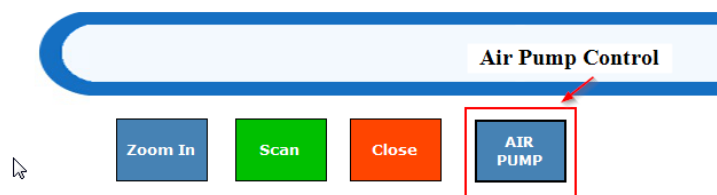
After the sample has been successfully injected into the VideoView™ without any bubbles, and the prism of the OBM is loaded as above, push the “Start” button to start the measurement process.

After the measurement has been made and the results obtained, clean and dry the VideoView™ and the OBM prism with suitable solvents.

For the VideoView™ often this cleaning requires two different solvent rinses. The first rinse is a solvent in which the sample itself is soluble. Push this rinse 1 solvent through the AlcoTest®'s VideoView™ using either a syringe or a rinse solvent bottle. Rinse #2 is often used as a solvent which will push out and replace any residue of rinse #1 and also dries completely and quickly. Acetone is often used as rinse #2 for this purpose.

Use the built-in air pump for drying out this solvent. In the “**Method Management**”, “**Measurement Parameters**” menu it is possible to set the air pump to turn itself off automatically in a predetermined amount of time. Normally, 1 to 2 minutes of drying time is adequate for the drying of acetone. If an alcohol is used as the drying solvent rinse #2, then it may be necessary to increase the drying time to 2 to 3 minutes.

Pressing the VideoView™ Image will allow the user to make a magnified inspection to ensure the tube is empty and clean. In addition, the Air Pump may be activated from this screen to assist in drying or solvent removal.



*Figure 7-6 - Air Pump Control*

After the AlcoTest® is clean and dry it is now possible, and recommended, to make a measurement on air to see if this cleaning and drying was done properly. If the Measurement Mode is set to either **Single** or **Multiple**, the air density measurement can be started after the cleaning and drying process by pushing the Start button.

## 7.3 Measurement Result Management

There is great flexibility and many options available to the user for the management, printing, saving and exporting of measurement results.

### 7.3.1 Printing

Any Windows compatible printer may be used to printout the results. The printer may be connected directly to the AlcoTest® via a USB cable or it may be configured to use a Networked printer. If it is found that the printer is not plug-and-play compatible it is possible to load a specific printer driver onto the AlcoTest® to support that printer.

Sample results may be printed out as required with the use of the “**Print**” Button or if the Method is so configured, printing will be automatic after each measurement is made.

Windows Embedded supports over two hundred different commonly used printers. This includes printers manufactured by Hewlett Packard, Epson and Lexmark. The software will, within a minute or two, recognize the printer which will then appear within your Devices and Printers in the Windows Control Panel. See Appendix D for a list of printers supported by Windows Embedded.

You may access the Windows Control Panel as follows:

Press **Menu > Operational Parameters > Instrument Configuration**

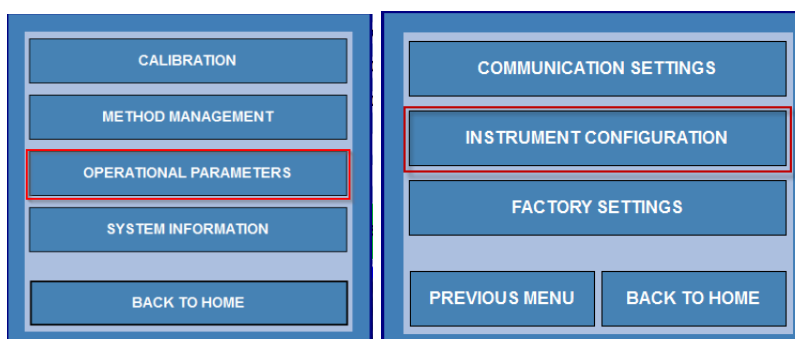


Figure 7-7 - Operational Parameters Menu

Now Press or click **Instrument Configuration** and then **Control Panel** and then **Windows Control Panel**

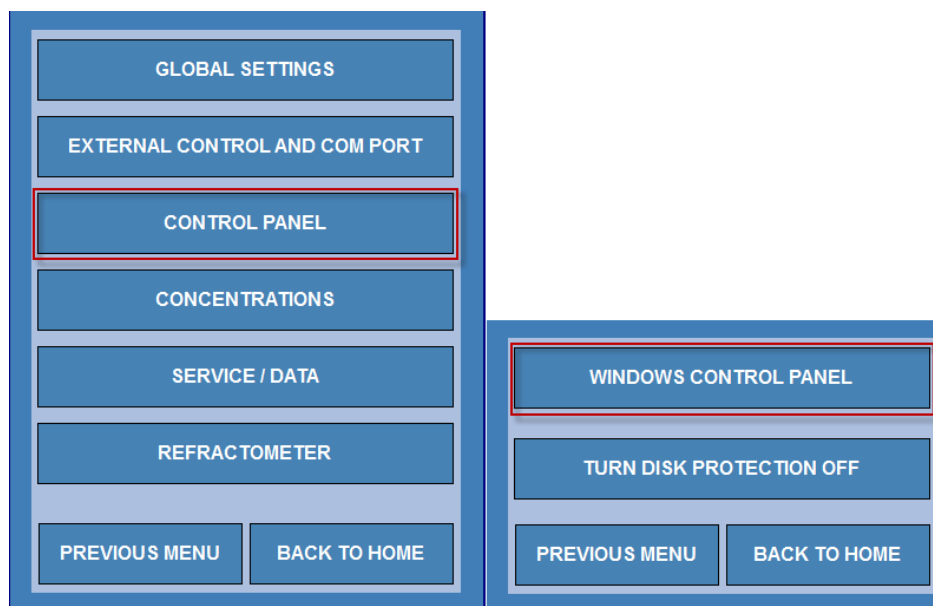


Figure 7-8 - Accessing the Windows 7 Embedded Control Panel

If you double click on “Devices and Printers” the following screen will appear:

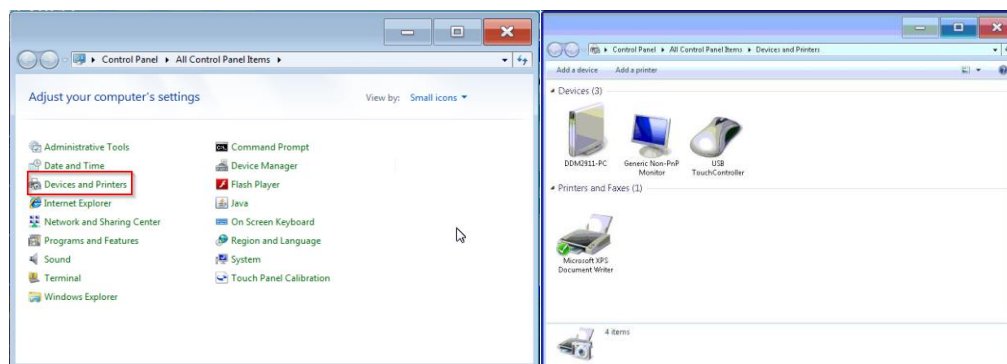


Figure 7-9 - Windows Control Panel - Devices and Printers

Select your printer from the displayed devices. There are options to configure the AlcoTest® to a non-local printer or a printer which requires customized device drivers.

If required, other drivers may be installed just as would be done with any PC. Much more detailed information is provided in Chapter 10 for loading printer drivers.

The selection of what measured parameters are to be printed is within Method Management. To customize the printed report for a specific Method go to: **Menu > Method Management**

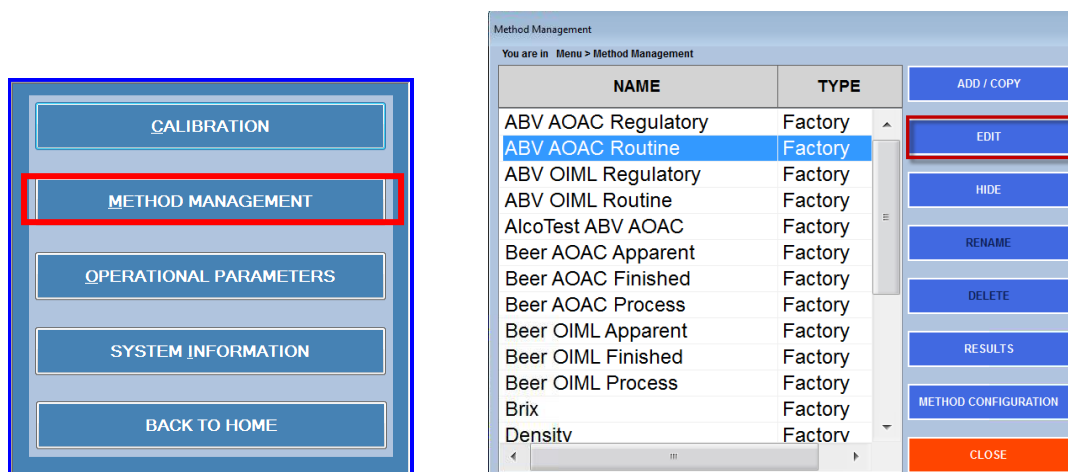
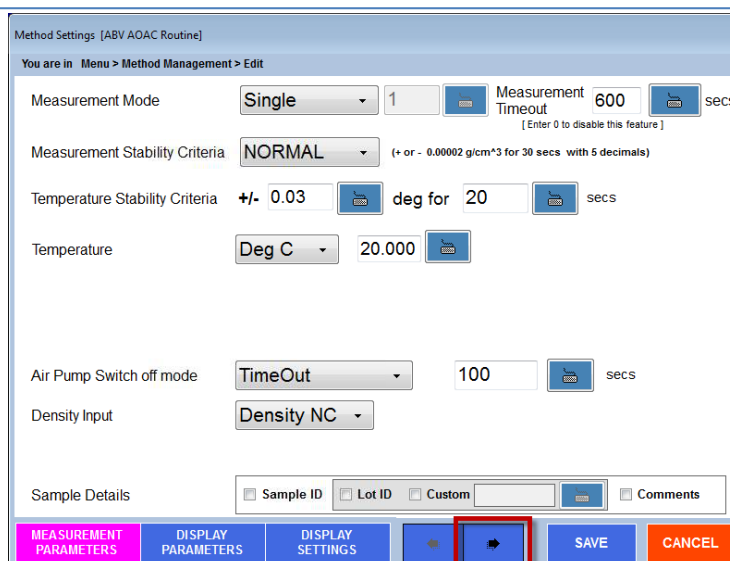


Figure 7-10 - Selecting the Method to Edit

Then highlight the Method where you wish to define what measured parameters are printed. Then select “**Edit**”. The menu will now open as shown in Figure 7-11.





Method Settings [ABV AOAC Routine]  
You are in Menu > Method Management > Edit

Measurement Mode: Single 1 Measurement Timeout: 600 secs  
[Enter 0 to disable this feature]

Measurement Stability Criteria: NORMAL (+ or - 0.00002 g/cm<sup>3</sup> for 30 secs with 5 decimals)

Temperature Stability Criteria: +/- 0.03 deg for 20 secs

Temperature: Deg C 20.000


Air Pump Switch off mode: TimeOut 100 secs

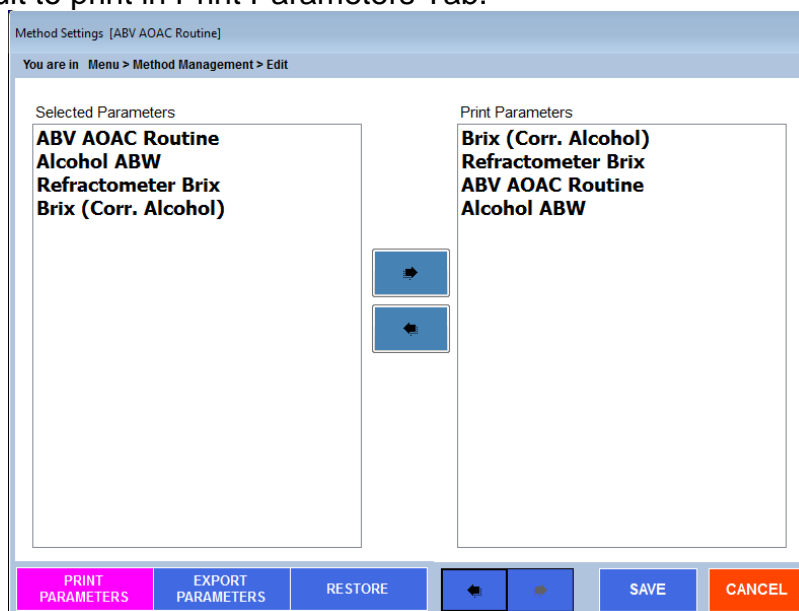
Density Input: Density NC

Sample Details: ☐ Sample ID ☐ Lot ID ☐ Custom ☐ Comments

MEASUREMENT PARAMETERS DISPLAY PARAMETERS DISPLAY SETTINGS [Back] [Next] SAVE CANCEL

Figure 7-11 - Configuring the Print Parameters

If you now select the  button you will see the parameters which have been set by default to print in Print Parameters Tab.



Method Settings [ABV AOAC Routine]  
You are in Menu > Method Management > Edit

Selected Parameters:  
ABV AOAC Routine  
Alcohol ABW  
Refractometer Brix  
Brix (Corr. Alcohol)

Print Parameters:  
Brix (Corr. Alcohol)  
Refractometer Brix  
ABV AOAC Routine  
Alcohol ABW

[Left Arrow] [Right Arrow]

PRINT PARAMETERS EXPORT PARAMETERS RESTORE [Back] [Next] SAVE CANCEL

Figure 7-12 - Choosing the Print Parameters

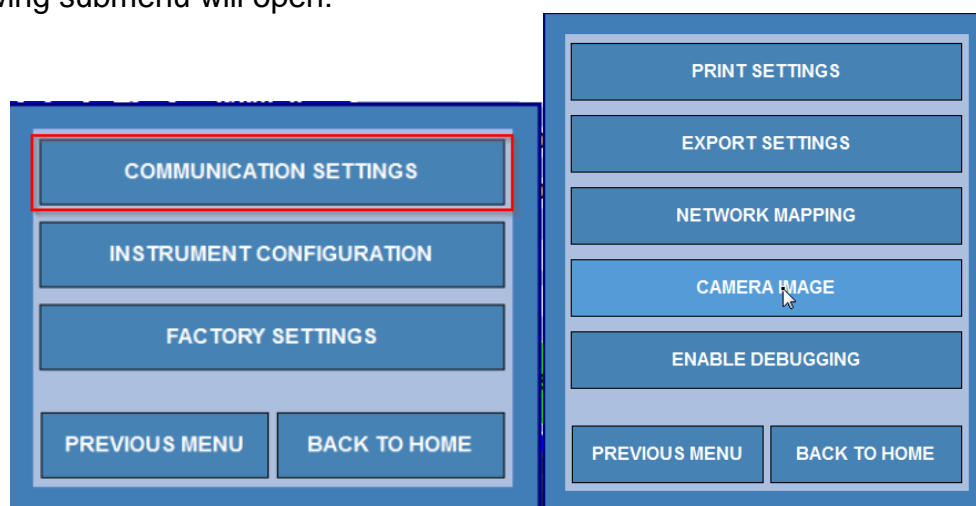
From this dialog it is possible to select or deselect what measured parameters will be printed. By default, the same parameters which are on the main screen's display are set to be printed, however one or two additional parameters may be printed on the report which are not displayed.

The same holds true for Exported measured parameters which will be discussed later.

### 7.3.2 Printer Results Selection

Besides selecting which printer you wish to use it is also possible to set when the results will be printed and if you desire to add your companies' logo onto the printout. See Figure 7-13 and Figure 7-14.

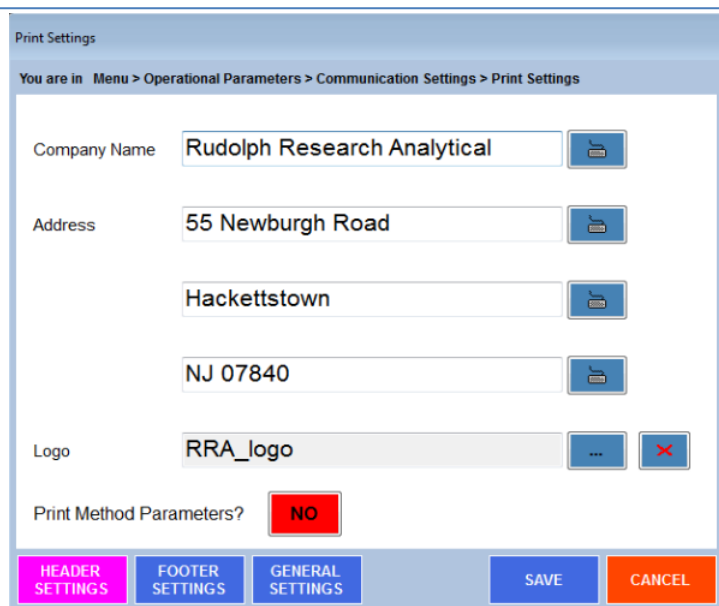
Go to: **Menu > Operational Parameters > Communication Settings**. The following submenu will open:



*Figure 7-13 - Communications Settings Menu*

This submenu allows your access into both Print Settings and Export Settings as discussed in the next section 7.4.2.

Select "**Print Settings**" and the following menu opens as shown in Figure 7-14.



Print Settings

You are in Menu > Operational Parameters > Communication Settings > Print Settings

Company Name: Rudolph Research Analytical

Address: 55 Newburgh Road

Hackettstown


NJ 07840

Logo: RRA\_logo

Print Method Parameters? NO

HEADER SETTINGS FOOTER SETTINGS GENERAL SETTINGS SAVE CANCEL

Figure 7-14 - Print Settings

Your company logo may be added to the print output. Select the  button and the following dialog will appear. Standard graphics format files – such as a PNG file, are acceptable for logos.

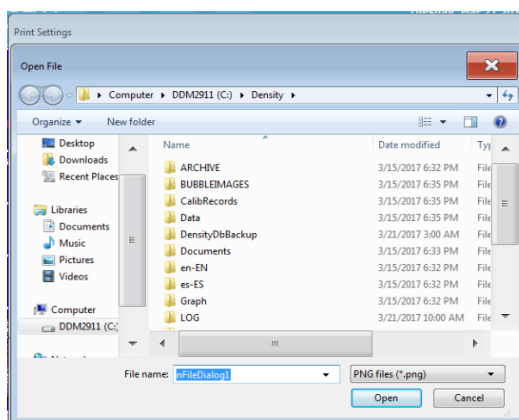
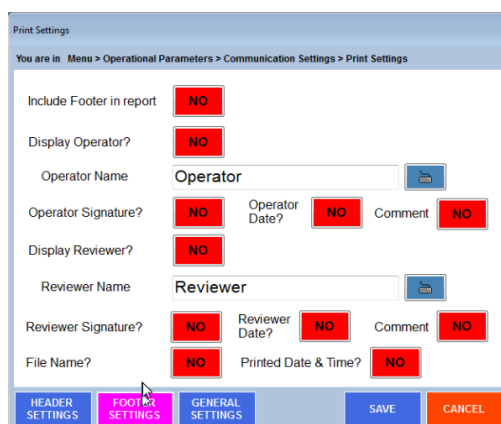


Figure 7-15 - Browse for logo

The FOOTER configuration screen allows the specifics of the output footer to be modified.



Print Settings

You are in Menu > Operational Parameters > Communication Settings > Print Settings

Include Footer in report **NO**

Display Operator? **NO**

Operator Name

Operator Signature? **NO** Operator Date? **NO** Comment **NO**

Display Reviewer? **NO**

Reviewer Name

Reviewer Signature? **NO** Reviewer Date? **NO** Comment **NO**

File Name? **NO** Printed Date & Time? **NO**

HEADER SETTINGS FOOTER SETTINGS GENERAL SETTINGS SAVE CANCEL

Figure 7-16 - Footer settings

In addition, the user may configure the General Settings. In this dialog the user may select the printout to be automatically produced at the end of each measurement.

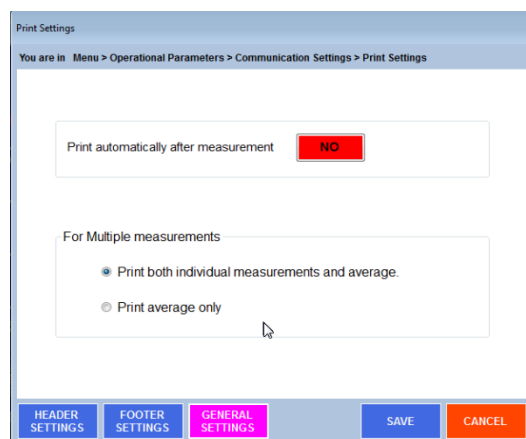

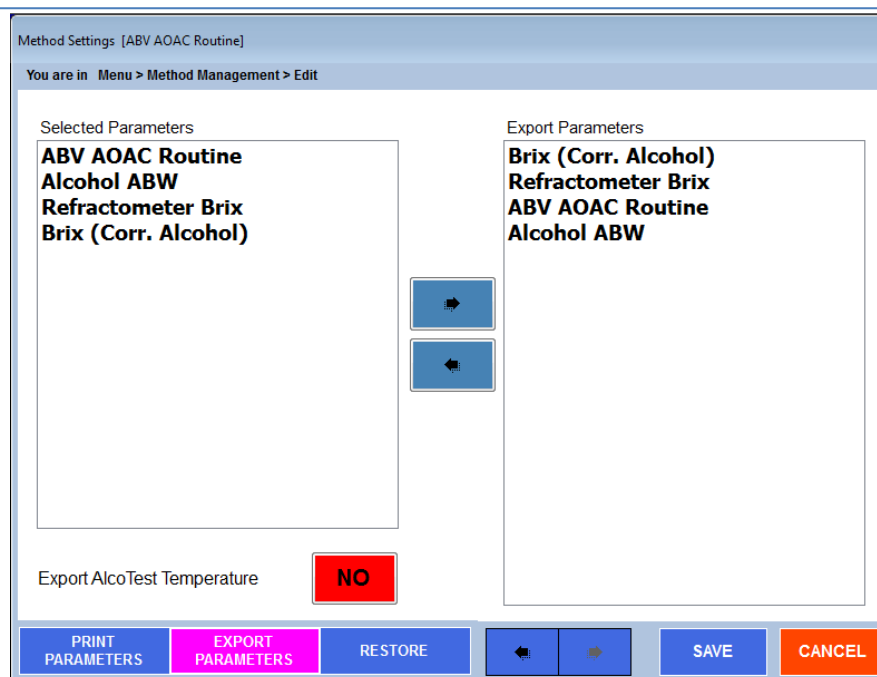


Figure 7-17 - General settings

### 7.3.3 Exporting

The selection of what measured parameters are exported is done exactly the same as the selection of printed parameters as explained above in section 7.4.1.

From the **Method Management > Edit** screen, select **Export Parameters** by clicking on the right arrow  on the bottom of the screen and then selecting Export Parameters.



*Figure 7-18 - Export Parameters*

### 7.3.4 Detailed Export Settings

To further define the items exported you must use the “**Export Settings**” submenu as in figure 7.18 above.

Select **Menu > Operational Parameters > Communication Settings**. Select **Export Settings** - The following submenu will open:

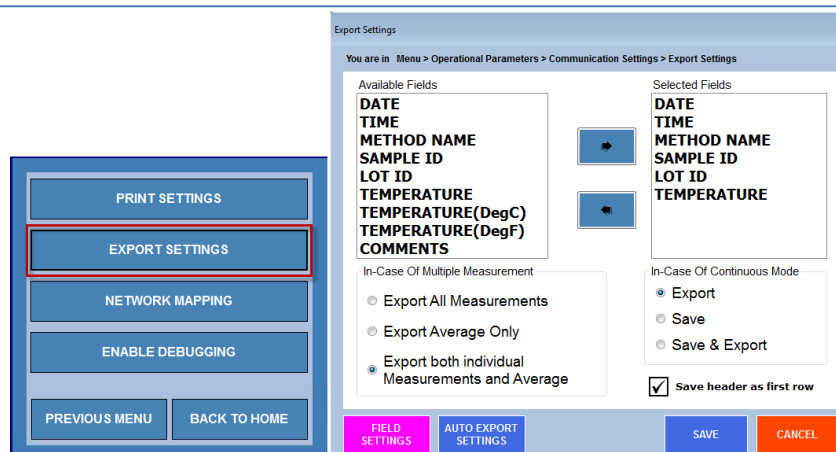


Figure 7-19 - Export Settings

From the screen shown in Figure 7-19 it is possible to define where to export the data and what file name should be used. To do so, select the Blue Button, “AUTO EXPORT SETTINGS”. When you do so, the following menu screen will appear:

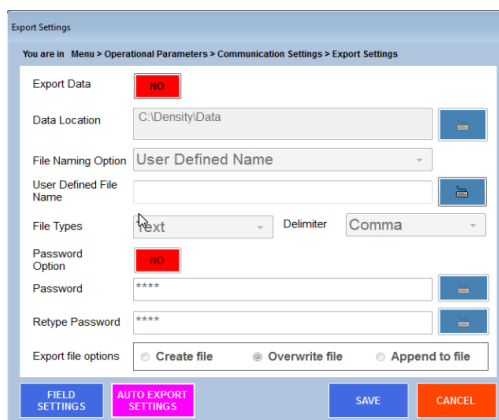

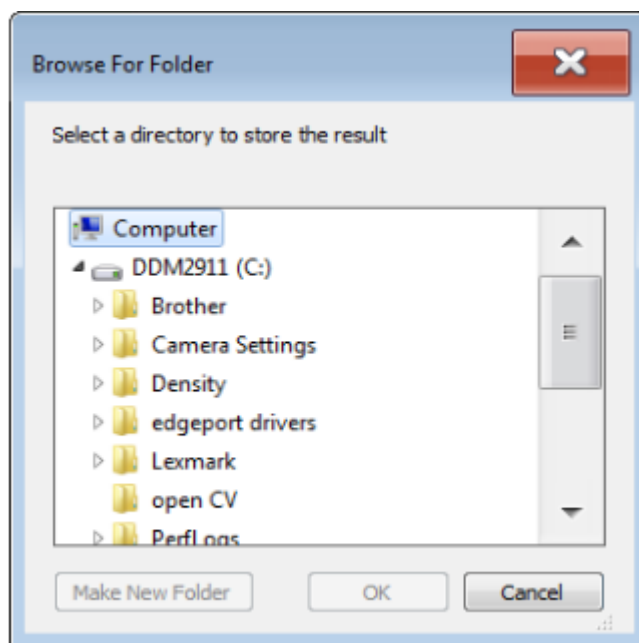


Figure 7-20 - Auto Export Settings Dialog

To set the location where files will be exported select the  button. Selecting the Browse Button will open the following dialog which is similar to a



Windows Explorer dialog. You may select from the displayed folders to choose the location where the Data will be exported to.



*Figure 7-21 - Choosing a location for the Exported Data file.*

Data may be saved/exported to any desired location, this is, a second PC, a server, etc. Just define the path. If a flash Drive (thumb drive) is inserted into one of the USB ports the AlcoTest® will recognize this USB device and offer it as an option for export location.

### 7.3.5 Saving Results

Measurement Results are automatically saved locally.

To review these saved results use the Result button on the bottom of the Main Screen. It is also possible to get to Results via Method Management. Select **Menu > Method Management**. Then, highlight the Method and press Results. By default the result for today's date are immediately available; however, any date range may be selected.

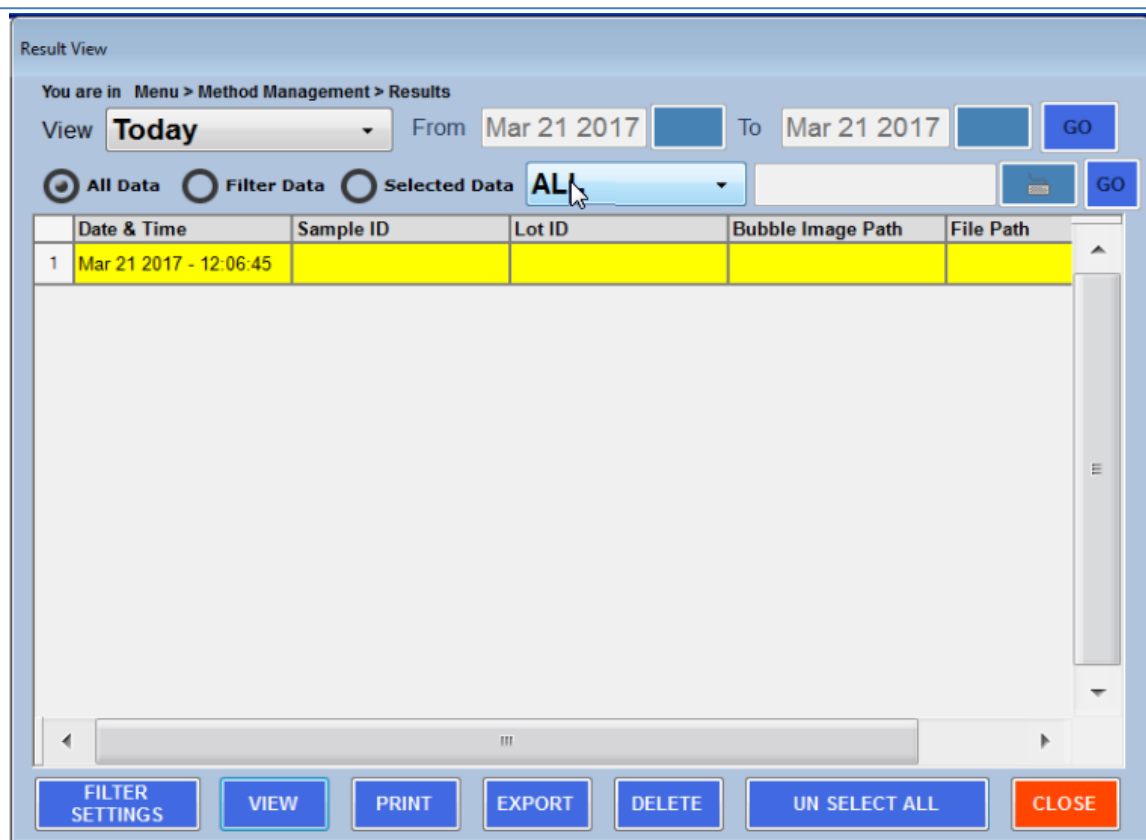


Figure 7-22 - Previous Stored Results Window

By making use of the **VIEW** button the user can see a selected result in detail.

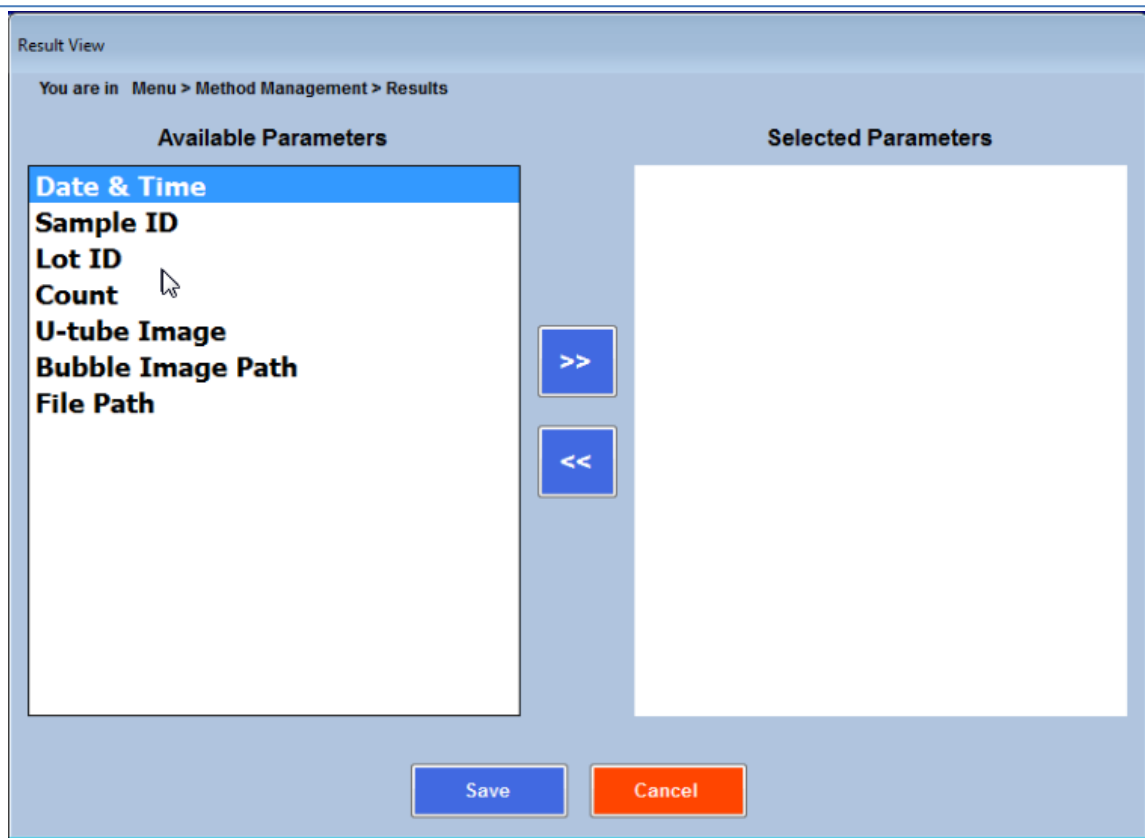
The **PRINT** button will send the selected result or result range to the configured printer.

The **EXPORT** button will export the selected results to the export file location.

The **DELETE** button is password protected. If 21CFR11 is enabled it is not possible at all to delete Results.

The **Un Select All** button will cancel the current selection.

The **Filter Settings** Button will bring up the below dialog.



*Figure 7-23 - Filter Settings*

Each parameter can be selected and added to the Filter Settings List. This will then provide the user with a way to cull the results and only display those results that match the filter.

Once a filter setting or settings have been chosen the user can select the Filter Data radio Button.

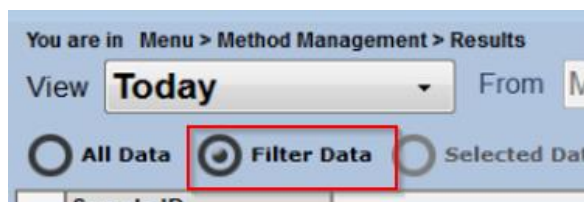


Figure 7-24 - Filter by Date

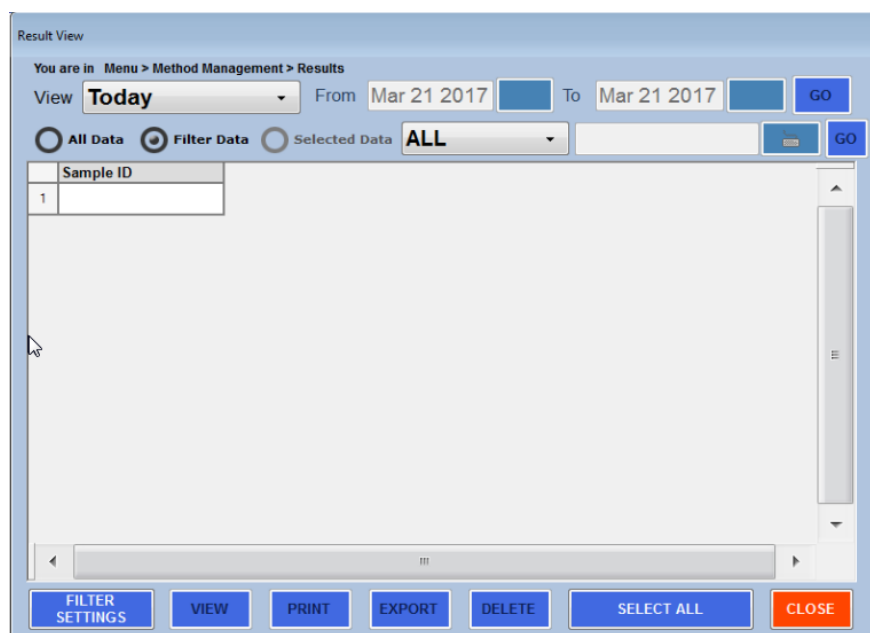


Figure 7-25 - Filter results output display

The selected filtered fields are displayed.

## 8 Cleaning and Drying the Sample VideoView™

### 8.1 Routine Cleaning in-between samples

In general, it is best to rinse, clean, and dry the VideoView™ after each and every measurement. This process is best done with two different rinsing solvents. The first rinse is selected as the best solvent for the sample material. If the sample is an aqueous solution, then water is often the best choice as rinse #1.

Then this rinse #1, water could next be cleaned out best with the rinse #2 which could be some solvent, like acetone, which dries quickly. The rinsing with solvents may be done using either a syringe or using solvent rinse bottles.



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*The chemistry of the sample determines the selection of the rinse solvent. A general rule of thumb is polar dissolves polar and non-polar dissolves non-polar. The end user must be responsible for appropriate selection of these rinse solvents. Special hazards of your samples may be only known to user. For example, you would not wish to rinse out concentrated sulfuric acid using water due to the resulting violent exothermic reaction that could cause splattering of sulfuric acid and possible exploding and **damage to the glass VideoView™**. Always have an understanding of the chemistry of the samples being measured.*

---

The general steps to proper cleaning and drying are as follows:

1. Use a well selected rinse solvent #1, push out the sample to the waste container and wash the VideoView™ using this solvent. Either a Luer tip syringe or a solvent rinse bottle may be used but the advantage to a syringe is it is possible to push and pull the solvent back and forth using it. Pulling back and forth on the plunger of the syringe with the solvent does a very good job at “scrubbing” of the VideoView™ and uses less solvent than the same cleaning done with a solvent wash bottle. It may be

necessary to repeat this rinsing with a second syringe full of rinse solvent #1.

2. If Rinse Solvent #1 is not a solvent which dries quickly or dries without residues, then rinse it out with solvent that does dry quickly and without residues. Often acetone or an alcohol is used in this step. If both solvents are available, acetone is preferred as it dries quicker than all alcohols.

Use of analytical grade or HPLC grade solvents is strongly recommended by Rudolph. If lower grade solvents are used it can result in errors and/or permanent damage to critical components .

3. The AlcoTest® has a built-in drying air pump. Use this pump to push out Rinse Solvent #2 and to completely dry the VideoView™ . It has available the option of a timer which will automatically turn it off after a set predetermined amount of time. See Chapter 6.2.1 under the heading, “Air Pump Switch Mode”. Normally 2-3 minutes of drying time is sufficient.
4. Once the VideoView™ is completely dry, it is possible to confirm complete cleaning and drying by making a measurement of air. If the VideoView™ is completely clean and dry, the measurement results should be that of clean dry air. For complete data on what the density should be for clean, dry air see Appendix D. In most cases, at 20° C and at one atmosphere, the density of air should be 0.0012 g/cm<sup>3</sup>. If the air measurement results are more than one or two counts high in the 4<sup>th</sup> decimal place, there is good reason to believe that the cleaning and/or drying process was not adequate. It would be suggested to clean and dry the VideoView™ again.



**TIPS:**

- If the Rinse Solvent #1 is a solvent which both dissolves the sample and also dries quickly, this is the only solvent required.
- In addition to the use of a Luer tip syringe for his cleaning as described above, the same cleaning may be accomplished by use of a peristaltic pump or gravity fed system.

- Be sure there is no chemical reaction between the sample and Rinse Solvent #1
- Be sure there is no chemical reaction between Rinse Solvent #1 and Rinse #2
- Do not use Alcohols as a rinse solvent for samples which contain sugars or proteins.
- In general, it is best to rinse, clean, and dry the VideoView™ after each and every measurement. The exception to this rule would be when the next sample is almost identical to the last sample. In this special case, the next sample acts to wash out the previous sample. This sample replacement mode of operating works well when filling the VideoView™ using a peristaltic pump or using the gravity fill method with a funnel. In these cases, there are copious amounts of sample available to wash out the previous sample thereby ensuring that little or no cross contamination between samples occur.

## **8.2 Cleaning and Drying Prior to an Adjustment and/or Calibration**

All subsequent measurements are only as good as the last calibration adjustment done to the AlcoTest®. Therefore it is absolutely essential that every effort is made to ensure the best calibration-adjustment as possible. This begins with the best possible cleaning and drying of the VideoView™.

A good practice in cleaning and drying prior to a calibration/adjustment is to double or even triple the amount of time and solvents used in normal daily operation. In other words, normal cleaning may consist of using about 10 ml of Rinse Solvent #1 followed by 10ml of Rinse Solvent #2 followed by 100 seconds of drying time. For the cleaning prior to a calibration/adjustment double or triple all of those values; use 20 to 30 ml of each solvent and set the drying time to 200 to 300 seconds or more.

## **8.3 Special Problem Cleaning Methods**

If care is taken to clean the AlcoTest®'s VideoView™ after each sample measurements and if the proper rinse solvents are used, there should never be any problems with cleaning the VideoView™. However, problems can happen if

1. A sample is forgotten about and left remaining inside the VideoView™ for a long period of time or



2. A sample is put in the VideoView™ and the proper solvent is not used or
3. The sample may be cleaned after a measurement but is not cleaned completely and over time a gradual buildup of residue occurs.



---

*Never stick pipe cleaners or paper clips or any other sharpened object down inside of the VideoView™ in an effort to clean the ID of the glass tube. These items will break the glass and require expensive factory repair.*

---

### **8.3.1 Four methods for problem cleaning:**

1. Room Temperature Soaking
  - a. Often, just allowing the Rinse Solvent #1 soak inside of the VideoView™ for 5 to 10 minutes will clean the VideoView™. You may also try using a mild soap detergent. And, there are many commercially available cleaning solutions made for cleaning laboratory glassware. Most require diluting with water. And most work very well at room temperature. Never leave the cleaning solution inside the VideoView™ for periods of time longer than required. In addition to soaking, many times scrubbing with the cleaning solution is helpful pull back and forth on the plunger of the syringe which contains the cleaning solution for a scrubbing effect.
2. Melting the Residue
  - a. It is often possible to just increase the temperature of the AlcoTest® and melt whatever residue is inside of the VideoView™. This works best for difficult to clean samples which are very viscous or for samples like wax that have solidified inside the VideoView™.
3. Hot Cleaning: Scrub and/or Soak
  - a. Warm or hot mild soapy water cleans much faster and better than cold soapy water. You could use a syringe and inject this hot soapy water into the VideoView™ pull back and forth on the plunger of the syringe to “scrub” the residue away. Also you may increase the temperature of the AlcoTest® and let the soapy solution soak inside the VideoView™ for some period of time.



*WARNING: Never use any hot or warm solutions which could cause damage to the glass VideoView™. Warm or hot caustics can etch and subsequently damage the glass. The same is true for some of the commercially available cleaning solutions. Read the directions on the label and use good common sense.*

The best general practice to follow when trying to solve a cleaning problem is to always use the least aggressive method(s) first. In other words, try cleaning at room temperature before cleaning at an elevated temperature. Also, use the lowest possible concentration (most dilute) of cleaning solution before trying a slightly more concentrated solution.

When in doubt about cleaning, please contact your Rudolph Research Analytical representative.



HINT

If none of the chemical methods above clean well; try the following:

#### 4. Mechanical Method of Cleaning:

- a. If the above chemical cleaning does not work you can use a mechanical method. Please don't use pipe cleaners or put anything inside the VideoView™ as it may result in a broken glass VideoView™ and very expensive factory repair. Besides, even if a pipe cleaner can clean away stubborn dirt on the straight legs of the VideoView™ there is no way to clean the bend of the VideoView™
- b. Use NaCl, that is, normal table salt found in the lunch room.
- c. Procedure: First grab a 3ml to 5ml Luer syringe. Pull the plunger all the way out. Cap the Luer tip off with your finger or some other capping device to keep the salt from not pouring back out. Fill the syringe about half way with this solid salt. Then with the Luer tip still capped, add a few drops of water. Shake. Maybe add another drop or two of water. Shake again. What you are trying to make is a salt paste; you don't want the salt to all dissolve into solution. Now put the plunger back into the syringe.
- d. Next be **patient**. You are going to start pumping the plunger of the syringe back and forth into the nozzle inlet of the AlcoTest®. This

is going to take several minutes to get the salt slurry into the glass VideoView™ . But it will go in; it just takes a little time; keep pumping back and forth. As the salt slurry gets into the VideoView™ it is abrasive enough to clean the glass tube but it will not harm the glass. After working this for several minutes take a good look at the VideoView™ . Does it look 100% better? If so just rinse the salt out with water.

## 9 Calibration; Checking and Adjusting

### 9.1 Definitions

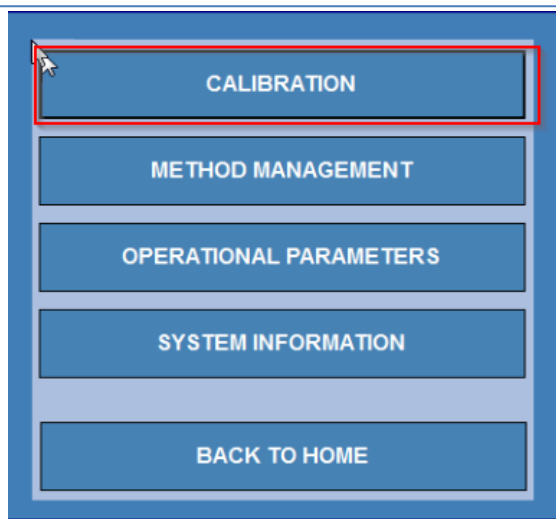
Calibration Check or Calibration Verification: It is the resulting procedure when a density measurement is compared to a known density standard. The AlcoTest® is supplied from the factory with one density standard. Either this or some other standard is possible to use. Whenever a measurement is made and then this resulting value is compared to a known or published value, this process is considered a Calibration Check or Verification. This procedure does not change the density reading, it is only a confirmation of the performance of the AlcoTest®. At least one density standard is required for a Calibration Check.

Calibration Adjustment: This is a procedure that is done which affects the resulting readings of the AlcoTest®. That is, if a Calibration Check proves that the AlcoTest®'s results are incorrect, an Adjustment will bring the AlcoTest® back into specifications so that it will measure within the required or specified accuracy. Calibration adjustments may be done with two or three density standards (normally air, water, and a third standard with a density greater than water and representative of the user's samples). A two-point calibration adjustment using air and water is best for most applications.

### 9.2 Calibration Checks – Verification

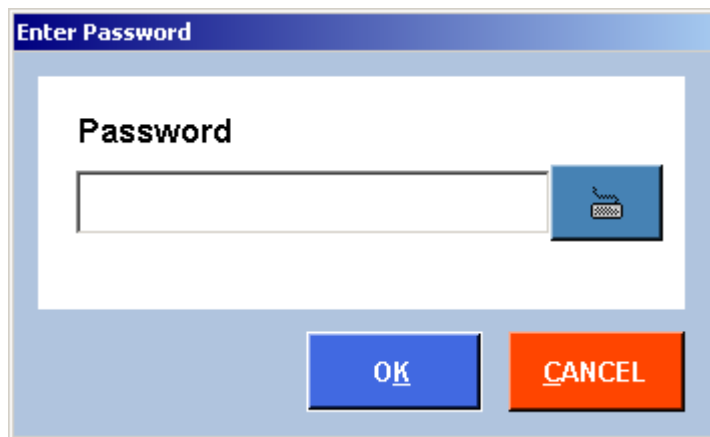
The frequency of the Calibration Checks is done as required by the Quality Management or as outlined in your SOP. Some users may select to do informal calibration checks with pure distilled water (non-traceable) as often as several times a day. Then it could be selected to formalize and record the results as frequently as once a week to maybe infrequently as once a year using a traceable known density standard.

To begin a calibration check select **Menu > Calibration** from the Main Menu.



*Figure 9-1 - Calibration Menu*

When entering the Calibration Menu, you may be asked to supply a password. The Factory default password is '519'. Password protection may be turned off or edited. See the Lab Manager's Password.



*Figure 9-2 - Calibration Password*

Once the proper password has been entered and "OK" is selected/touched the following screen will open.

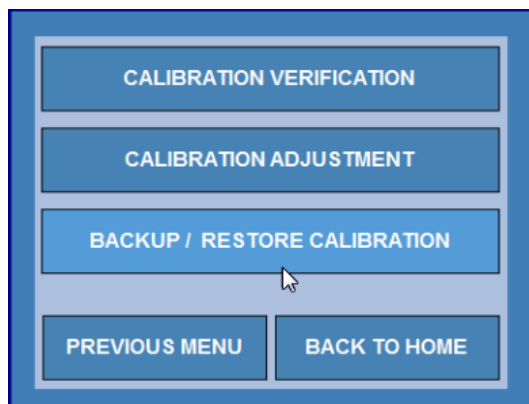


Figure 9-3 - Backup/Restore Calibration



*Only one Calibration Verification method is pre-loaded by the Factory. By selecting “Add”, other standards and temperatures are possible. This list of Calibration Verifications may grow as large as required.*

Select Calibration Verification from the menu. The following screen will be displayed.

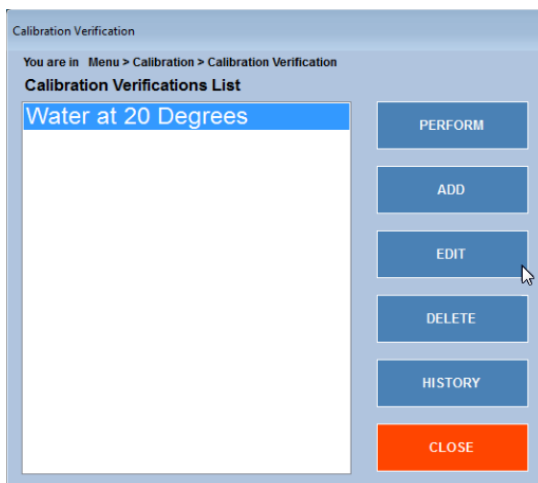


Figure 9-4 - Calibration Verifications List

One Calibration Method is installed by default from the factory. Other Calibration Methods may be added using this menu.

After selecting the desired Calibration Verification Method, the measurement is done as is any other measurement. These results are automatically saved within the AlcoTest®'s internal memory as well as in any external path defined by that method. These results cannot be either deleted or changed.  
Be sure to follow the Cleaning and Drying Instructions as outlined in Chapter 8.2 prior to any Calibration.



---

*The AlcoTest® s have a feature whereby a single calibration adjustment done at 20°C will permit accurate measurements at all temperatures. It is possible to do a calibration adjustment at other temperatures, but by doing so the feature of making accurate measurement at other temperatures will no longer be effective.*

---

### 9.3 Two-Point Calibration Adjustment


If the AlcoTest® has shown that it is making measurements correctly and within the limits of uncertainty of measurement (defined as the combined uncertainties of both the AlcoTest® and the density standards itself) a Calibration Adjustment cannot make the instrument more accurate.

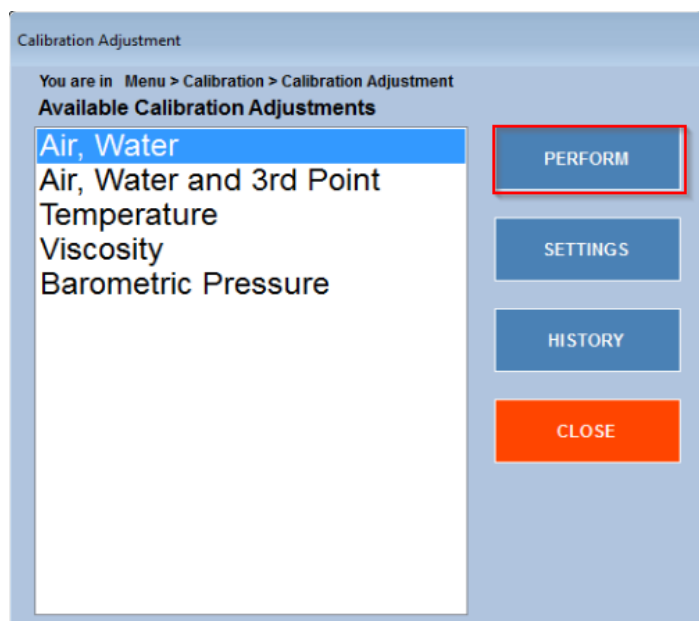
In other words, you cannot fix something which is not broken. Therefore, it is best to perform an Adjustment only when necessary to correct the AlcoTest®'s measurement results when they are not correct as shown by a Calibration Verification.

If the AlcoTest® has failed a Calibration Verification it is recommended that the VideoView™ be again cleaned and dried carefully as outlined in Chapter 8 and the Calibration Verification is done a second time. If then if it fails this verification it is safe to perform the Calibration Adjustment.




*Be sure to follow the Cleaning and Drying Instructions as outline in Chapter 8.2*

Select the Air/Water Calibration Adjustment, hit  and follow the command prompts.



*Figure 9-5 - Calibration Adjustment Menu*

If necessary, you may change the Calibration adjustment settings before performing a procedure by pressing  on Figure 9-5. You will see instantly a new window as show in Figure 9-6.



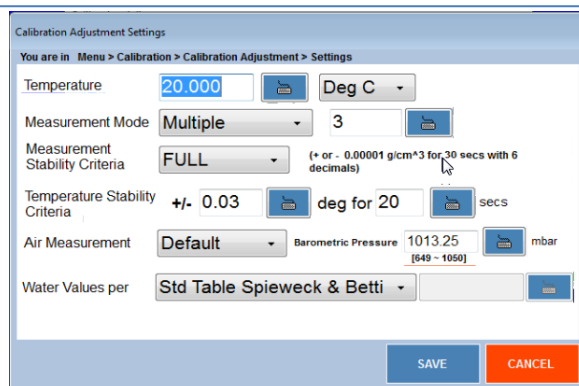


Figure 9-6 - Calibration Adjustment Setting dialog

From this menu it is possible to define how you wish to do the two point air and water calibration adjustment.

Rudolph Research Analytical recommends using 20°C as the calibration adjustment temperature as by doing so it is then possible to make accurate measurements at any other temperature.

While it is possible to do a calibration adjustment at temperatures other than 20°C, the AlcoTest® will no longer be accurate at all other temperatures; it will only be accurate at the other calibrated temperatures.

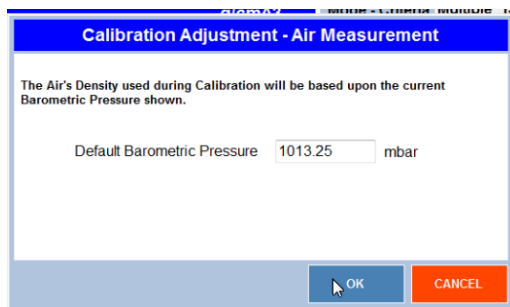
For the air measurement, you may select a Default Barometric Pressure value or use the Internal Barometer to correct the air's density.

During the air calibration, when prompted, enter the average of typical barometric pressure for the area in which the AlcoTest® is located. For sea level that value is 1013 mbar. For locations which are 1,000 ft above sea level that value is about 976 mbar, 2,000 ft above sea level it is about 942 mbar, and at 4,000 ft above sea level it is about 875 mbar.



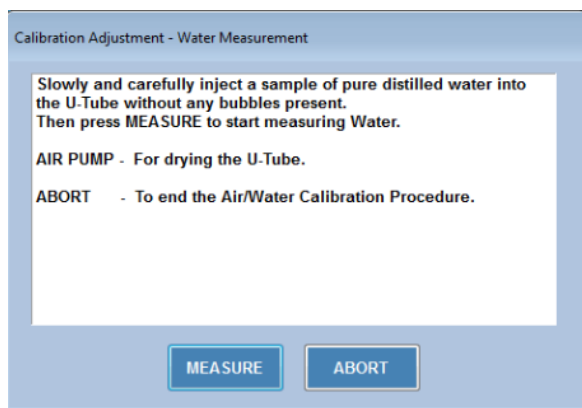
Figure 9-7 - Calibration Adjustment – local Air Pressure based on Altitude

You will be prompted to confirm your selection of local air pressure.



*Figure 9-8 - Calibration Adjustment - AIR*

At this point you may either skip the air calibration or complete it. Once is done, you will have the option to water calibrate the instrument as shown in Figure 9.7



*Figure 9-9 - Calibration Adjustment – Water Measurement*

## 9.4 Temperature Calibration Verification & Adjustment

The temperature inside the VideoView™ may be verified using a Fluke Hart Handheld Thermometer P/N 1523 with temperature probe P/N 5622-10 and probe calibration P/N 1923-10 or its equivalent.



*The Fluke Hart thermometer's certificate of calibration must be valid. Serial numbers are recorded for thermometer and probe on the Measurement Data Sheet.*

### 9.4.1 Temperature Verification

Remove one of the filling nozzles and carefully place the Fluke Hart Thermometer probe inside the internal diameter of the VideoView™.

Perform this procedure very slowly and with very little force as **the glass is very fragile!** Reference Figure 9-10 below.



Figure 9-10 - Temperature Verification with a certified Fluke-Hart Thermometer



*Figure 9-11 - Verify Temperature*

Set the AlcoTest® temperature using the dialog box on the right and permit sufficient time for the VideoView™ and the thermometer probe to come to complete thermal stability. This may require up to 10 minutes.

Then compare the AlcoTest®'s sample temperature as displayed to the temperature reading on that of a certified thermometer. The results of the two temperature readings must be within the combined accuracies of the AlcoTest® and that of the thermometer.

The AlcoTest®'s temperature's accuracy is  $\pm 0.03^{\circ}\text{C}$  and the thermometer's probe has an accuracy of  $\pm 0.04^{\circ}\text{C}$ . The combined maximum error or difference between the two readings is therefore  $0.07^{\circ}\text{C}$ .

If these two readings agree within the above tolerance,  $0.07^{\circ}\text{C}$  or less, then the AlcoTest® is properly calibrated and does not require Temperature Calibration Adjustment.

If there is a discrepancy – follow the procedure to Adjust the Temperature Calibration given in the next section.

*Note: The RRA Factory has the ability to do a much more accurate temperature calibration than is possible in the field.  
Therefore, returning the instrument to the Factory is recommended if there is a persistent temperature discrepancy.*

## 9.4.2 Temperature Calibration Adjustment

Always follow the Probe Insertion Instructions above for the Temperature Verification prior to deciding to perform a Temperature Calibration Adjustment.

*NOTE: If the instrument passes verification and is within specification for temperature, doing a Temperature Calibration Adjustment **will not** make the instrument any more accurate.*

It is rare that the temperature in the AlcoTest® should go out of calibration. In the event that the AlcoTest® requires a Temperature Calibration Adjustment you may opt to have the Factory do this adjustment or alternately you may enter the Calibration Adjustment menu as shown and select Temperature.

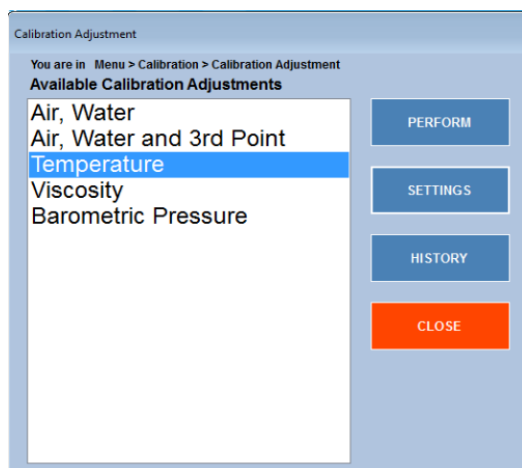
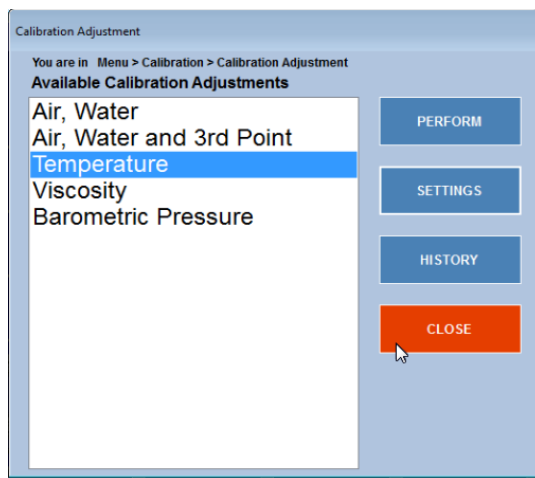


Figure 9-12 - Calibration Menu

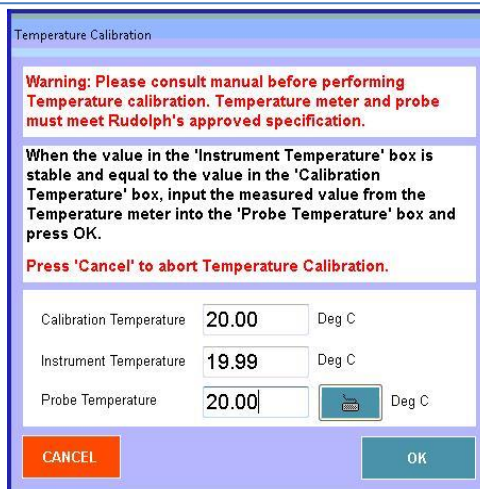
The AlcoTest® requires adjustments at 3 temperatures. These temperatures are 20°C, 40°C, and 60°C.

The factory settings of 20°C, 40°C, and 60°C must be used. Press or click the **PERFORM** button.



*Figure 9-13 - Calibration Adjustment – Temperature Calibration*

Follow the instructions displayed on the screen. Allow 20 minutes or more between temperature changes and confirm that the temperature is stable for both the AlcoTest® and the Fluke-Hart Thermometer.



Temperature Calibration

**Warning: Please consult manual before performing Temperature calibration. Temperature meter and probe must meet Rudolph's approved specification.**

When the value in the 'Instrument Temperature' box is stable and equal to the value in the 'Calibration Temperature' box, input the measured value from the Temperature meter into the 'Probe Temperature' box and press OK.

**Press 'Cancel' to abort Temperature Calibration.**

Calibration Temperature	20.00	Deg C
Instrument Temperature	19.99	Deg C
Probe Temperature	20.00	Deg C

CANCEL OK

Figure 9-14 - Temperature Calibration



**HINT**

*It is advisable to re-check the measurement accuracy after re-assembly of the nozzle which was removed for the temperature verification and/or temperature adjustment. It is very possible that the tension between the nozzle and the opening to the glass VideoView™ may be slightly different and will not oscillate exactly as before. Therefore, an air and water calibration check (verification) is always best. Perform a calibration adjustment, if required.*

## 9.5 Viscosity Calibration Adjustment

The viscosity calibration adjustment was done at the factory and normally is not required to redo again by the end user. However, this calibration is easy to do. All that is required is a viscosity standard which has a known density.

It is best to use a viscosity standard which has an absolute viscosity of between 150 to 200 mPa.s at room temperature. The actual viscosity value is not needed for this calibration, it is only necessary to know the density of this standard.

From: **Menu > Calibration > Calibration Adjustment** ; highlight **Viscosity**

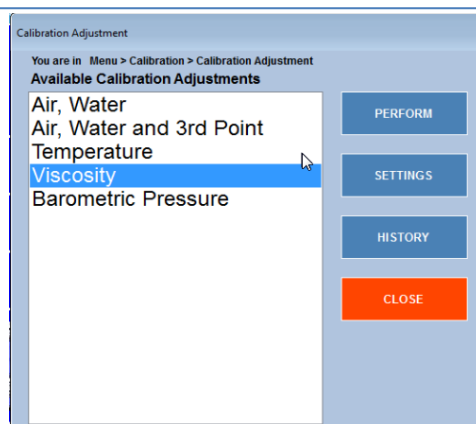


Figure 9-15 - Viscosity Calibration

Next select **“Settings”**. A Window will open as shown.

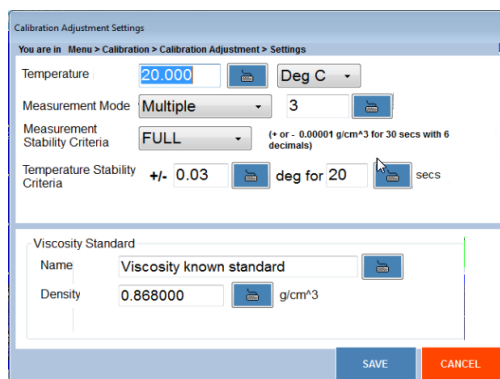


Figure 9-16 - Viscosity Adjustment Settings

Type in the correct density in  $\text{g/cm}^3$  for this standard being used and then hit on **“SAVE”**.



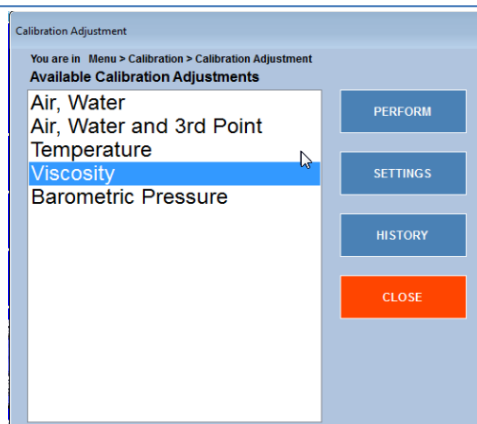


Figure 9-17 - Perform Viscosity Calibration

Select “**PERFORM**”. Then follow the system prompts on the display.

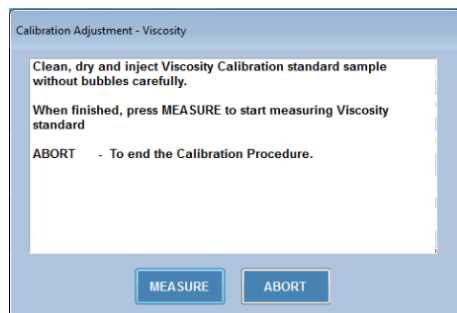


Figure 9-18 - Viscosity Calibration wizard

## 9.6 Calibrating the Refractometer

The AlcoTest® Refractometer Module is normally not accessed by the user. However when the Density Meter is calibrated it is a good idea to also check the calibration of the Refractometer. This section will explain how to perform both the Validation and the Calibration of the AlcoTest® Refractometer.

### 9.6.1 Menu Functions



To access the Refractometer software you must click the ACCESSORIES button.

ACCESSORIES

The following menu will be displayed. Click **Refractometer Optics Module** as shown below.

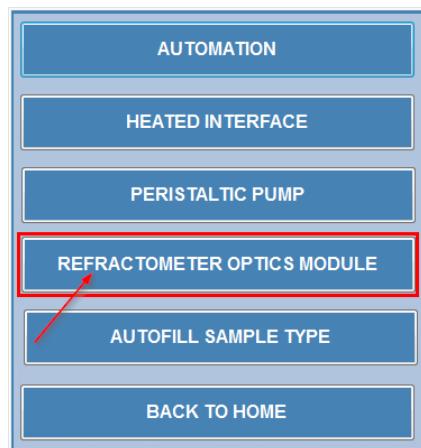


Figure 9-19 - Accessing the Refractometer Application

The Refractometer application will be launched as shown below. To return to the normal AlcoTest® screen you just have to press AlcoTest® as shown below.

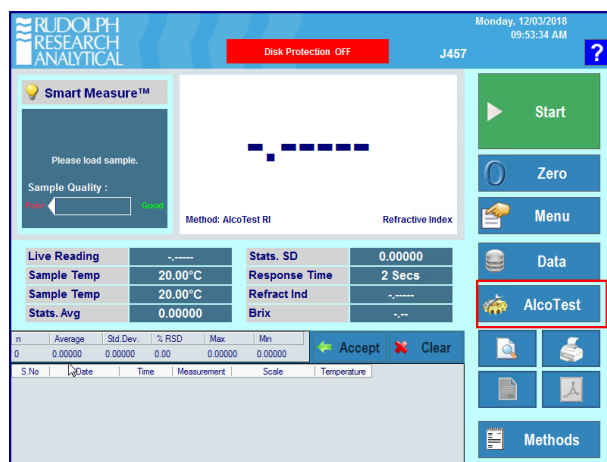




Figure 9-20 - Refractometer Application

To perform the Validation click the Methods  button and then click Validation.  The following menu will be displayed. Default Validation is performed at 20°C with **distilled** water.

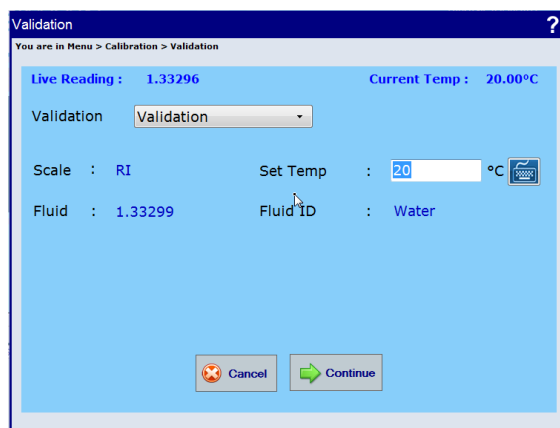


Figure 9-21 - Default Validation

The Validation window allows the user the set the temperature the temp **MUST BE** 20°C. Press Continue to load the sample and take measurement.

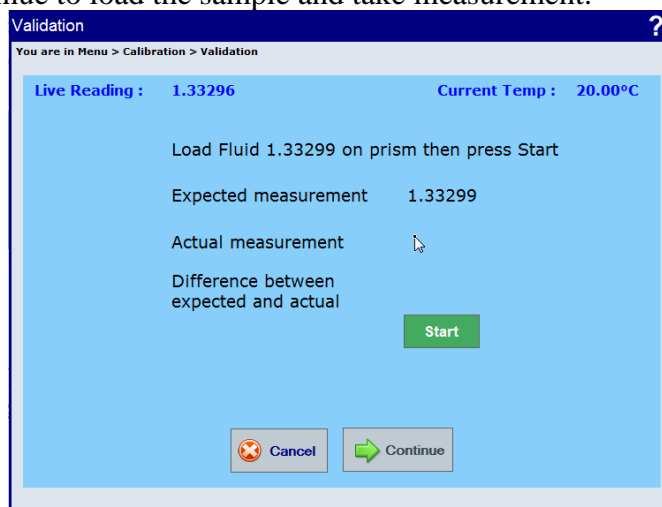


Figure 9-22 - Validation Wizard

Once the sample is loaded on the Prism press the Start button. The instrument will perform the measurement and return the measured value.

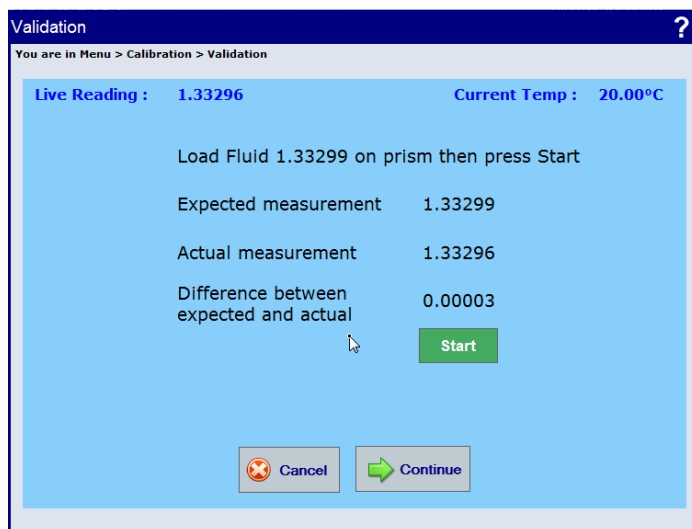


Figure 9-23 - Validation Wizard start

Once the measurement is complete press the Continue button and the following chart will appear indication if the measurement Passed or Failed.

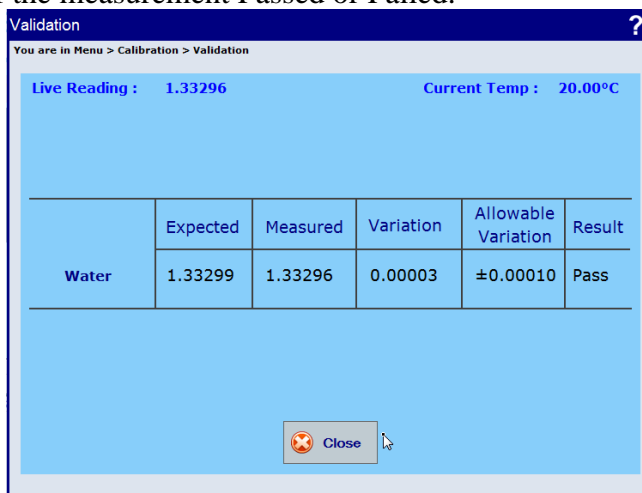


Figure 9-24 - Validation Pass/Fail

Press Close to return to the Calibration Menu or Home to return to the Home Menu.

## 9.6.2 Calibration

To enter the Calibration first click the Menu  button. The MENU function is password protected. Please enter the password provided to you as the Administrator.

The Menu function allows the user to change the operation of the system including calibrations, collection parameter, scales, and operational parameters. This function should be used by customers trained in the correct usage of the instrument. Untrained customers can change these parameters to alter the measured readings of the instrument so distribution of the passwords should be limited.

When the MENU key is pressed this screen appears:

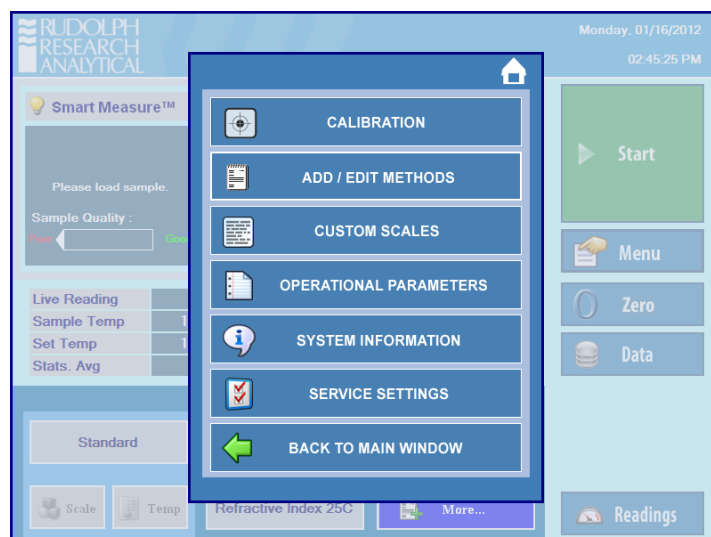

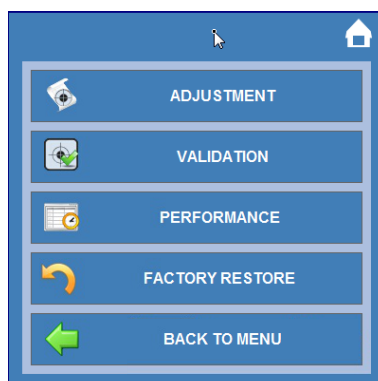


Figure 9-25 - Menu Functions

### 9.6.3 Menu - Calibration

Calibration  CALIBRATION Function brings up the following menu choices.



*Figure 9-26 - Calibration Menu*

#### 9.6.3.1 Adjustment

- Is a two-point calibration using two known standards. This form of calibration is usually done by an experienced operator. The instrument is supplied with two standard samples, distilled water and a refractometer calibration fluid with a known refractive index.

#### **Two Point Calibration- Setting up the calibration**

The two-point calibration is initiated from this screen:

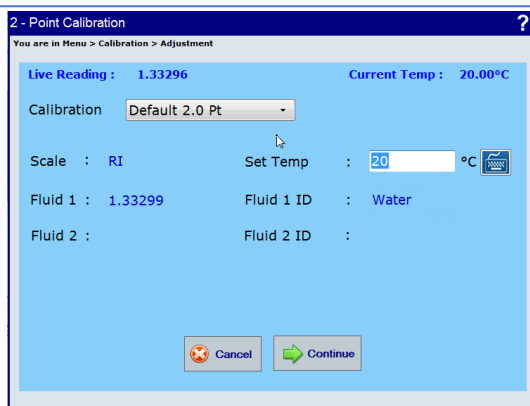


Figure 9-27 - Two Point Calibration

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*Note: The fluid RI values are configured in the Calibration method screen. This screen allows the user to choose the type of calibration and the temperature to calibrate the unit.*

---

### Scale

This is the scale that the user wishes to use. The options are Refractive Index and Brix.

### Set Temp

This is the temperature the instrument will measure the standards at and it must correspond to the value given for the standard. Important notes;

- Brix is defined at 20°C and should not be calibrated at different temperature
- Both standards must be measured at the same temperature.

### Fluid 1, Fluid 2

These are the known values of the standards

### Fluid 1 ID, Fluid 2 ID

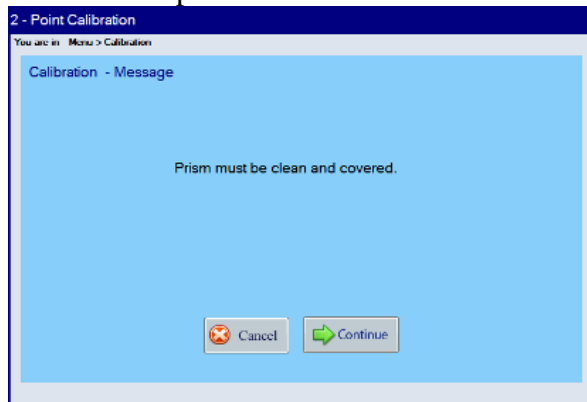
These spaces are provided so the user can enter information about the standard to provide traceability. This information could be a lot number or a description. Leaving these boxes empty will not affect the calibration.

### Performing the calibration



### **Step 1 – Air Zero**

After pressing CONTINUE on the previous screen the instrument will show;



*Figure 9-28 - Two Point Calibration*

The instrument is about to perform an Air Zero and it is important that the sample area is clean. It is also important that stray light is excluded from the prism and the simplest method of doing this is to lower the presser however if the instrument being used does not have a presser the stray light can be excluded by an upturned cup.

The instrument will pause at this screen to allow the user to clean and cover the prism. When this process has been done press CONTINUE

### **Step 2 – Measurement of Fluid 1**

The instrument will then display this screen

(Note that the number 1.33299 is fluid 1 in this example)

**2 - Point Calibration** ?

You are in Menu > Calibration > Adjustment

Live Reading : 1.33296 Current Temp : 20.00°C

Calibration Default 2.0 Pt

Scale : RI Set Temp : 20 °C

Fluid 1 : 1.33299 Fluid 1 ID : Water

Fluid 2 : Fluid 2 ID :

Cancel Continue

Figure 9-29 - 2 Point Calibration – Step 2

The instrument will then wait for the user to load the fluid. When that has been done the user should press MEASURE. The instrument will then stabilize the sample at the reference temperature and measure it. The result will be displayed in the Actual Measurement box.

At this point the instrument will pause and wait for the user to press CONTINUE, before doing so the user should compare the expected and actual measurements. In most cases these values will be different by less than 0.0002. If the difference is greater than 0.0002 the user should look for a possible error. Some examples of possible errors are:

- The standard value been entered incorrectly, for example has the user really entered 1.33299 or have they type 1.33929 (transposition error)
- An incorrect material (or even no material) has been placed on the prism

- The instrument is set to the wrong temperature. (For example, the user has entered 1.33299 which is water at 20°C and then calibrated at 25°C where water should read 1.33251)

If the user does find an error then pressing CANCEL will cancel the calibration. For some errors (such as placing the wrong fluid on the prism) it is possible to rectify the error and press START again.

If the expected and actual measurements are within acceptable parameters then press CONTINUE.

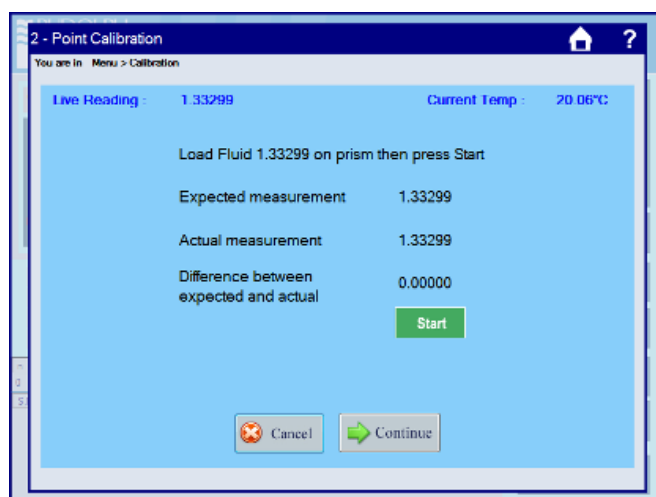


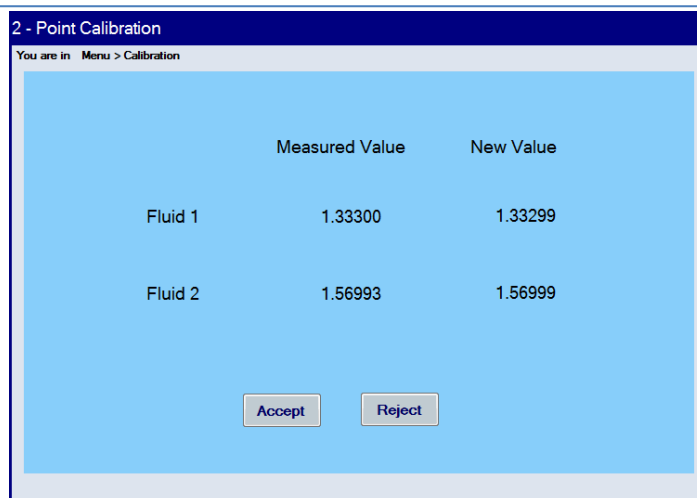
Figure 9-30 - 2 Point Calibration

### Step 3 – Measurement of Fluid 2

This process is simply a repeat of the measurement of fluid 1

### Step 4 – Confirmation

The instrument will display this screen

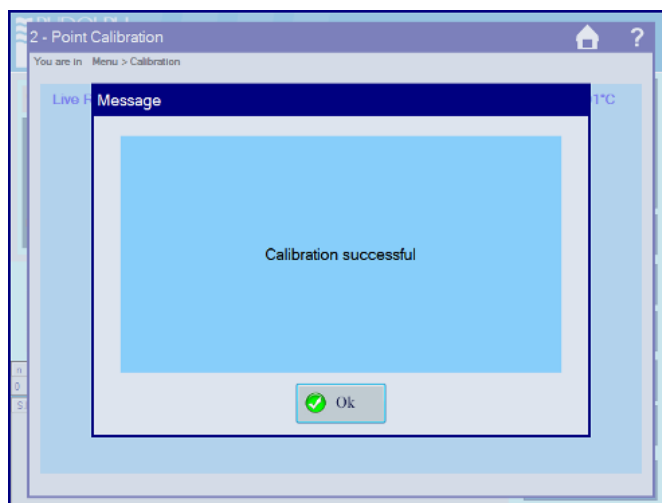


	Measured Value	New Value
Fluid 1	1.33300	1.33299
Fluid 2	1.56993	1.56999

Accept Reject

Figure 9-31 - 2 Point Calibration - Confirmation

Once again this is simply a check screen. Provided the results are within acceptable parameters the user should press ACCEPT.



Live Message

Calibration successful

Ok

1°C

Figure 9-32 - Calibration Completed

## 10 Printers and Network Connections

The AlcoTest® supports connection to modern Ethernet networks and to both local and networked printer devices. The support for these advanced capabilities is provided through the Windows Embedded operating system which is the execution environment for the AlcoTest® application.

Windows Embedded is a very robust and stable platform, providing familiar interfaces to add Plug-and-play type devices and most networks with ease. The AlcoTest® uses a variant of Windows that has been customized for laboratory equipment use. This variant allows certain protections to be put in place to protect the data and the operating system from inadvertent damage. One of these features is called Disk Protection.

Disk Protection has the side effect of preventing a normal user from installing low level applications, such as network drivers or printer drivers. Often these drivers need to be installed in a user's environment. As a consequence, Disk Protection has to be 'turned off' temporarily.

The AlcoTest® software fully supports and controls this Disk Protection feature. The following sections will describe the general process for Enabling and Disabling Disk Protection as the user may be required to do when installing a printer or a network connection.



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*Note: If you are not comfortable or familiar with the setup of Network Connections or Printer Drivers STOP and consult with your local IT personnel for assistance.*

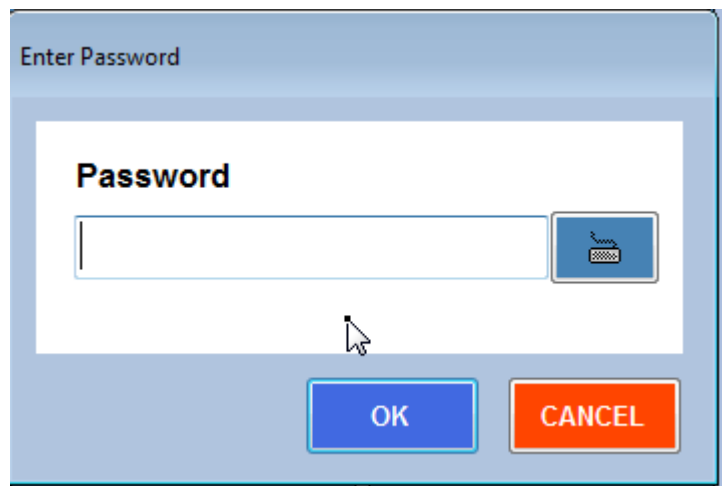
---

### 10.1 Basic Steps required for Printer or Network Configuration

It will be necessary to access the Windows Embedded Control Panel and be able to turn off Disk Protection in many of the following procedures. Therefore, this procedure will be outlined only once and will be referred to in the remainder of this document as the "Basic Steps".

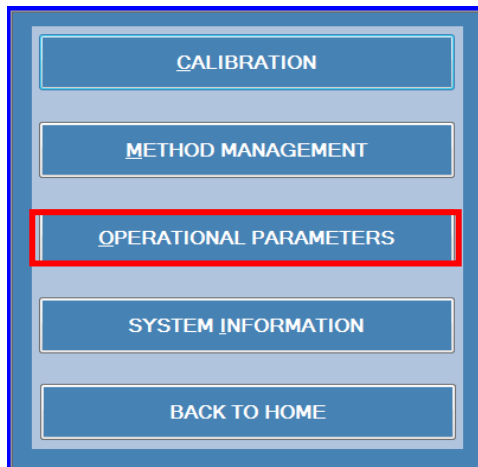
#### 10.1.1 Basic Steps:

1. Click the **Menu** button, enter the password and click OK. The factory default password; if it has not been deactivated or changed by Lab's Manager; is **123**.



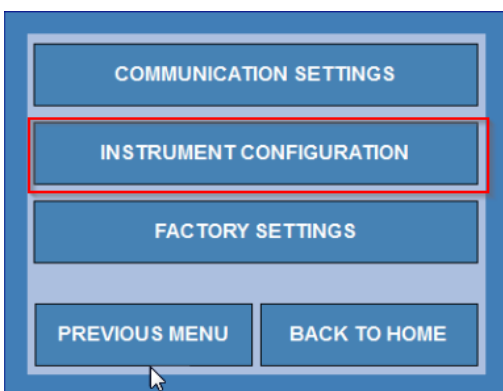
*Figure 10-1 – Enter Menu Password (if required)*

2. Select **Operational Parameters** from the menu.



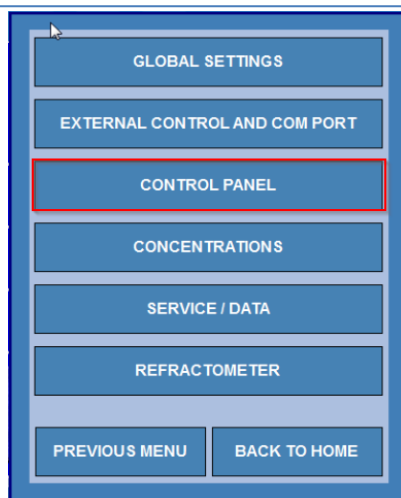
*Figure 10-2 - Select Operational Parameters*

3. Select **Instrument Configuration** from the Operational Parameters menu.



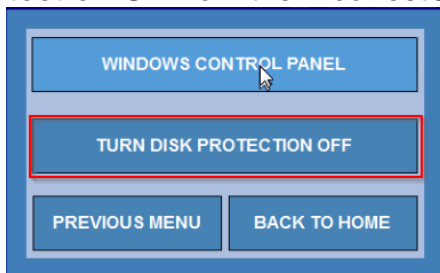
*Figure 10-3 - Instrument Configuration*

4. Select **Control Panel** from the Instrument Configuration menu.



*Figure 10-4 - Accessing the Windows Control Panel*

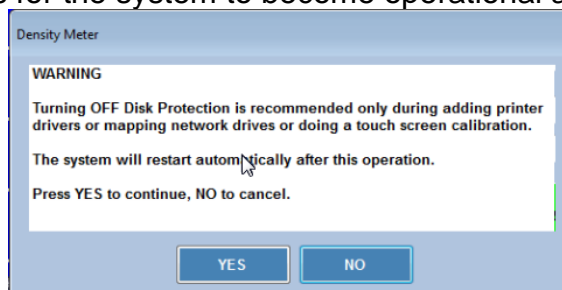
5. Select **Turn Disk Protection Off** from the AlcoTest® Control menu.



*Figure 10-5 - Turning Off Disk Protection*



6. You will see the warning message shown in Figure 10.6 below. Click the **Yes** button. The AlcoTest® system will automatically restart. Please allow 20 to 30 seconds for the system to become operational again.



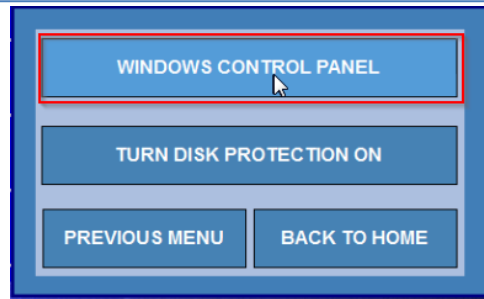
*Figure 10-6 - Turn Off Disk Protection - Confirmation Dialog*

7. When system reboots you will see a red box in the Main Screen header showing that Disk protection is off (see Figure 10-7)



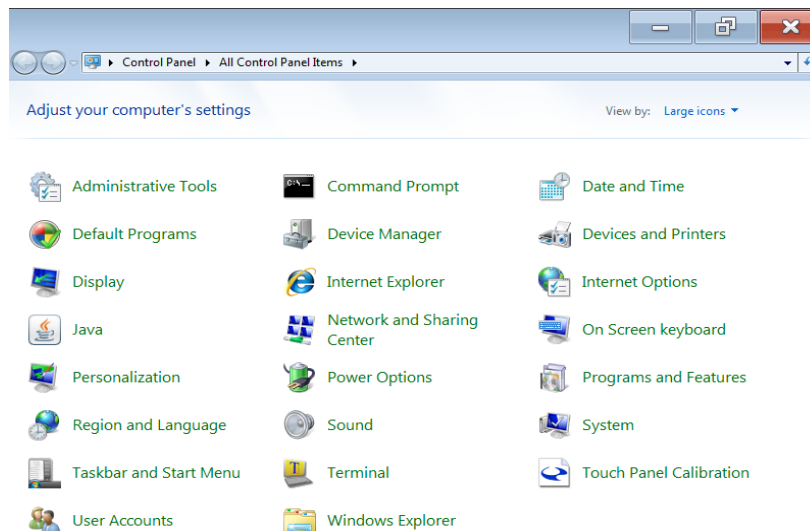
*Figure 10-7 - Disk Protection Status Indicator*

- Click the **Menu** button and enter the password (refer to Figure 10.1). The factory default password is 123, if was not modified by the Lab's Manager.
8. Click Operational Parameters and select Instrument Configuration from the menu.
9. Select **Control Panel** from the Instrument Configuration menu (see Figure 10-8)
10. Select **Windows Control Panel** from the AlcoTest® Control Panel menu.



*Figure 10-8 - Accessing the Windows 7 Embedded Control Panel*

11. You are now in the Windows 7 Embedded Control Panel as below.



*Figure 10-9 - Windows Control Panel*

## 10.2 Installing Plug-n-Play Local Printers

The AlcoTest® allows the connection of any of the 200 plus USB printers whose drivers are preloaded in Windows Embedded. Follow the instructions below to install a plug and play compliant USB printer on the AlcoTest®. See Appendix D for the complete list of printers.



*Most printers released in the last 5 years are plug and play compliant.*

Connect the USB cable from the printer to the AlcoTest® \. Be sure both instruments are turned ON. It may take a minute but the Windows Embedded software will recognize the printer.

You may see some Windows dialog boxes pop up and disappear – this is normal. Once the printer is fully installed you should get a message that the printer is ‘Ready for Use’

You now need to set this new printer as your default printer. To do this ensure that disk protection is off as outlined above in section 10.1 - “Basic Steps”.

Once in the Control Panel select Devices and Printers.

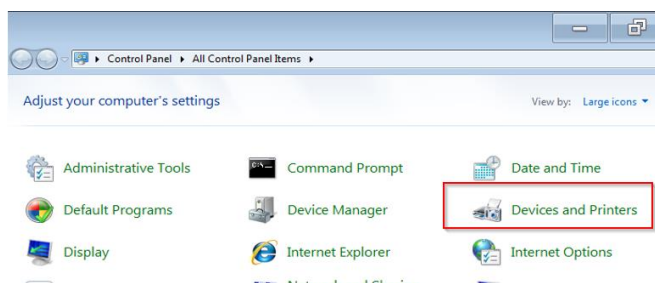
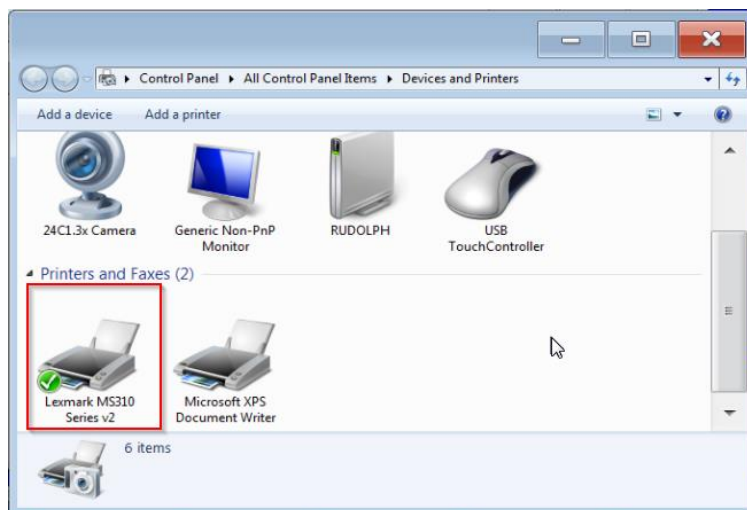


Figure 10-10 - Devices & Printers

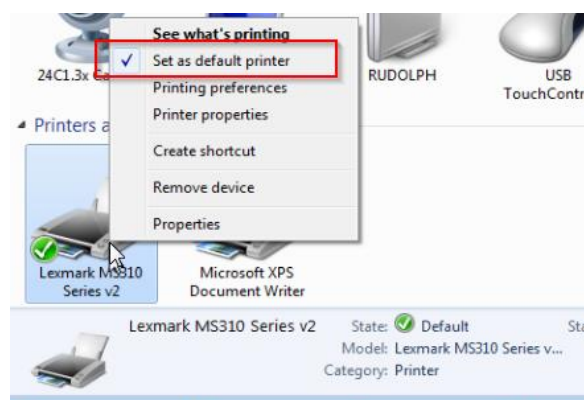
The AlcoTest® screen will display the current set of connected devices and printers. An example of this screen is below.



*Figure 10-11 - Connected devices and Printers*

If using the touch panel 'LONG Press' (press your finger on the icon and hold it there) or Right click if using a mouse on the printer you wish to set as the default printer.

The following dialog will appear.



*Figure 10-12 - Set default Printer*

Click or press “Set as Default Printer”. A check will appear next to the device and a green checkmark will also appear next to its picture on the Devices and Printers screen.

### **10.3 For a Local Printer which is not Plug-n-Play**

For some cases it will be necessary to load a printer’s driver. Normally this will only be required for older printers, or printers which are not connected directly to the AlcoTest® via the USB ports.

---

*You should load a driver on the AlcoTest® ONLY when absolutely required.*



*Some printers ship with printer management software, additional editing software and additional fonts. You do not need these or want these to use resources on your AlcoTest®. Most printer manufacturers have just the printer drives available for download on their web sites.*

*AS PREVIOUSLY NOTED: If you are not comfortable or familiar with the setup of Network Connections or Printer Drivers STOP and consult with your local IT personnel for assistance.*

---

#### **10.3.1 Loading a custom or older Printer Driver**

This process will generally require some expert knowledge about your specific printer. The printer driver is usually located on the manufacturer website or possibly with the software CDROM that shipped with the printer. This driver must be located and copied onto a USB thumb drive. Generally this process is done using another computer – not the AlcoTest® itself.

Once the proper printer driver is located and copied to the thumb drive follow the process below.

- 1) Load the printer's driver onto a USB thumb drive.
- 2) Follow the Basic Steps as outlined in section 10.1 above.
- 3) Plug the USB thumb drive device containing the printer drivers (such as a USB flash drive) into one of the AlcoTest®'s USB ports.
- 4) Connect the USB cable from the desired Printer to AlcoTest®. When the Found New Hardware wizard starts, select **No, not this time** and click **Next**. (See Figure 10-13)



Figure 10-13 - Found new Hardware wizard

- 5) Select Install from a list or specific location (Advanced) and click Next.

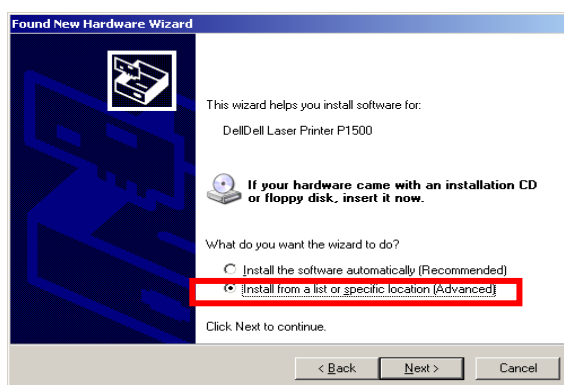
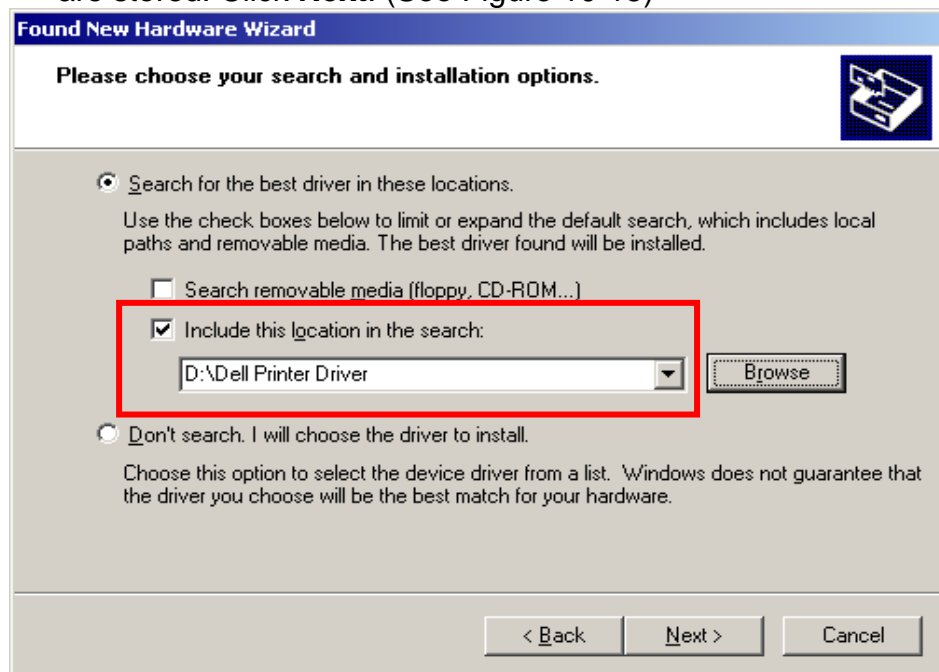


Figure 10-14 - Found New Hardware Wizard

- 6) Select **Search for the best driver in these locations**. Only select the **Include this location in the search**: check box and click **Browse** to navigate to the folder on the USB storage device where the printer drivers are stored. Click **Next**. (See Figure 10-15)



*Figure 10-15 - Search for Driver in Specific Locations*

- 7) If presented with a list of printers, select your specific model printer from the list, then select **Next**

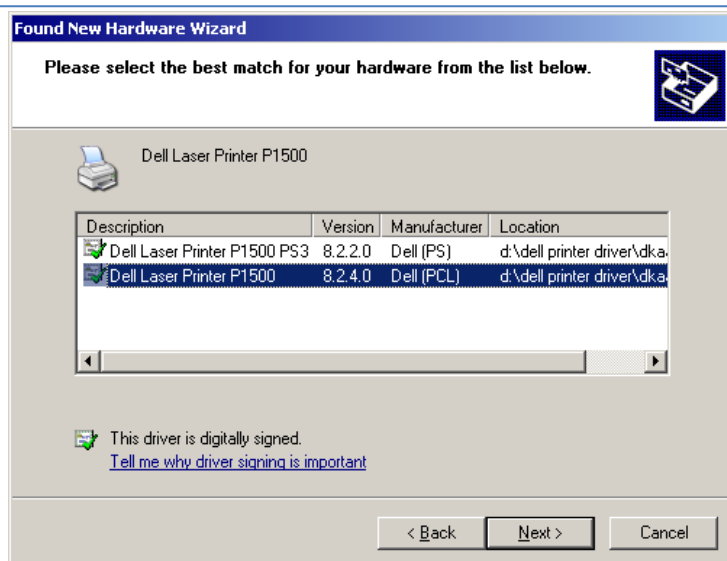


Figure 10-16 - New Hardware Wizard Printer List

- 8) Select Finish.
- 9) Double click the Devices and Printers Icon as shown in Figure 10.14 below.

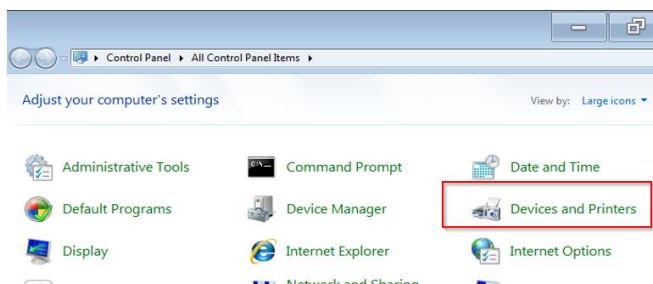
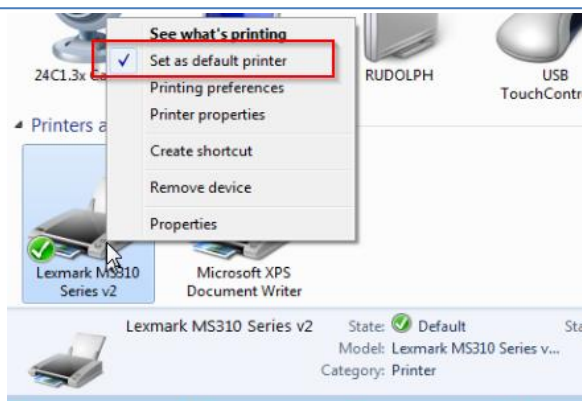


Figure 10-17 - Control Panel – Devices and Printers

- 10) Right click on the printer you just installed and select Set as Default from the menu.





*Figure 10-18 - Set default Printer*

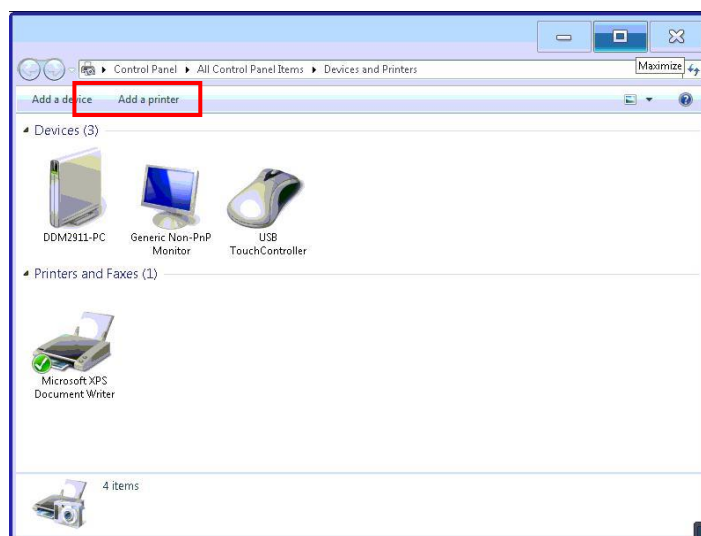
- 11) Close the Devices and Printers window by clicking the X in the top right hand corner of the windows. This will return you to the AlcoTest®'s Control Panel menu. Select **Turn Disk Protection On**. The system will display a message that the AlcoTest® will restart. Click **Yes** to continue.

After the system restarts, the AlcoTest® is ready to print to your printer.

## 10.4 Serial Printers

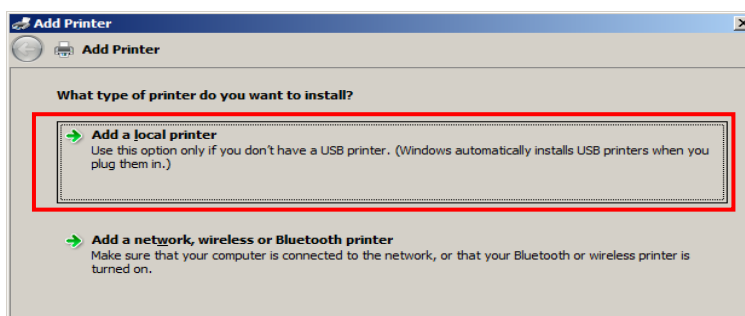
Most older serial printers are not plug and play. The instructions below show how to install the drivers required to use such a printer.

- 1) Follow the Basic Steps listed earlier to gain access to the Control Panel.
- 2) Once in the Control Panel select **Devices and Printers**.
- 3) Select **Add A Printer** at the top of the window as shown in the image below. (see Figure 10-19)



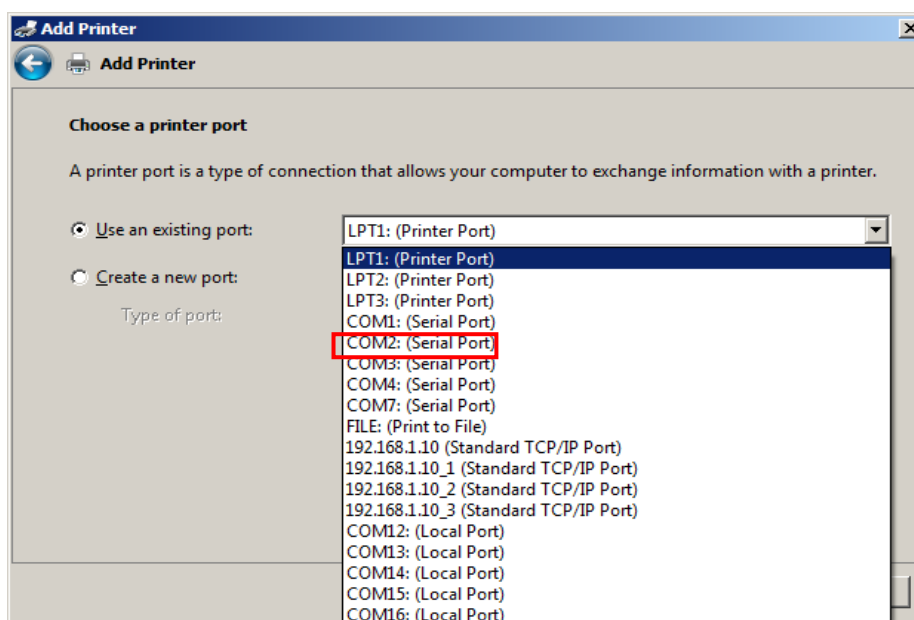
*Figure 10-19 - Select the Add a Printer option*

- 4) The Add Printer dialogue will start as shown below in Figure 10-20.



*Figure 10-20 - Add a non plug-n-play local printer*

- 5) Select “**Add a local printer**”. (Figure 10-20)
- 6) Click **Next** and select the port the printer is attached to on the back of the AlcoTest®. For the serial port on the back of the AlcoTest® select **COM2** for an older serial printer. (Figure 10-21) NOTE: This does not apply to local USB connected printers.



*Figure 10-21 - Add a serial printer – COM Port Selection*

- 7) Once the correct port is selected hit **Next**.
- 8) On the Add Printer dialogue box shown below (Figure 10-22) select the “**Have Disk**” option and point it to where you saved the printer drivers on your USB drive.

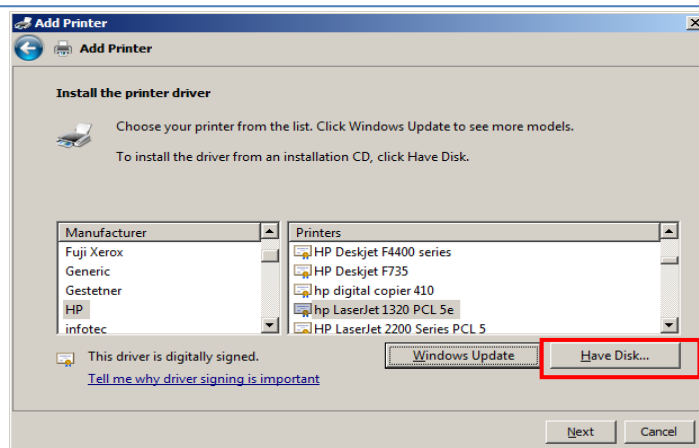


Figure 10-22 - Add Printer

- 9) Navigate to the USB storage device or network location where the drivers for the printer to be installed are located as shown in Figure 10-23.

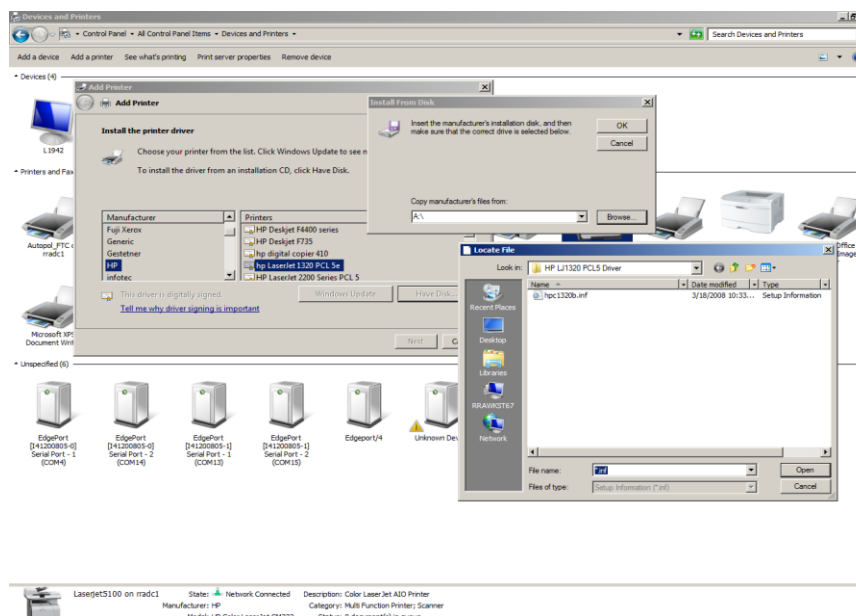
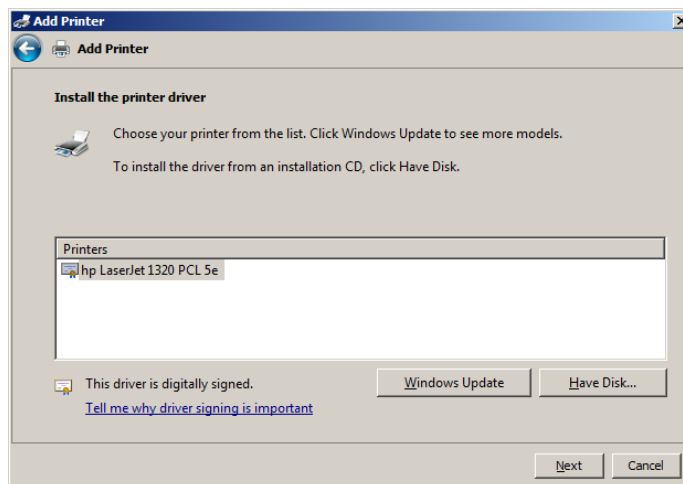


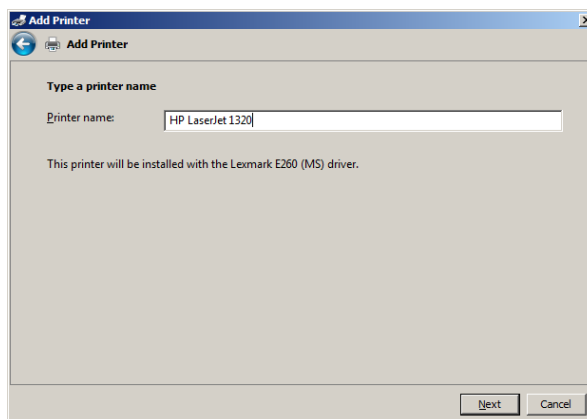
Figure 10-23 - Install custom Driver

10) Select your printer from the list and click **Next**.



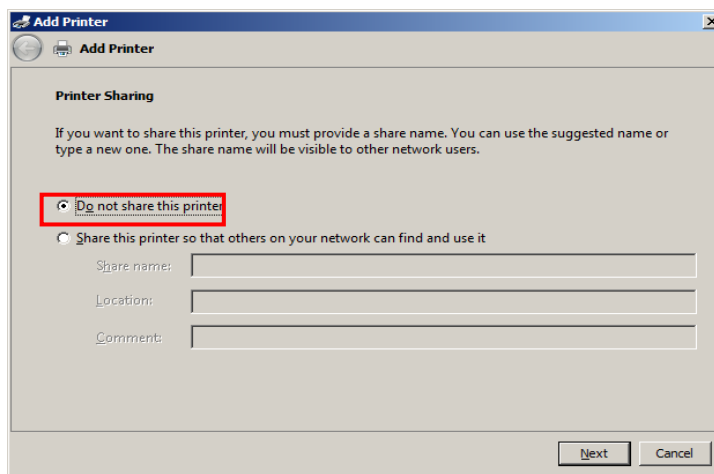
*Figure 10-24 - Install specific driver from location*

11) Enter the name you would like to call the printer. See Figure 10-25 below.



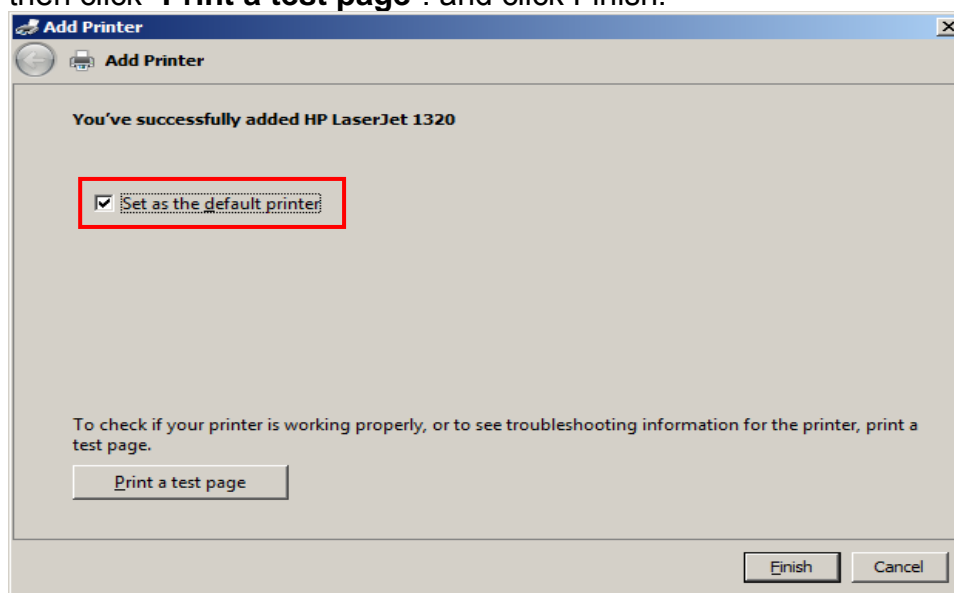
*Figure 10-25 - Name the new Printer*

12) You may see a window that asks if you would like to share the printer. Do not share the printer! and select **Next**. See Figure 10-26.



*Figure 10-26 -- Set for no Share*

- 13) Click **Next**. Check the dialogue box for “**Set as the default printer**” and then click “**Print a test page**”. and click Finish.



*Figure 10-27 - Print a Test Page*

Close the Devices and printers window by clicking the X in the top right hand corner of the window. This will return you to the AlcoTest®'s Control Panel menu. Select **Turn Disk Protection On**. The system will display a message that the AlcoTest® will restart. Click **Yes** to continue.

After the system restarts, the AlcoTest® is ready to print to your printer.

## 10.5 Print to a TCP/IP Printer Attached to a Network

By default AlcoTest® assumes that your network supports TCP/IP and is using DHCP (your server automatically assigns an IP (internet protocol) address to the AlcoTest® when you attach the AlcoTest® to your network via the Ethernet port. This is also sometimes called a CAT5 or CAT6 port. This port is located on the back of the instrument).



---

*If the above network conditions are not met or if you do not know if the AlcoTest® is properly configured on your local network STOP and consult with your local network administrator or IP department.*

---

To install a TCP/IP printer attached to a network follow the instructions below:

- 1) Connect the AlcoTest® to the TCP/IP network by connecting a patch cable to the ETHERNET Network port on the back of the AlcoTest®.
- 2) Connect the other end of this patch cable to an appropriate network port.

---

*If you do not know if a particular network port is correct or appropriate for connection to the AlcoTest® unit STOP and consult with your local network administrator or IT department.*

---



***IT IS NOT RECOMMENDED TO ATTEMPT TO CONNECT THE  
AlcoTest® TO A NETWORK PORT UNLESS IT IS PROPERLY  
CONFIGURED!***

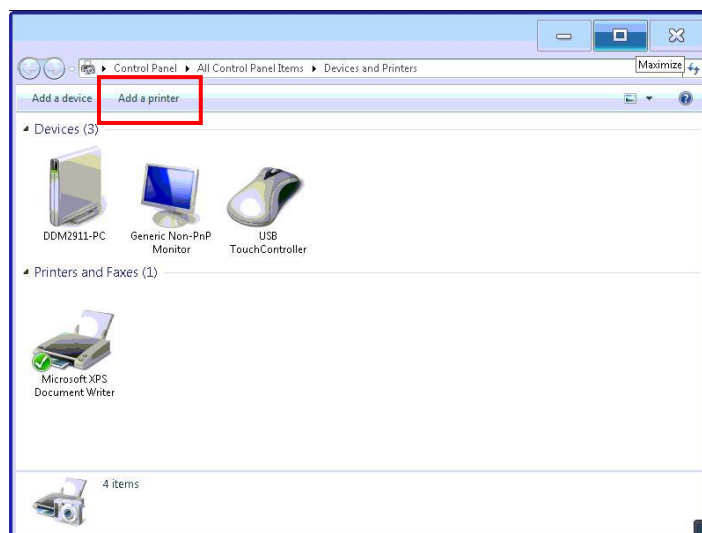
*Connecting to a misconfigured network port or a port that 'looks'  
like a network port but may be for example a local telephone port  
may cause damage to your network or to the AlcoTest® unit.*

*WHEN IN DOUBT – **STOP** – and consult the proper personnel  
within your organization.*

---

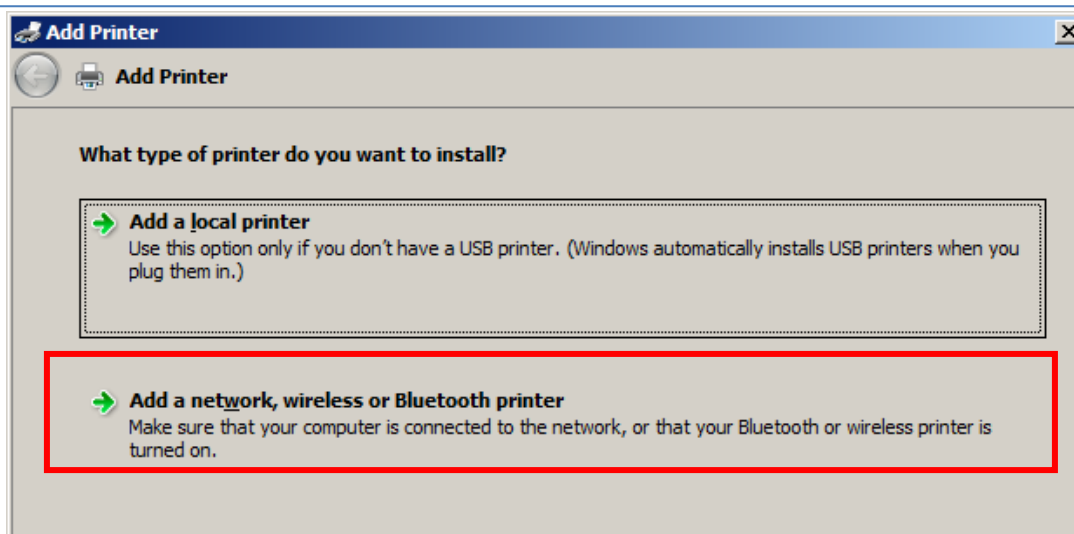


- 3) Follow the Basic Steps to reach the Control Panel.
- 4) Once you are in the Windows Control Panel select “Devices and Printers”.
- 5) Select **Add a printer** from the menu at the top of the window. (Figure 10-28 10.25) below



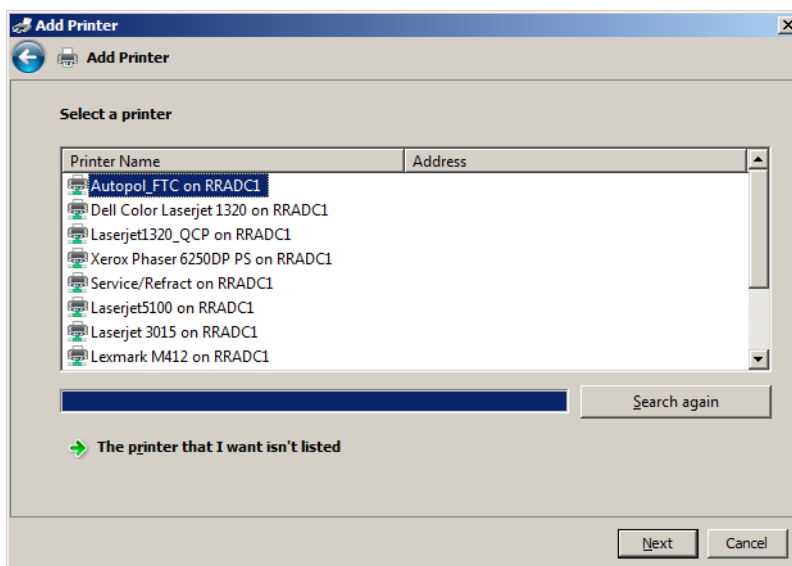
*Figure 10-28 - Adding a Network Attached printer*

- 6) When the add a printer dialogue box pop up select “**Add a network, wireless or Bluetooth printer**”. (Figure 10-29).



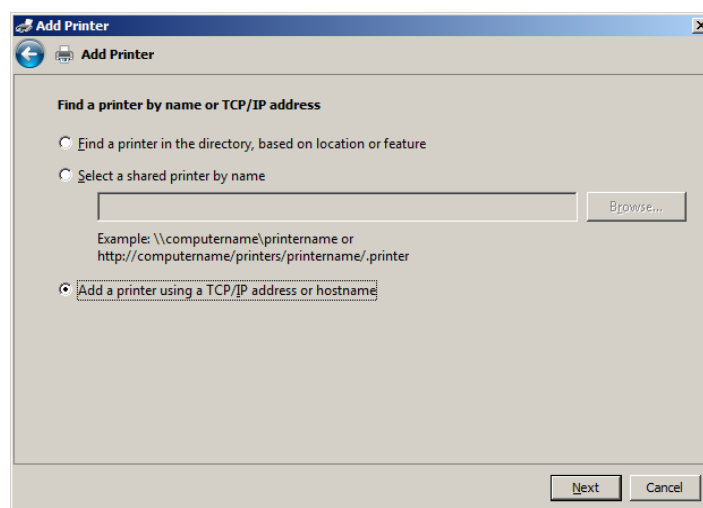
*Figure 10-29 - Adding a Network Printer*

- 7) If your network has printer discovery turned on a list of network printers will be displayed as shown in Figure 10-30 below.



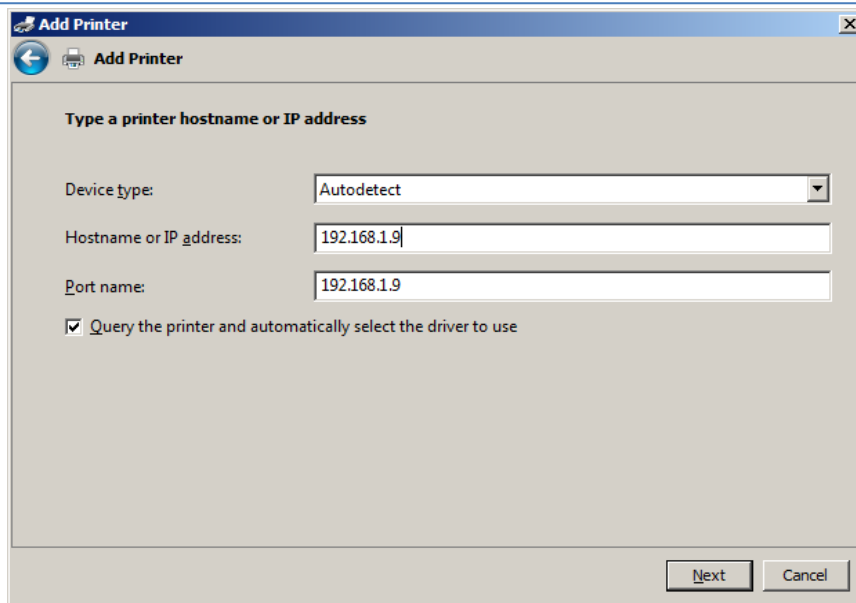
*Figure 10-30 - Select Printer Driver*

- 8) If the printer you want to add is shown in the list select it and click **next** and you can skip ahead to step 10. If the printer you want to add is not shown click **“The printer I want isn’t listed.”**
- 9) You will be presented with the “Find a printer by name or TCP/IP address” dialogue box with three options as shown below.



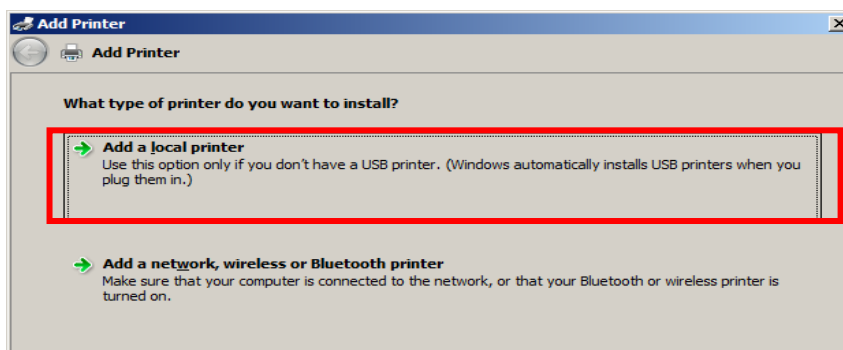
*Figure 10-31 - Add Printer by TCP/IP*

- 10) Select whichever option is applicable. If you know the printers IP address select **Add a printer using TCP/IP address or hostname** as this is the preferred method and hit next.
- 11) On the next window for Device Type: **choose Autodetect**. For Hostname or IP address enter the Hostname or IP address. For Port name should automatically fill in as you enter the IP address as shown below in Figure 10-32.
- 12) Make sure Query the printer and automatically select the driver to use is selected.



*Figure 10-32 - Network Printer Configuration*

13) Click Next and select add a Local Printer. See Figure 10-33below.



*Figure 10-33 - Local Printer – TCP/IP port*

14) Select **Create a new port:** Next to **Type of port:** select **Standard TCP/IP port** and click **Next** as shown in Figure 10-34.

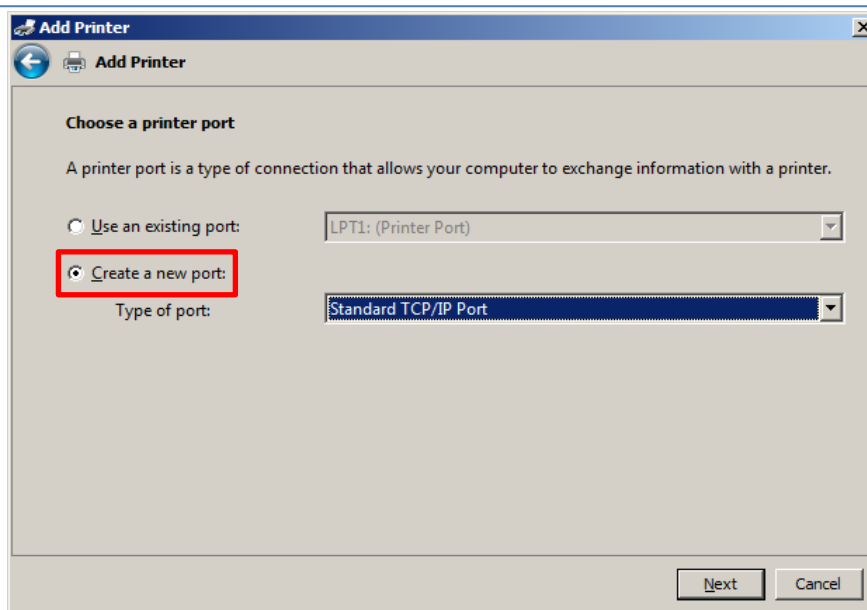
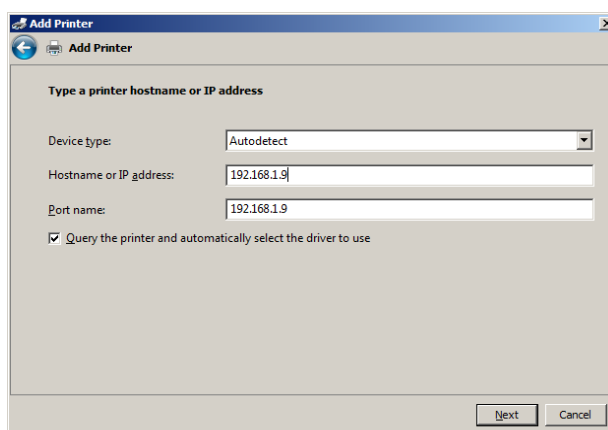


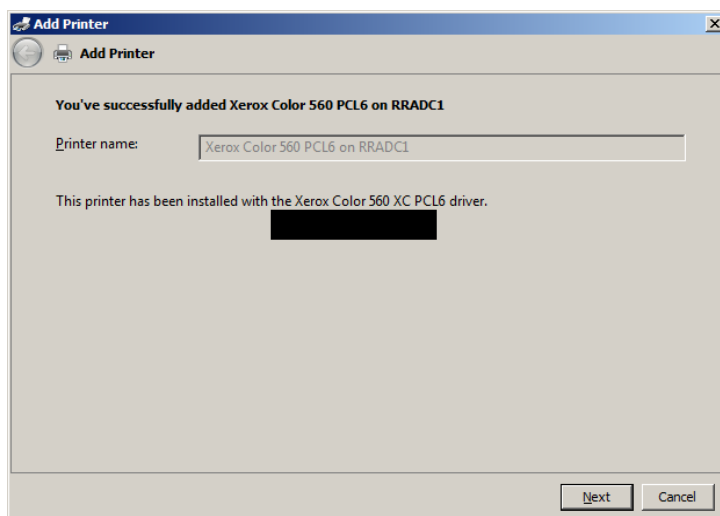
Figure 10-34 - Configure Local TCP/IP port settings

- 15) On the next window for Hostname or IP address enter the Hostname or IP address of the printer you want to add. Port name should automatically fill in as you enter the IP address as shown below in Figure 10-35. Make sure the **“Query the printer and automatically select the driver to use”** box is checked. Hit **next**.



*Figure 10-35 - Driver selection*

- 16) If Windows was able to automatically configure the printer you will see a screen similar to Figure 10-36 below and you can click Next.



*Figure 10-36 - Confirmation*

- 17) If windows was unable to automatically select the proper driver to use you will be presented with the same screen as shown in Figure 10-22 and you will need to click **"Have Disk"** and specify a location where you have the printer driver saved.
- 18) Once you have selected the proper driver or the computer has automatically installed the proper driver you will be presented with Figure 10-37 as shown below indicating a successful printer installation.
- 19) Make sure **"Set as the default printer"** is checked and click **"print a test page"** and then click **"Finish"**.

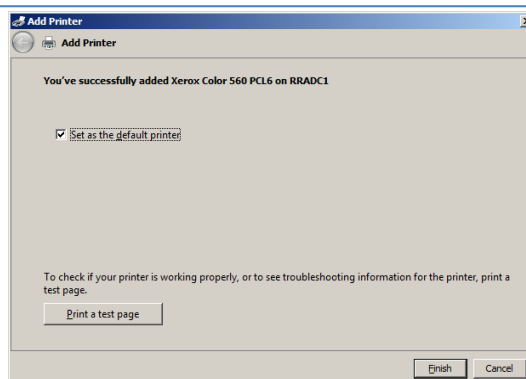


Figure 10-37 - Printing a Test Page

## 10.6 Access Network Drives

The instructions for accessing a network drive with the AlcoTest® assume the following:

- a. The network provides DHCP. It is possible to set a static IP, but the instructions assume the IP address is set dynamically. If you plug the AlcoTest® into your network via the Ethernet jack (labeled Network) on the back of the AlcoTest®, the instrument will use DHCP to ask for an automatically assigned IP address.
- b. The network drive is on a Windows based network.

---

*CAUTION: The AlcoTest® is not currently designed to join a Windows Domain. You can map to a network drive by just providing user credentials of someone who has security privileges to the network folder. There should be no reason to use the Windows Control Panel Network Connections feature.*



*Joining the AlcoTest® to a Windows Domain may have undesirable effects on both the AlcoTest® unit and the Network Operation itself. Before attempting to join an AlcoTest® unit to a Windows Domain **STOP** and consult with your network administrator or IT support department.*

---

To add a network drive:

- 1) Connect the AlcoTest® to the TCP/IP network by connecting a patch cable to the Ethernet Network port on the back of the AlcoTest®.
- 2) Connect the other end of the patch cable top an appropriate network port on your network.

---

*If you do not know if a particular network port is correct or appropriate for connection to the AlcoTest® unit **STOP** and consult with your local network administrator or IT department.*



***IT IS NOT RECOMMENDED TO ATTEMPT TO CONNECT THE AlcoTest® TO A NETWORK PORT UNLESS IT IS PROPERLY CONFIGURED!***

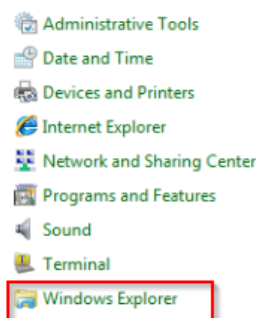
*Connecting to a misconfigured network port or a port that 'looks' like a network port but may be for example a local telephone port may cause damage to your network or to the AlcoTest® unit.*

*WHEN IN DOUBT – **STOP** – and consult the proper personnel within your organization.*

---

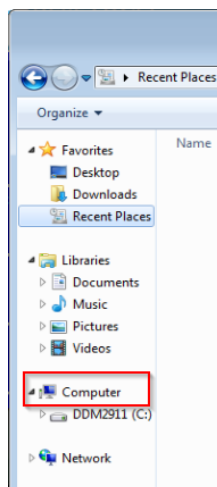
- 3) Follow the Basic Steps as given in section 10.1
- 4) Select **Control Panel** from the AlcoTest® Control menu
- 5) Once in the control panel select the Windows Explorer Icon as shown below.





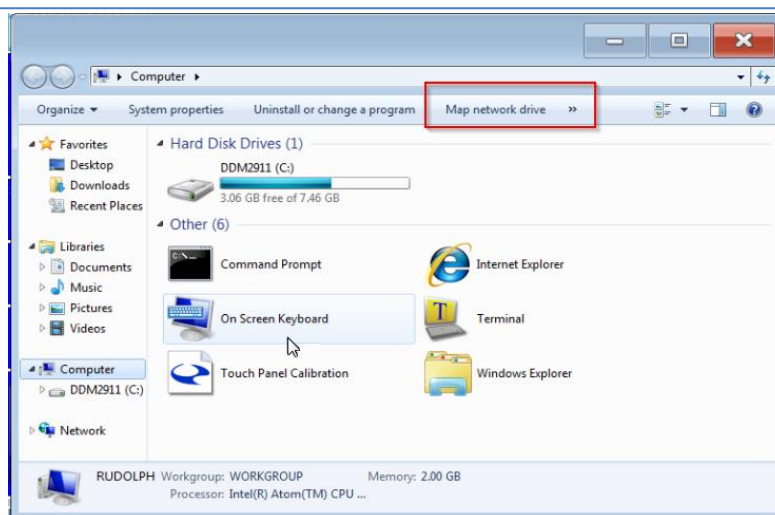
*Figure 10-38 - Open Windows Explorer*

- 6) Click the Computer Icon on the Left hand side of the screen.



*Figure 10-39 - Open Computer*

- 7) A screen similar to Figure 10.42 below should be displayed. Select Map Network Drive at the top of the screen.



*Figure 10-40 - Mapping the Network Drive*

- 8) Select the drive letter to assign to the network drive and enter the name of the network share. You may need to ask your Network Administrator for the network share name.

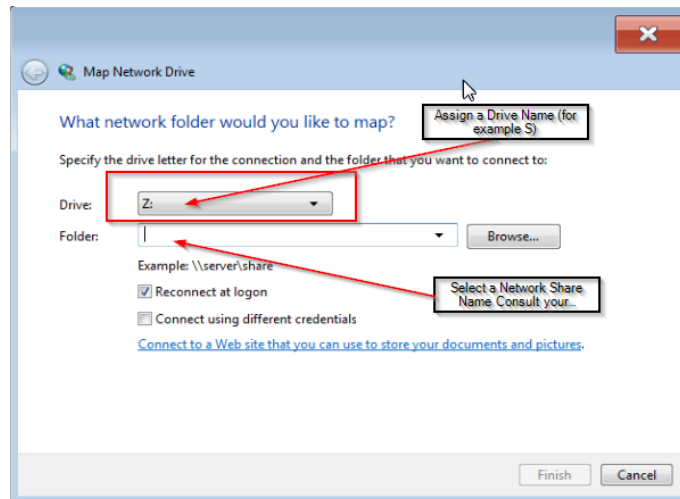


Figure 10-41 - Choosing the local drive designation

- 9) Click on **Connect using different credentials**. Enter the user name and password of someone who has permission to access the network share and click **OK**.

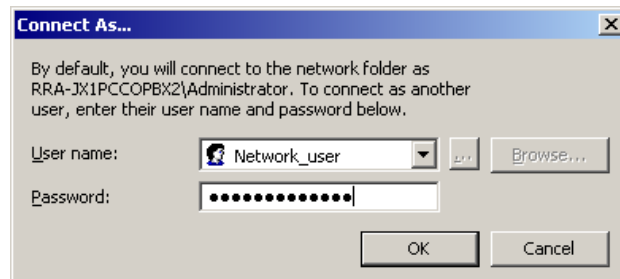


Figure 10-42 - Connecting using Username and Password

- 10) Click **Finish**.

- 11) Close the Control Panel window by clicking the X in the top right hand corner of the windows. This will return you to the AlcoTest® Control menu. Select **Turn Disk Protection On**. The system will display a message that the AlcoTest® will restart. Click Yes to continue.



---

*This information is intended for the IT support personnel. Under certain instances the AlcoTest® may not remember the User name and Password combination used to map to the network drive. This can be overcome by using the Windows NET USE command. Perform the following actions:*

---

- 1) Turn off the AlcoTest®'s Disk Protection (shown in steps 2 – 7).
- 2) Enter the Windows Embedded Control Panel (shown in steps 8 – 11).
- 3) In the Control Panel address bar enter C:\Windows\System32\cmd.exe to bring up the command window.
- 4) At the command prompt type:
  - NET USE y: [\\server\\_name\share\\_name](#) /savecred /persistent:yes
  - Where:
    - y: is the drive letter you want to map the share to.
    - server\_name is the name of the server the share resides on
    - share\_name is the name of the share you are mapping to
    - /savecred will save the user credentials to be used to access the network share. **NOTE:** Access the mapped drive while still in control panel. The system will prompt you for the user credentials. Enter the credentials this one time and the system will remember the user credentials.
    - /persistent:yes will make the mapping persist even with a system power down.

- 5) You will then be prompted to input the User Name and Password to be used to access the network share.
- 6) Turn disk protection back on and reboot the system.

After the system restarts, the AlcoTest® contains the mapping to the network share.

## 10.7 Importing/Exporting the Configuration Settings

### 10.7.1 Exporting the Configuration Settings

- 1) Enter the menu by pressing the **Menu** button. If required enter your password in the dialog. Select **Operational Parameters** from the menu

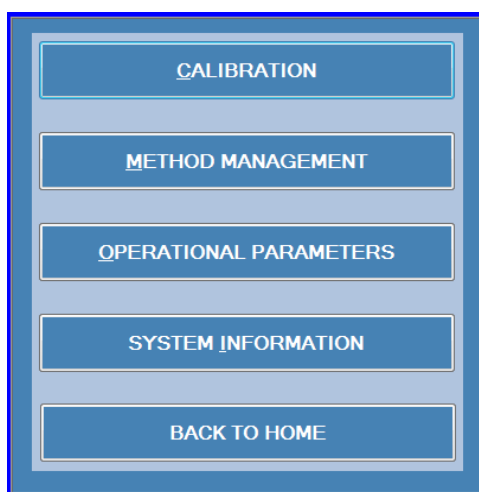


Figure 10-43 - Operational Parameters Menu

- 2) Select **Instrument Configuration** from the **Operational Parameters** menu.

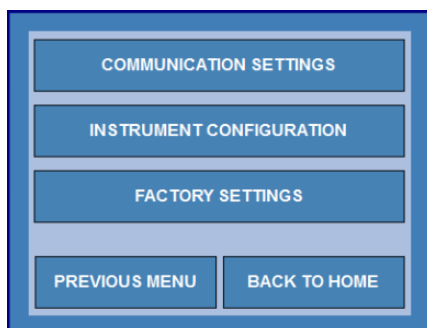
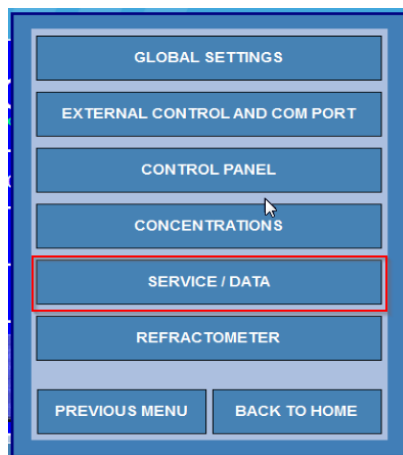


Figure 10-44 - Instrument Configuration

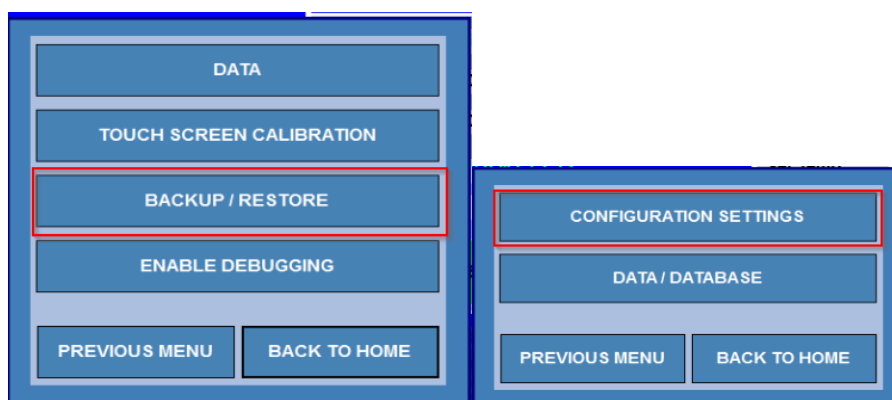


- 3) Select the **Service/Data** button from the Instrument Specific Menu



*Figure 10-45 - Service / Data*

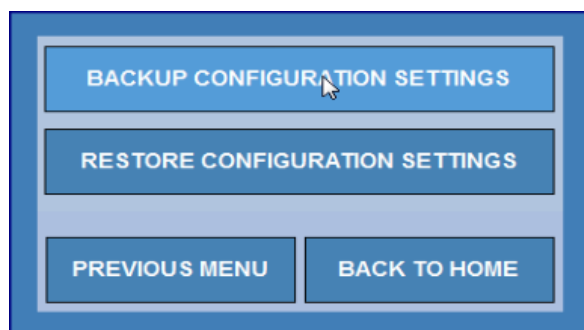
- 4) Select **Backup and Restore** from the Instrument Configuration menu.  
Then select **Configuration Settings**



*Figure 10-46 - Backup/Restore Configuration*

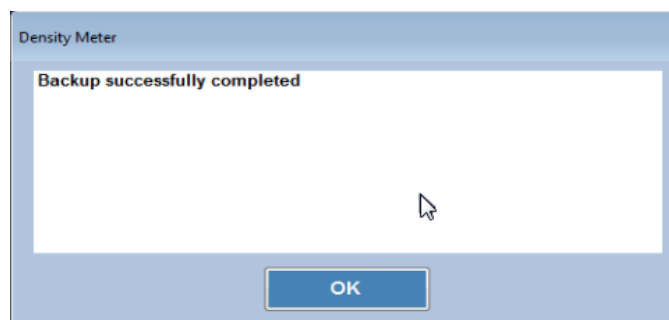


- 5) Select **Backup Configuration Settings** from the Configuration Settings menu.



*Figure 10-47 - Backup Configuration Menu*

- 6) When the Backup is complete the following screen will display.



*Figure 10-48 - Backup completed*

## 10.7.2 10.5.2 Restoring the Configuration Settings

- 1) Enter the menu by pressing the menu button (see Figure 10-47above).  
Navigate the menus to the **Menu > Operational Parameters > Instrument Configuration > Backup/Restore > Configuration Settings** menu.
- 2) Click the **Restore Configuration Settings** button.

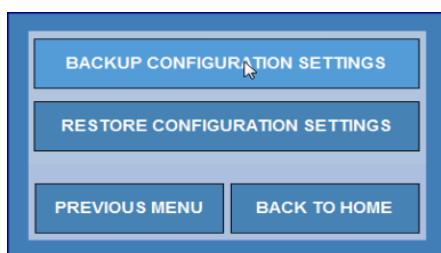


Figure 10-49 - Restore Configuration

- 3) The following dialog will open displaying all of the saved config files organized by Date and Time. Highlight the configuration you wish to restore and click the **RESTORE** button.

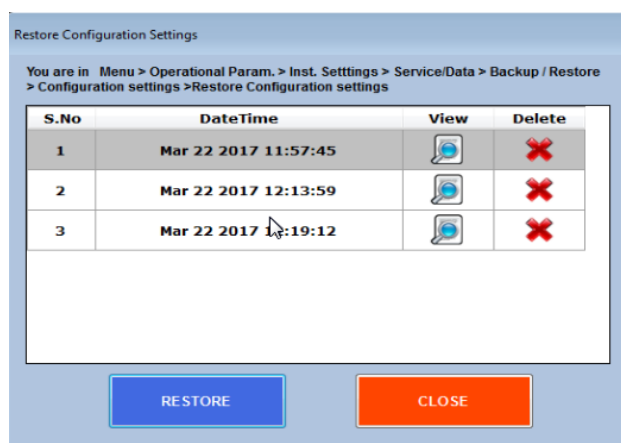



Figure 10-50 - Restore older configuration



- 4) Optionally you may view the stored configuration and verify that you wish to restore it prior to pressing **Restore**. To view a stored configuration click the  icon in the View column. The following dialog will display.

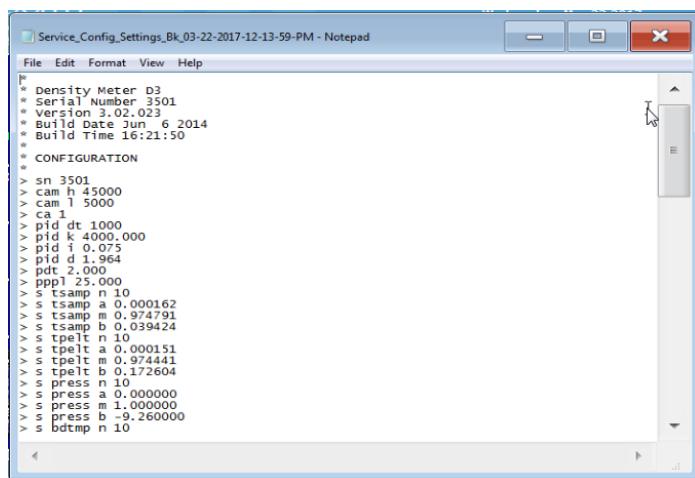


Figure 10.53 – Configuration file

Figure 10-51 - Configuration file

- 5) After the configuration settings have been restored you will see the screen shown in figure 10.54 below. Click the **OK** button. The restore is finished.

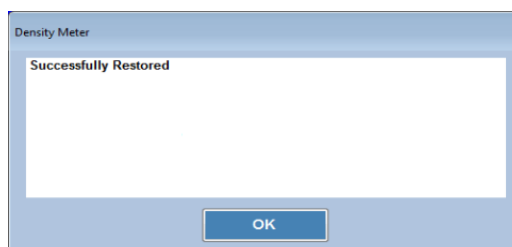


Figure 10-52 - Restoration success

## 10.8 Importing/Exporting the Database Settings

### 10.8.1 Exporting the Configuration Settings

- 7) Enter the menu by pressing the **Menu** button. If required enter your password in the dialog. Select **Operational Parameters** from the menu

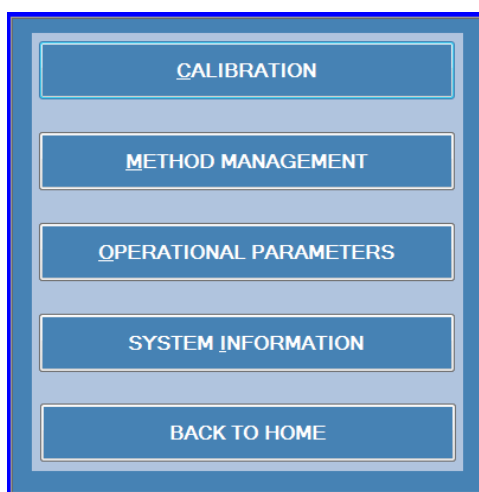


Figure 10-53 - Operational Parameters

- 8) Select **Instrument Configuration** from the **Operational Parameters** menu.

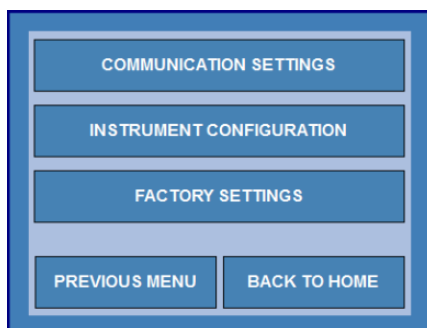
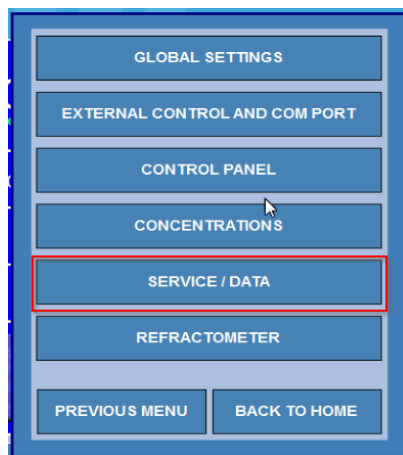


Figure 10-54 - Instrument Configuration

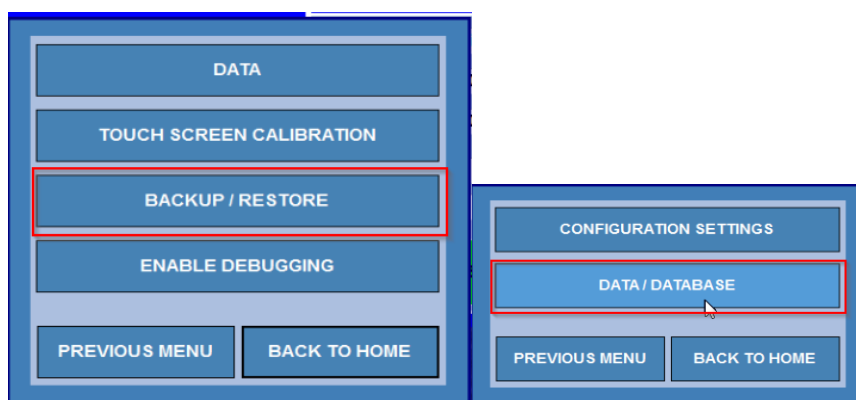


- 9) Select the **Service/Data** button from the Instrument Specific Menu



*Figure 10-55 - Service / Data*

- 10) Select **Backup and Restore** from the Instrument Configuration menu.  
Then select **Configuration Settings**



*Figure 10-56 - Data/Database Configuration Settings*

The following menu will be displayed.

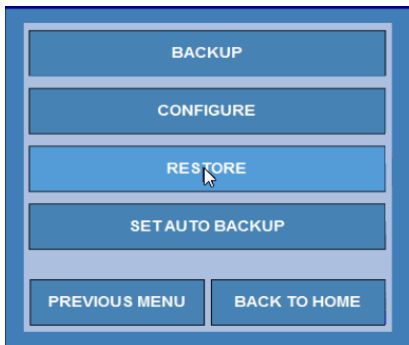


Figure 10-57 - Configuration Menu

From this point the user has the option to set the place where Database Backups will be saved as well as either Backup or Restore the Database. The Set Auto Backup button allows the user to configure a regular snapshot of the system database to be saved to the Backup folder.

Each option will be described in the following sections.

## 10.8.2 Configuring the Database Backup Folder

From the menu above click the **Configure** button. The following dialog will display.

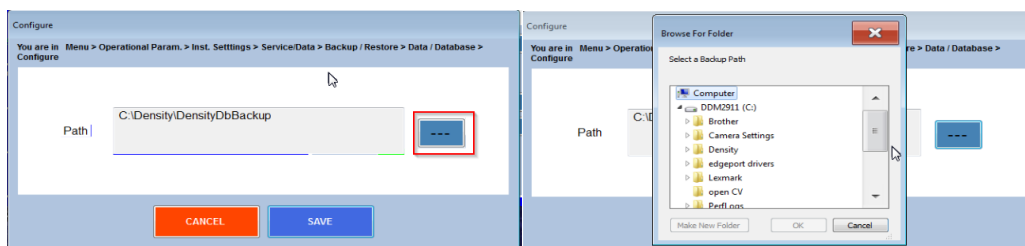


Figure 10-58 -Config Database Backup

The default database backup folder is shown. The user may chose a different folder using the browse button (highlighted in the red box). This allows the user

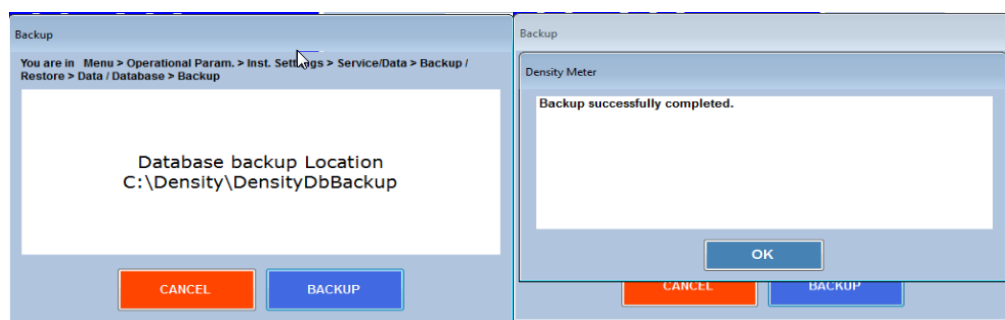


to pick a location on either a networked storage drive or a removable USB thumb drive. The Database can thereby be backed up in a location that is secure or protected as needed.

### 10.8.3 Backing up the Database

Once the user has configured the location for storing the database backup, or possibly using the default location, the **Backup** button may be pressed to perform the backup.

The following screen is displayed: The current location is shown and the user is given the option to **Backup** or **Cancel**.



*Figure 10-59 - Backing up the Database*

Pressing the Backup button shows the confirmation screen.

### 10.8.4 Setting up the Auto Backup Schedule for the Database

Optionally the user may desire to have a regular backup of the database performed on a schedule. To configure this option, press the **Set Auto Backup** button. The following menu is displayed.

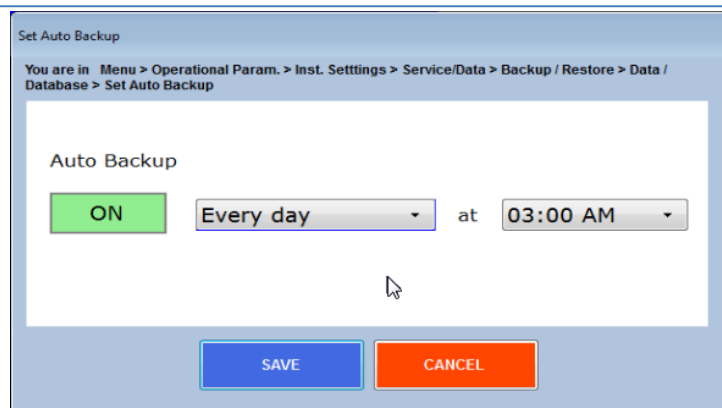


Figure 10-60 - Backup Settings configuration

The user can select the frequency of backups in the drop-down menus as well as the time of day that the backup is to run. The folder that the backup is stored to must be available, so the network drive or external drive must be connected to the unit in order to perform this type of unattended backup.

### 10.8.5 Restoring the Database

- 1) Enter the menu by pressing the menu button (see Figure 10-47above). Navigate the menus to the **Menu > Operational Parameters > Instrument Configuration > Backup/Restore > Database Settings** menu.
- 2) Click the **Restore** button.

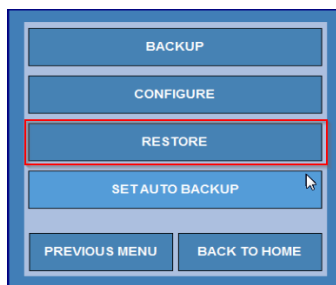
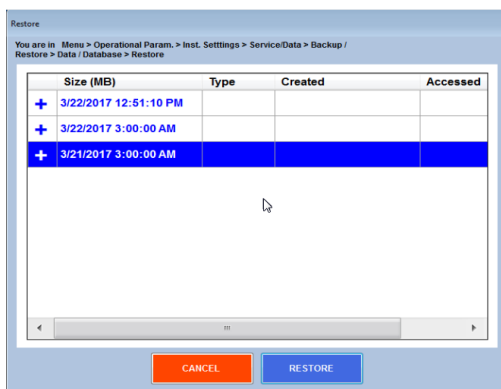


Figure 10-61 - Restoring a Database

- 3) The following dialog will open displaying all of the saved database files organized by Date and Time. Highlight the configuration you wish to restore and click the **RESTORE** button.



*Figure 10-62 - Restoring the Backed Up Database*

The following confirmation screen will display.

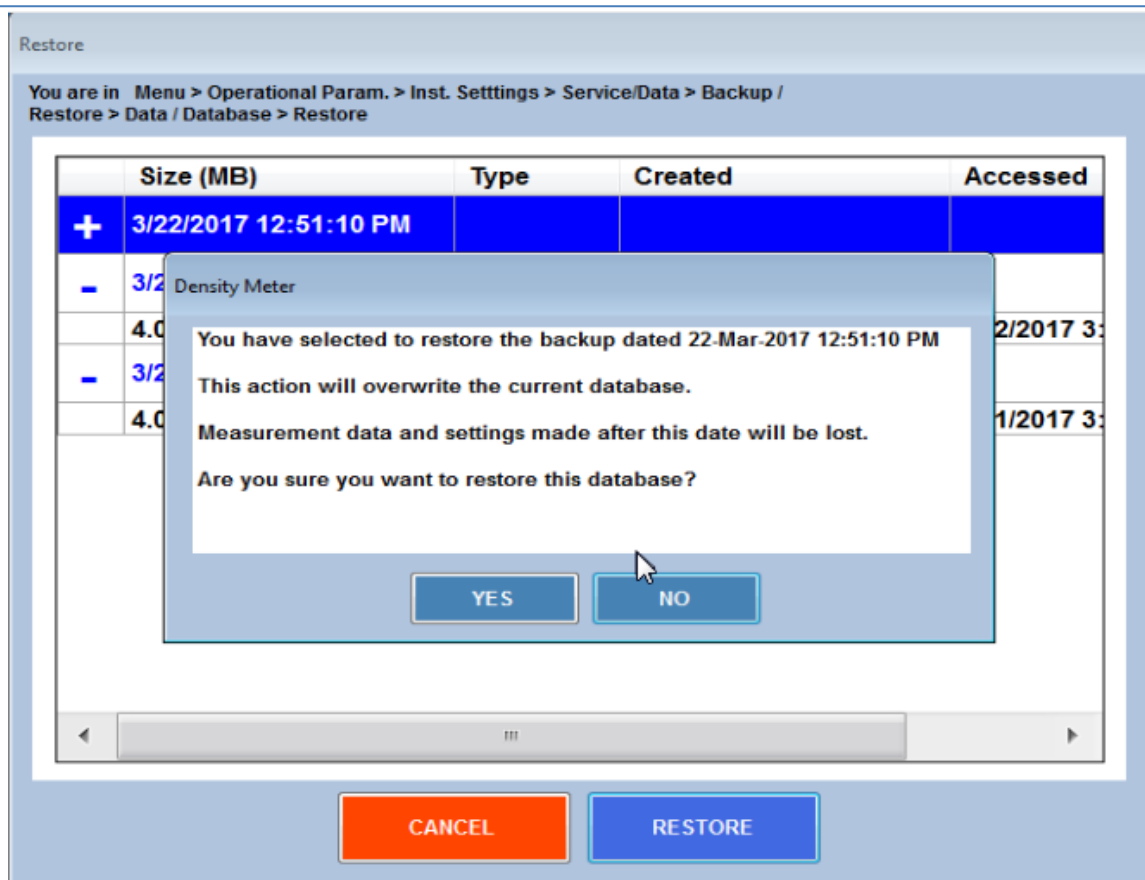


Figure 10-63 - Selecting the Database to Restore

Pressing **YES** will restore the selected database to the unit.



*NOTE: restoring a database will result in the LOSS of any measurement data that was performed since the last backup. Please consult RRA support personnel or your local instrument admin before restoring to an earlier copy of the unit database.*

## 11 Factory Testing – QC – Electronic Copy of Manual

A variety of menus and information is available on the AlcoTest® to assist with confirming proper documentation.

### 11.1 System Information

To learn the instrument's Serial Number, Software and Firmware Versions:

Select **Menu** from the Main Screen > Select **System Information**

A Window, similar to the following, will open providing all this information.

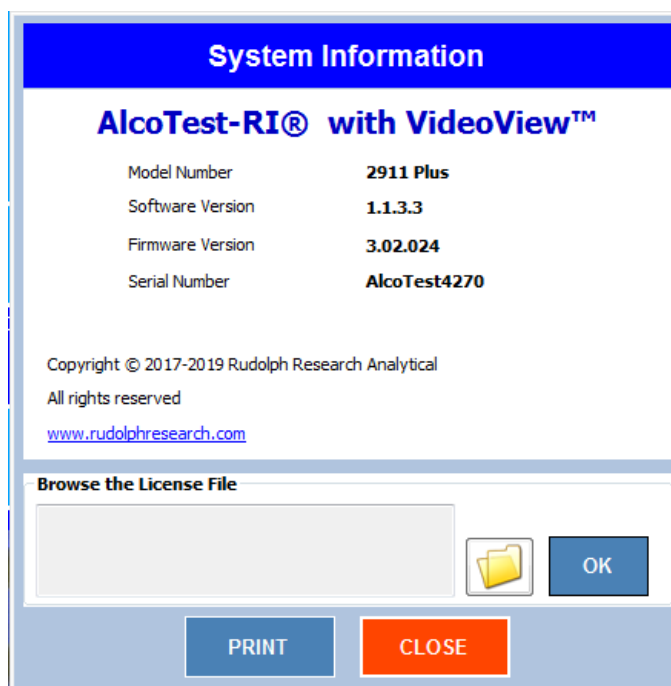


Figure 11-1 - System Information

## 11.2 QC Procedure at Factory IQ/OQ/PQ

From the Method Management option you can select “Factory QC Testing” method. You will get a window similar to Figure 11-2.

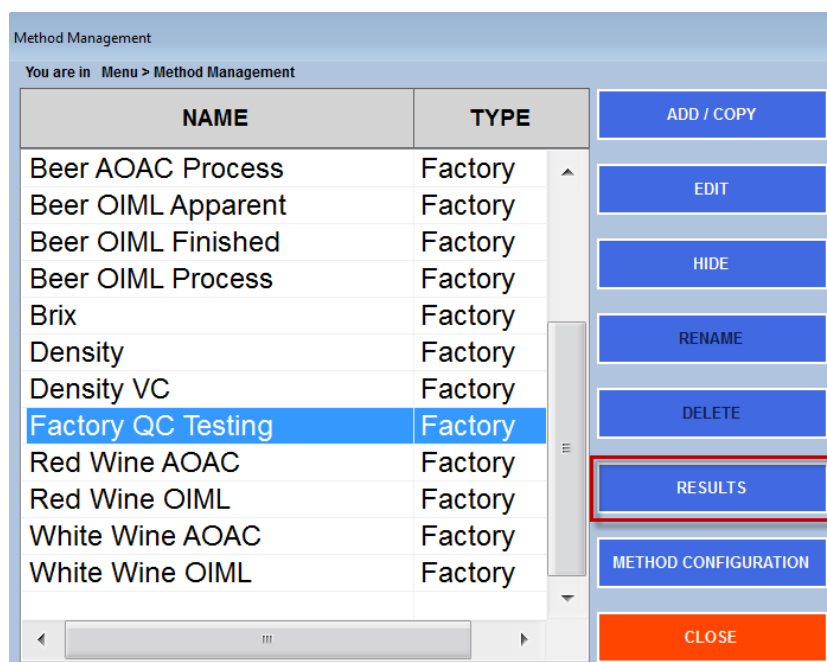


Figure 11-2 - Factory QC Results

Select “RESULTS” to view the Factory QC measurement results document. This is a Read Only Document and cannot be deleted or altered.

## 11.3 Electronic Copy of User’s Manual (HELP)

This Users’ Manual may be accessed with the **Help** button located in the upper right of the main screen.

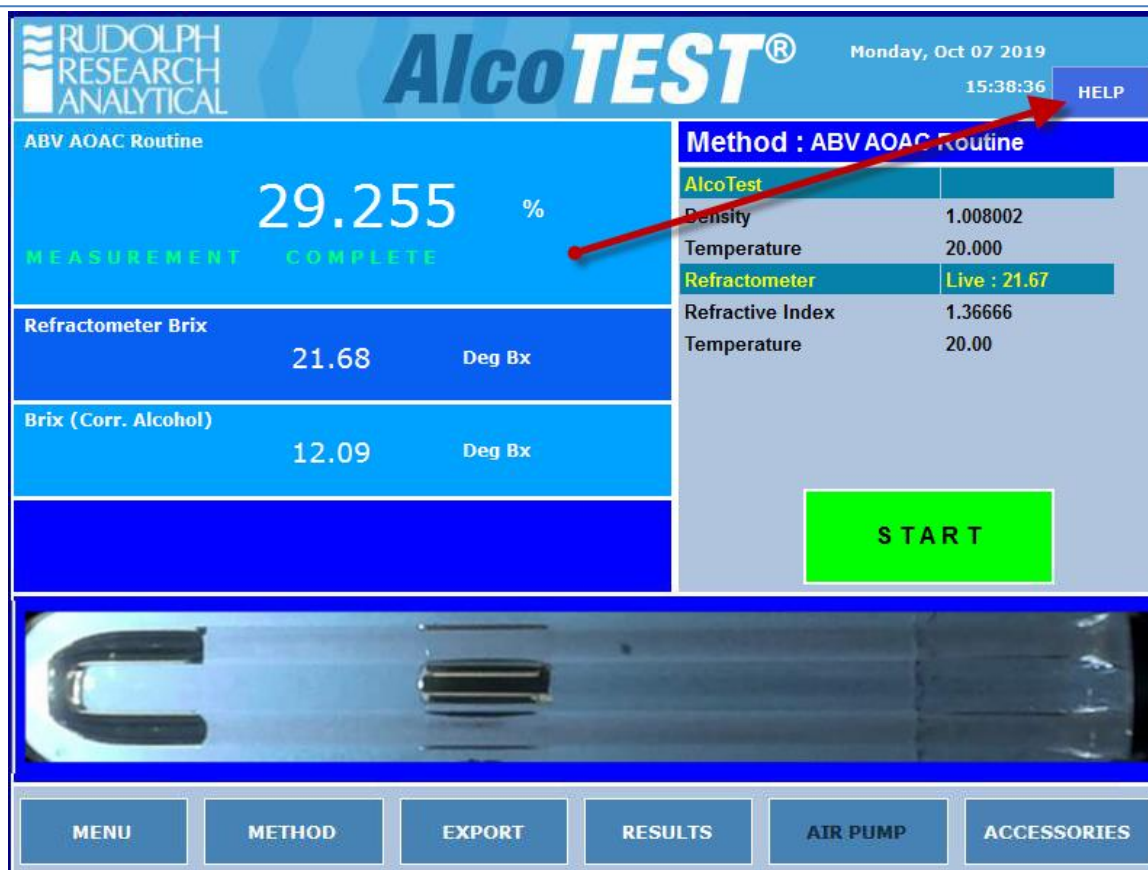


Figure 11-3 - Help Button

The following Window will open as shown in Figure 11-4.





*Figure 11-4 - Digital Copy of User Manual*

There is also access to a remote desktop sharing program; TeamViewer™. This software permits both training of operators as well as troubleshooting done at remote location.

AlcoTest® AlcoTest®



## 12 Understanding Density and Specific Gravity

### 12.1 Definitions

Density is the mass of a material divided by its volume. Some of the most commonly used units for density include: grams/cubic centimeter (g/cm<sup>3</sup>), grams/milliliter (g/ml), kilograms/cubic meter (kg/m<sup>3</sup>), and pounds /gallon (lbs/gal).

While a material's mass does not change as a function of temperature, its volume does. Therefore, a material's density is a function of temperature. It is necessary to always include temperature with any description of density.

Density is often shown in the literature as the Greek letter rho,  $\rho$ .

Specific Gravity, sometimes called Relative Density, is a dimensionless value that is the quotient of two density values. In its most basic form it may be expressed as:

$$SG^{t_1/t_2} = \frac{\text{Density of the material being measured at some temperature } t_1}{\text{Density of some reference material (usually water) at some temperature } t_2}$$

Temperature  $t_1$  does NOT have to be equal to temperature  $t_2$ , that is;  $t_1 \neq t_2$

For example:  $SG^{20^\circ\text{C}/4^\circ\text{C}}$ , or  $SG^{20^\circ\text{C}/60^\circ\text{F}}$  (See Chapter 6 page 31 for more details on  $t_1$  &  $t_2$ )

Therefore, it is best to always indicate the temperature in both the numerator and denominator when describing Specific Gravity.

Unfortunately, this is not always done. It is common to hear or read descriptions of SG at only one temperature. That is, the SG at 20 °C or SG at 60 °F. If this is all the information given, one can only assume that the temperature in the numerator and denominator are the same. But assume this with some caution.

When temperature  $t_1$  equals temperature  $t_2$  the SG of water is always 1.00000, at all temperatures. Let's look at the example below to understand why this is so.

The Density of pure water at 20 °C is 0.99820 g/cm<sup>3</sup> and the Density of pure water at 25 °C is 0.99704 g/cm<sup>3</sup>

If in the SG equation,  $t_1 = t_2$ , and if the reference material is water then,

At 20°C:

$$SG_{t_1}^{t_2} = SG_{20^\circ\text{C}}^{20^\circ\text{C}} = \frac{0.99820 \text{ g/cm}^3}{0.99820 \text{ g/cm}^3} = 1.0000$$

and,

At 25°C:

$$SG_{t_1}^{t_2} = SG_{25^\circ\text{C}}^{25^\circ\text{C}} = \frac{0.99704 \text{ g/cm}^3}{0.99704 \text{ g/cm}^3} = 1.0000$$

Note that the units of density cancel each other out; thereby leaving SG as a dimensionless unit of measure. Also, it should be apparent that whenever  $t_1=t_2$  that the SG of water will be 1.0000 at all temperatures.

#### Apparent Density and Apparent Specific Gravity

In the discussion above, we only considered “true” density and “true” specific gravity, which are measurements related to mass of the material. Apparent Density and Apparent Specific Gravity are functions not of mass, but of weight.

That is, Apparent Density is the weight of a material divided by its volume. And, Apparent Specific Gravity is the Apparent Density of a material divided by the Apparent Density of some reference material (again, usually water).

As in the discussion above, temperature must always be defined.

Mass is a constant independent of an object's position. Weight, however, is a function of gravitational force. Subsequently, one's mass is identical on the earth and the moon, but one's weight is completely different.

The difference between True Density and Apparent Density can be shown easily by looking at the densities of air.

We know that air is made up of mostly Nitrogen and Oxygen. Therefore air has mass and we would expect air to have a density value.

The true density of dry air at 20 °C at 1 atmosphere is 0.00120 g/cm<sup>3</sup>

But you cannot weigh air on a balance; the Apparent Density of air is 0.00000 g/cm<sup>3</sup>.

## **12.2 The Mechanical Oscillation Principle – A Brief Explanation**

In the most simplistic of terms, the glass VideoView™ (the sample cell) acts like a tuning fork. The tuning fork always yields a reproducible harmonic oscillation; that is, always giving off the same exact tone or note similar to a piano key, it always strikes the same string the same way and yields the same note each time. The tuning fork and the piano string are examples of objects vibrating at their natural or harmonic frequency. Imagine, however, that the tuning fork was hollow or was a capillary tube. It will again yield some reproducible frequency of oscillation or tone. But if we now fill that tube with water, the tone will become lower and the time required for a cycle of oscillation to happen is now longer. That is, the period (time) has now increased by adding mass to the inside of that hollow capillary tube. As it turns out, the period of oscillation is directly proportional to the increase in mass inside the vibrating oscillator.

The nature of the frequency or period depends upon the mass and subsequently the density of the materials filling the oscillator.

Through use of a piezo-electronic system, the hollow VideoView™ inside the Automatic AlcoTest® is caused to vibrate at its natural resonance frequency, much like the tuning fork example above. At a constant temperature, this harmonic frequency is a constant and a reproducible value.

The VideoView™ is then filled with the sample which is also controlled to the same constant temperature. The frequency of the VideoView™ will shift; the shift in this frequency is indirectly proportional to the mass of the sample inside the VideoView™. We now have a measurable frequency that indicates mass and we have a constant volume VideoView™, acting somewhat like a pycnometer. With mass and volume, we now have all that is required for a very accurate and reproducible density measurement.



## 13 Rudolph Automation

A variety of different automated systems are available to use with the AlcoTest®. Optionally additional mechanical pressure or vacuum for loading gassy samples such as beer or white wine is available. The system can automate single samples or as many as 240 samples. All systems are modular and can be upgraded at any time.

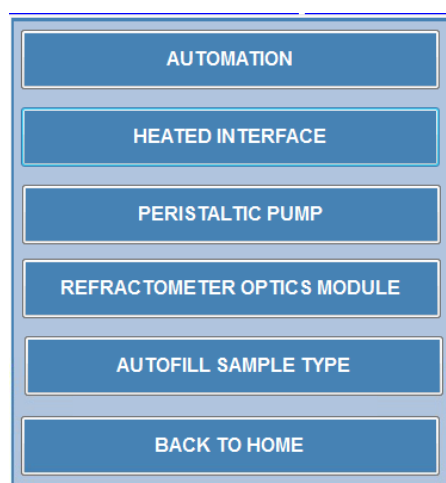
---

*Note: Both the AutoFlex and the ECS have their own Manuals which are supplied if automation is purchased*

---

### 13.1 Access to Optional Automation in the AlcoTest®

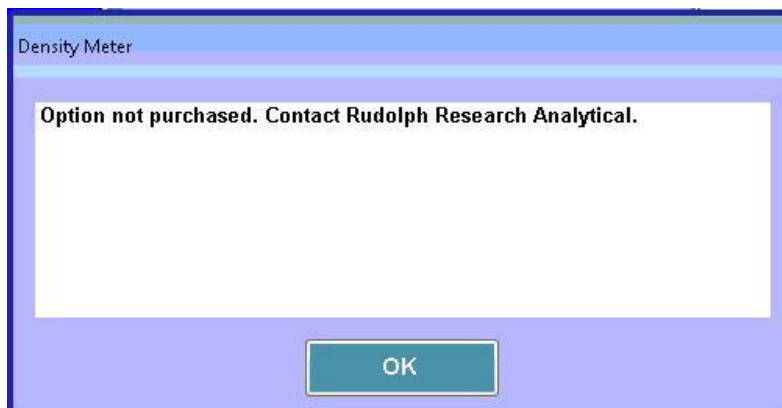
From the main screen on the AlcoTest® push the button at the bottom right, Accessories. The Accessories Menu with now opens as shown in Figure 13.1.



*Figure 13-1 - Accessories menu*

All Accessories are optional equipment and they do not come with the standard AlcoTest®. Each of these options requires special hardware and software. Please contact your sales representative for more information.

If these options have not been purchased the window as below will appear:



*Figure 13-2 - Automation not installed message*

## **13.2 Automation Options for the AlcoTest®**

All automation options are modular and can be purchased with the original instrument or may be upgraded at the customer's site at a later time. Each of these various automation options are fully covered separated in the Automation Manual. Photos of two of Rudolph's most popular Automation options are shown below in Figure 13.3 and 13.5. There are numerous other automation options and possibilities; for more information please contact your Rudolph Research Analytical Sales Representative.

### **13.2.1 The ECS Automation Option**

This option completely automates the measurement of a single sample. Rudolph's Easy Clean System – ECS – simplifies sample introduction, measurement and the subsequent cleaning using two different rinses solvent and drying. The entire cleaning and drying cycles are programmable adding flexibility to handle a variety of samples.





*Figure 13-3 - The ECS – Easy Clean System*

Sample volume required is only 3 to 4 ml. The sample may also be recovered for other testing or flushed directly to waste.

### 13.2.2 The Peristaltic Pump Option

If this option is available the AlcoTest® will look as shown in Figure 13.4 below.



*Figure 13-4 - Peristaltic Pump option*

The Peristaltic Pump option is completely Menu driven; pumping speeds, pumping times, pumping directions back and forth are available for easy and flexible use.

#### 13.2.3 Connecting the Peristaltic Pump:

Using the 1/8" ID by 3/16" OD Silicone tubing (P/N P23279) found in the No Charge Kit which comes with all AlcoTest® units, cut 2 pieces with lengths of 3" and 5". The 5" piece will connect to the left side of the sample cell and will be inserted into the sample. The 3" piece will connect to the right side of the Peri-Pump tubing and will go into the waste jar. The left side of the Peri-Pump tubing will connect to the right side of the sample cell. See pictures below.



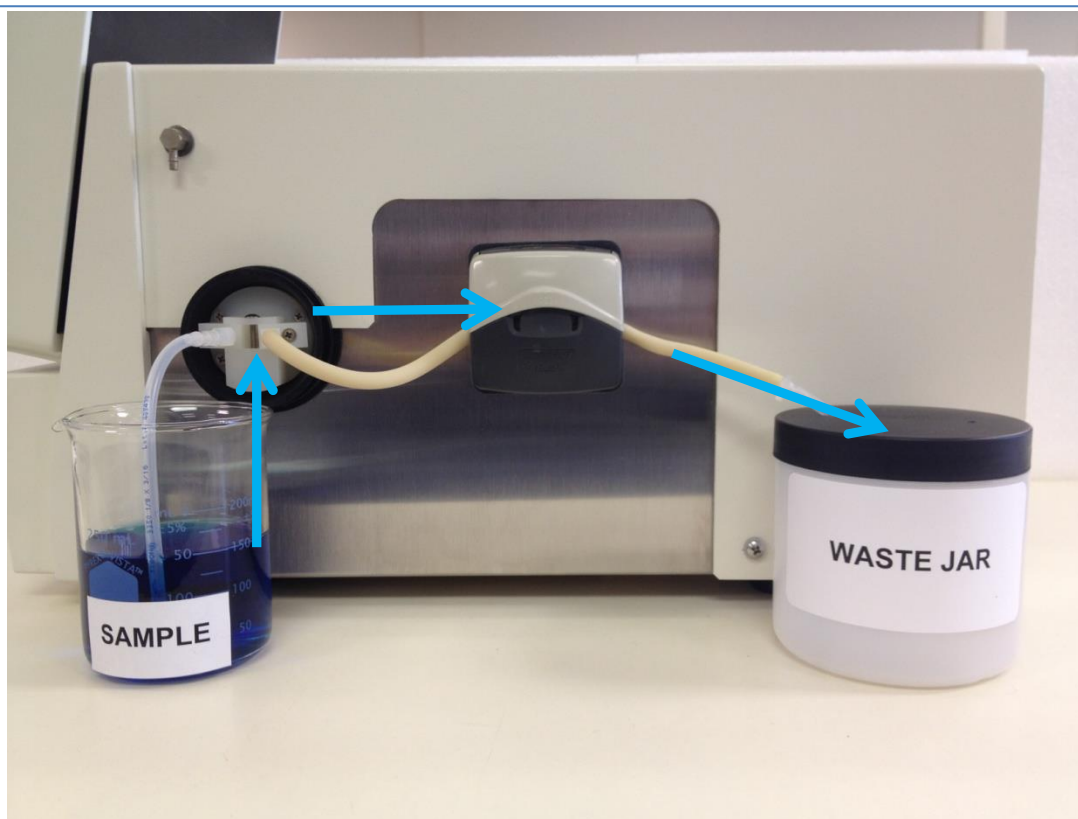
*Figure 13-5 - Peristaltic Pump Body Connections*



*Figure 13-6 - Flow of Sample into system via the Pump operation and thence to Waste Jar*

#### **13.2.4 Direction of Pump Flow:**

When in operation, the Peri-Pump will suck the sample from the sample container into the VideoView™ and out into the Waste Jar. See picture below.



*Figure 13-7 - Pump Flow Diagram*

### 13.2.5 Peristaltic Pump Settings:

Changing the Peri-Pump measurement settings is a simple process. Follow the steps below:

- From the main AlcoTest® screen press **Accessories**



Figure 13-8 - Accessing the Accessories Menu

- Press **Peristaltic Pump**

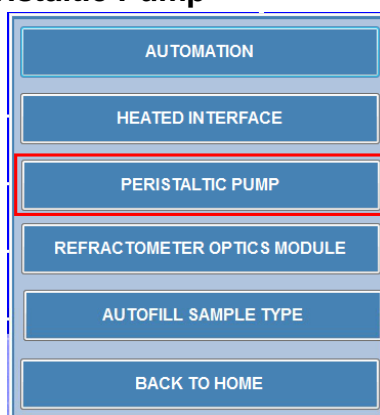


Figure 13-9 - Accessing the Peristaltic Pump Menu

The **Standard Fill Pump Settings** are used for most samples. In this mode of operation, the Peristaltic Pump will only pump sample in a forward direction. That is to say, sample will be pumped from the sample container into the inlet of the AlcoTest® out of its outlet and then through the peristaltic pump itself (which is therefore being operated in a vacuum mode) and then finally to the waste container.

The slower the pump operating speed the longer the filling time is. In general, you will want a slower filling speed as this will generate less bubbles in the sample as the Peri-Pump is running.

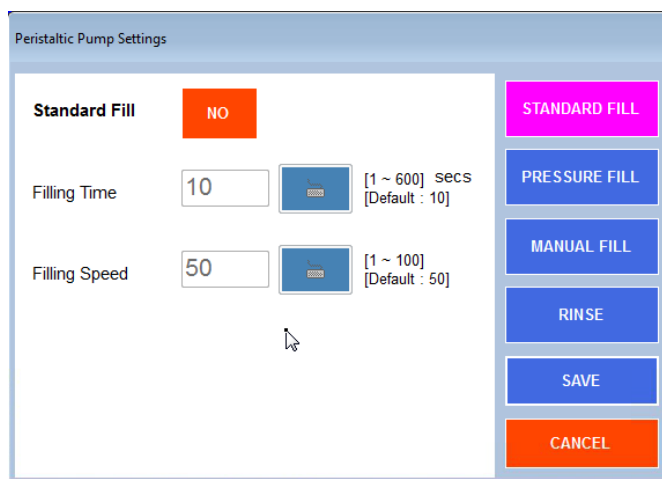


Figure 13-10 - Peristaltic Pump Settings – Standard Fill Mode

### 13.2.6 Performing a Measurement with the Peri-Pump

Once the Peri-Pump settings have been saved, using the system is simple.

1. Add the Sample to be measured into the funnel or place the PeriPump pickup tube into the sample receptacle.
2. Push the **Peri Pump** button on the AlcoTest®'s main screen. A new window will open as shown in the Figure below.

Note that this is default behavior but it also depends on the Peristaltic Pump settings. It is possible for a press on the Peri Pump button to start/stop the pump without appearance of the menu. It is also possible to configure the instrument so

that pressing the Start button both starts the pump and launches the measurement.

Select your desired method to Fill the sample; Standard Fill or Pressure Fill or Manual. Once selected, the fill window will disappear and the pump will begin pumping the sample as per your settings. When the pumping operation is complete, the AlcoTest® will begin making a measurement on that sample.

### 13.2.7 Pressure Fill

Some samples that the AlcoTest® is designed to measure, for example some types of white wines, may be prone to outgassing. The AlcoTest PeriPump can be used to provide a pressurized sample chamber to prevent outgassing and the incorrect measurement of density that this phenomenon can cause.

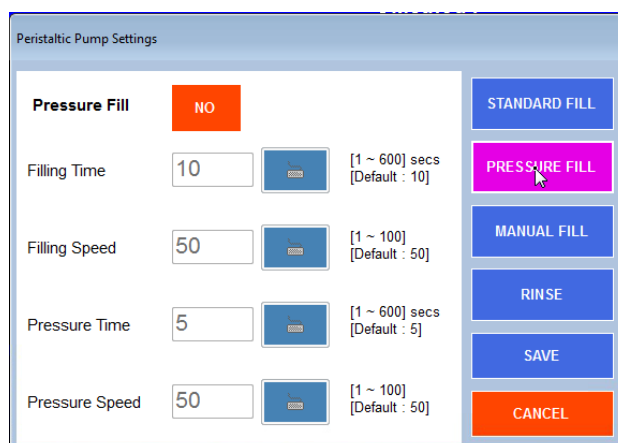


Figure 13-11 - Peri-Pump Pressure Fill Settings

To enable Pressure Fill – select the Pressure Fill Option and click the button to turn the Pressure Fill ON above.

Now when the PeriPump button is clicked the following menu will appear. As with Standard Fill, selecting the Pressure Fill menu item initiates the fill and then launches the measurement when the fill is complete.



*Figure 13-12 - PeriPump Pressure Fill Menu*

The Pressure Fill can be accomplished using these settings and the optional Pressure Clip kit the prevents the sample from flowing back into the funnel when it is under pressure.

If your application requires Pressure Fill please contact your Rudolph Sales Representative for assistance with setting up for this operation.

### **13.2.8 AutoFill® Option**

AutoFill® (AF) is the faster and easiest means of loading a sample and cleaning, drying after measurement is completed. Samples are poured directly into the AutoFill® sample well without any further handling. Just pour it in! AutoFill® is built-in, requiring no extra bench space. Safe, Easy, Fast.





*AlcoTest® AutoFill®*

*Figure 13-13 - AlcoTest® Main Screen with AutoFill®*



*AutoFill®*

*Figure 13-14 - Lift the AutoFill®'s Lid and Pour your Sample into Cup.*

Fill with approximately 3ml to line as shown below and then Close Lid



*AutoFill®*

*Figure 13-15 - AutoFill® Control Screen*

After Pouring your Sample into the Cup and Closing the Lid Open the AutoFill®'s Menu.

Press "Load" for the Sample to now be pushed by pressure into the VideoView™



*AutoFill®*

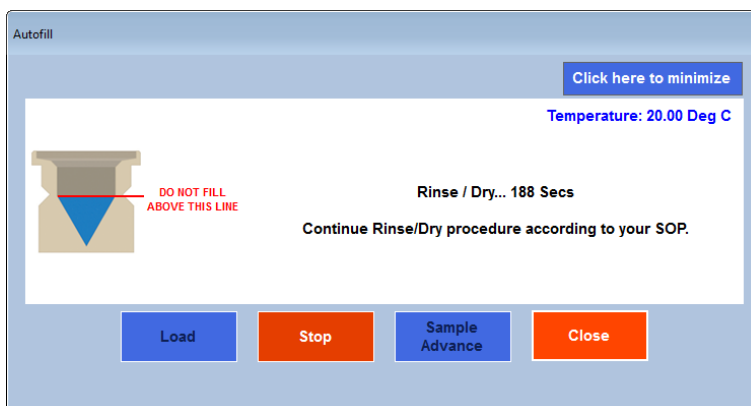
Figure 13-16 - AutoFill® Sample Loaded

Once the Light Gate detects that the sample is properly loaded into the VideoView™ the Menu will change from “Load” to “Start”.

Pressing Start will begin the Measurement and also Close the AutoFill®’s Menu



Figure 13-17 - Measurement is Completed



AutoFill®

*Figure 13-18 - AutoFill® Rinse/Dry Cycle*

Open the AutoFill®'s Menu once again and Select Rinse/Dry. This will push the sample out and through the VideoView™ into the Waste Container

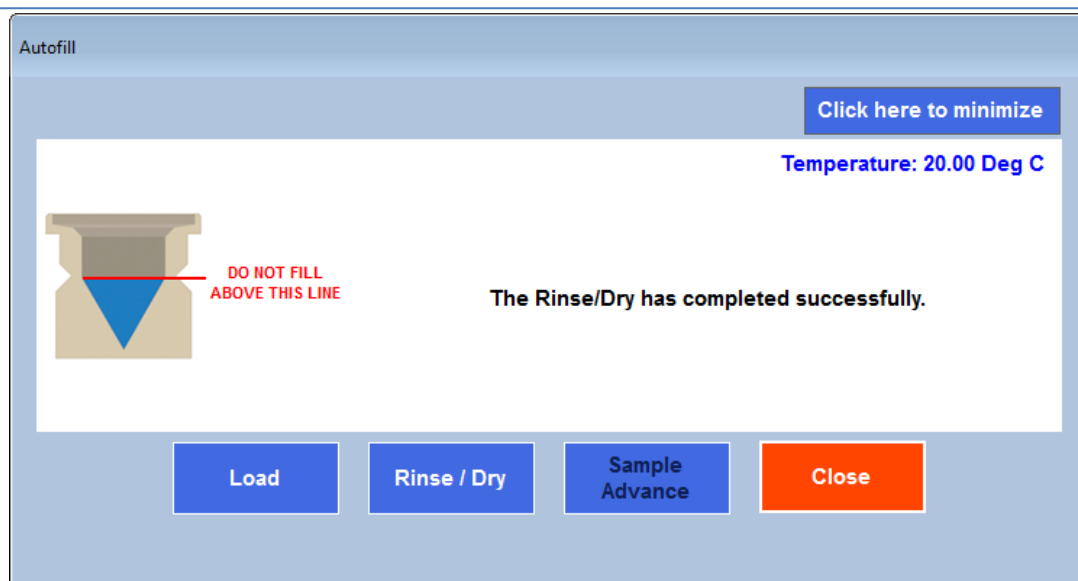


*AutoFill®*

*Figure 13-19 - Adding Solvent/Rinse Fluid to the AutoFill® Cup*

Open the Lid and use the Proper Solvent(s) for your Sample Type.

Close the Lid and the Rinse/Dry cycle will begin again.



*AutoFill®*

*Figure 13-20 - AutoFill® Cycle Complete*

The measurement and the Subsequent Cleaning and Drying is now complete and ready for the next sample

### 13.2.9 Full Automation with various Lab Instruments in Tandem

Rudolph's Automation Systems have unmatched flexibility and functionality.

- Sample containers may often be the exact same sample bottle which your laboratory uses; 1 oz. or ½ oz. Boston Rounds, different size test tubes or straight shoulder bottles, etc.
- SmartSample™ Loading technology automatically adjustment the pump speed for both low and high viscosity samples.
- Samples may be loaded using either vacuum or pressure. All parameters of the measurement and cleaning/drying cycles are programmable.
- Easy bar code scanning possible without worry of the labels location.



*Figure 13-21 – AutoFlex® Auto-sampler with J Series Automatic Refractometer and Automatic Polarimeter in tandem with AlcoTest®*

### **13.3 Connections from AlcoTest® to Automation and/or other Instruments**

The Automation/Manual feed kit for AlcoTest® Assembly PN: A22792 as shown below is just one method of making secure and quick connections between the AlcoTest® and other instruments.



*Figure 13-22 - Automation Feed Kit Parts Illustration*

#### **Parts Required**

1. PN: P22386 - Fitting, Female Luer, ¼-28 male, stainless steel
2. PN: A22727 - Quick Connect, Modified, Luer Lock, ¼-28 female, peek
3. Thread seal, Teflon tape





*Figure 13-23 - Automation Interface*

#### Upgrading a system

1. Disconnect the fittings from the
2. Install the 2 stainless fittings in the
3. Install the 2 black and red fittings to the tubing lines
4. Connect the twist lock fittings to the stainless fittings

#### Switching from automation to manual feed

1. Close the Rudolph Automation GUI.
2. Disconnect the black and red fittings from the stainless fittings. Make sure the stainless fittings stay connected to the .
3. Use a syringe to feed the sample and solvents to the .
4. Use the built-in air pump to dry the VideoView™ .



## **14 Operator Safety and Proper Equipment Operation**

The AlcoTest® line of laboratory grade AlcoTest®'s have been designed with full safety of the operator in mind. The units are UL and CE approved for use in a laboratory or office environment. There are important considerations when using any type of laboratory equipment that should be observed so as to prevent the operator from accidental injury. In this section the proper precautions and recommended safety equipment will be outlined.

### **14.1 OSHA Standards**

Rudolph Research recommends that customers conform their safety and operational standards and practices to the best practices recommended by OSHA and/or similar government safety bodies. The relevant standard falls under the OSHA 3404-11R 2011 document.

Rudolph Research recommends that operators of our equipment and similar types of laboratory equipment familiarize themselves with this standard. The standard is freely available from the OSHA website:

<https://www.osha.gov/Publications/laboratory/OSHA3404laboratory-safety-guidance.pdf>

### **14.2 Chemicals & Test Liquids**

The AlcoTest® series of laboratory AlcoTest® equipment have been designed to accommodate a wide range of both polar and non-polar types of liquid solvents and test liquids. It is well known that certain types of liquids present workplace hazards, both to exposed skin, eyes and mucous membranes.

It is assumed that best practices are in place to guard against noxious exposure to these types of liquids. For a list of chemicals and test liquids that require special caution when in use with the Rudolph Research AlcoTest® equipment please see table F.1 below. This is not intended to be an exhaustive list.

CHEMICAL	COMMENTS
<b>SODIUM HYDROXIDE</b> <b>NAOH</b>	Strong caustics especially at higher temperatures can etch the glass of the VideoView™. When making measurements of Sodium Hydroxide it is recommended not to do so above 20°C and not to remain inside the glass VideoView™ for any extended period of time. Rinse immediately after measurement is completed.
<b>HYDROFLOURIC</b> <b>ACID - HF</b>	Not to be used at all as HF etches glass very quickly!
<b>SULFURIC ACID</b> <b>H<sub>2</sub>SO<sub>4</sub></b>	The silicone waste hose is not compatible with sulfuric acid. Use Viton tubing instead. Also, be cautious concerning the exothermic reaction between the acid and a water rinse.

*Figure 14-1 - Table F.1*

If you have any questions as to the proper use of any solvent or test liquid in conjunction with either cleaning or testing with Rudolph Research AlcoTest® equipment, please contact the factory directly.

Rudolph Research Analytical  
55 Newburgh Road  
Hackettstown, NJ 07876 USA  
Web Site: [www.rudolphresearch.com](http://www.rudolphresearch.com)

Phone: 973 584 1558  
Fax: 973 584 5440  
E-Mail: [info@rudolphresearch.com](mailto:info@rudolphresearch.com)

### **14.3 Eye protection**

Rudolph Research recommends that all operators wear proper protective eye gear when using or cleaning the AlcoTest® series of AlcoTest® equipment. All eye protection devices should meet or exceed ANSI Standard Z87.1 – available from ANSI here:

<http://webstore.ansi.org/Cart.aspx?Action=AddProduct&Catalog=ESSCatalog&ProductID=ANSI%2fISEA+Z87.1-2015>

### **14.4 Electrical Protection**

Rudolph Research equipment is designed to accept a wide range of mains power. The units will work with AC power from 100VAC to 240VAC. Operators should be cautious when installing or moving the equipment and always make use of the cord provided with the equipment to connect it to a properly grounded and electrically safe mains power connection.

It is not required but it is desirable that the equipment be connected to the mains via a GFCI (Ground Fault Circuit Interruption) type system. GFCI outlets are recommended in any environment where the operator or the equipment is exposed to ambient moisture as a part of normal operation.

Care should be exercised when connecting or reconnecting the unit to the mains or when shutting the power to the unit on or off.

The AlcoTest® system is UL tested and approved for electrical safety under normal operation.

### **14.5 Skin/Hand and Personal Protection**

Operators should use appropriate skin, hand and personal protection, as per the relevant OSHA standards for the liquids, solvents and test materials being used. Certain types of solvents may be absorbed through unprotected skin or cause chemical burns or damage.

Appropriate protective gear and clothing that meets or exceeds OSHA standard 3151-12R 2004 should be employed when making use of the AlcoTest® system. The OSHA standard can be downloaded here:

<https://www.osha.gov/Publications/osh3151.pdf>

## **14.6 Static Electrical Discharge**

The AlcoTest® system is designed to accept normal levels of ESD (Electro-Static Discharge) without affecting operation. Users are not required to use anti-static protective gear to operate the AlcoTest® system.

It is however recommended that users guard against electro-static discharge when employing any types of flammable solvents or test liquids in conjunction with the AlcoTest® system. Flammable liquids may be ignited in the presence of electro-static discharges and thereby present a fire hazard.

It is further recommended that appropriate fire safety measures be in place at the customer site. These should comply with or exceed local fire safety regulations.

## **14.7 Heat and Hot Surfaces**

The AlcoTest® system has been designed with operator safety in mind. As a function of normal operation some parts of the AlcoTest® system are designed to heat up and may become uncomfortably hot to the unprotected touch.

Care should be taken when operating or cleaning all parts of the AlcoTest® system.

The maximum operating temperature specifications system may approach 100 °C – care should be exercised when using any part of the system which is intended to heat or temperature control samples.

## **14.8 Internal Components**

There are no user serviceable internal components within the AlcoTest® system. Users are cautioned to not access the internal components of the AlcoTest® system as there is a risk of shock or damage to the equipment. All internal service and maintenance required to be performed on the AlcoTest® system must be performed by a qualified authorized Rudolph Research technician or support engineer.

## **14.9 Liquid Spills and Cleaning**

The AlcoTest® system is designed to be very tolerant to liquid spills. The Touch Screen is both liquid and soil resistant and its designed to work in a wide variety of environments without issues. Regardless users should be careful not to spill excessive amounts of liquids into the touch screen.

The AlcoTest® system is also designed to be easily cleaned. Normal cleaning solvents, such as are employed in standard laboratory bench cleaning, are most likely fine for use with the AlcoTest® system. External cleaning may be done on a regular basis by maintenance and janitorial staff with proper normal care.

#### **14.10 Flammable Liquids**

- NOTE: When using inflammable liquids near the equipment or for testing or cleaning purposes please follow the following precautions.
- Do not store flammable material near the equipment. This included materials which may contribute to the severity of an incident, such as lab coats, packing material or papers.
- Do not leave flammable sample containers or solvent containers uncovered.
- Spillage of flammable solvents, samples and or cleaning materials should be addressed immediately. Please do not operate the equipment in the event of a nearby flammable liquid spillage.
- Ensure adequate ventilation if the AlcoTest® is to be used with noxious and/or flammable liquids or solvents.
- Follow best practices with regards to the connection of this equipment to the mains power when used with flammable liquids. It is recommended that the local fire safety ordinances be consulted and that all required fire safety inspections be conducted prior to operation of the equipment in a flammable liquid environment.
- Fire extinguishing equipment and/or fire suppression equipment as required by local ordinances or fire safety codes, should be installed and operators should be familiar with their operation prior to using this equipment in a flammable liquid environment.
- Never leave the equipment unattended when it is operated in an environment where flammable liquids are present.

#### **14.11 Explosion Proof Standards**

The AlcoTest® unit is not designed to meet the UL1203 standard for explosion proof equipment. This means that the unit has not been rigorously tested to ensure that it will not be a source of ignition in explosive or flammable atmospheres or environments. Please refer to the relevant standard from UL here: [http://ulstandards.ul.com/standard/?id=1203\\_5](http://ulstandards.ul.com/standard/?id=1203_5)

Rudolph Research does not recommend that the AlcoTest® unit be used in any environment that requires UL1203 certification.

#### **14.12 Bio Hazards**

The AlcoTest® system is not designed to guard against bio hazardous materials. In the event that biohazardous materials are used for either testing or cleaning the system it is the responsibility of the end user to take all appropriate steps to ensure safety as well as contain any possible exposure vectors.

## Appendix A – Technical Specifications

### CHOOSE A DENSITY METER

The density meter is detailed in Technical Bulletin 935. Some key features are:

- Patented VideoView™ system for detecting even the smallest bubbles
- Direct network connection using Windows software
- Complies with ISO / GMP / GLP.

#### DDM 2910

Accurate to 0.0001 g/ml density  
Accurate to 0.1% ABV  
Ideal for wineries and breweries

#### DDM 2911

Accurate to 0.00005 g/ml density  
Accurate to 0.05% ABV  
Ideal for wineries and breweries  
Meets European requirements for spirits

#### DDM 2911 PLUS

Accurate to 0.00002 g/ml density  
Accurate to 0.02% ABV  
Ideal for distilleries and multi-product producers  
Meets US and European requirements for spirits.  
Used by the US TTB



### CHOOSE A REFRACTOMETER

The refractometer is detailed in Technical Bulletin 930. Some key features are:

- Sample quality system checks that sample is loaded correctly.
- Operation from density meter touch screen
- Complies with ISO / GMP/GLP
- Wide range (not A model) means the instrument can measure materials like cinnamon oil



#### J157OM-DP

Accurate to 0.00002 Refractive index  
Accurate to 0.02 Brix  
Range 1.32 – 1.53 Refractive Index  
Range 0 – 100 Brix  
Ideal instrument for all beverage applications both alcoholic and non alcoholic

#### J457OM-DP

Accurate to 0.00002 Refractive index  
Accurate to 0.02 Brix  
Range 1.26 – 1.70 Refractive Index  
Range 0 – 100 Brix  
Identical performance on beverages to the J157 model this refractometer is a good choice for flavor companies wanting to measure raw materials



## 15 Appendix B – Water Density Table

°C	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	0.999840	0.999846	0.999853	0.999859	0.999865	0.999871	0.999877	0.999883	0.999888	0.999893
1	0.999899	0.999903	0.999908	0.999913	0.999917	0.999921	0.999925	0.999929	0.999933	0.999937
2	0.999940	0.999943	0.999946	0.999949	0.999952	0.999954	0.999956	0.999959	0.999961	0.999962
3	0.999964	0.999966	0.999967	0.999968	0.999969	0.999970	0.999971	0.999971	0.999972	0.999972
4	0.999972	0.999972	0.999972	0.999971	0.999971	0.999970	0.999969	0.999968	0.999967	0.999965
5	0.999964	0.999962	0.999960	0.999958	0.999956	0.999954	0.999951	0.999949	0.999946	0.999943
6	0.999940	0.999937	0.999934	0.999930	0.999926	0.999923	0.999919	0.999915	0.999910	0.999906
7	0.999901	0.999897	0.999892	0.999887	0.999882	0.999877	0.999871	0.999866	0.999860	0.999854
8	0.999848	0.999842	0.999836	0.999829	0.999823	0.999816	0.999809	0.999802	0.999795	0.999788
9	0.999781	0.999773	0.999766	0.999758	0.999750	0.999742	0.999734	0.999725	0.999717	0.999708
10	0.999699	0.999691	0.999682	0.999672	0.999663	0.999654	0.999644	0.999635	0.999625	0.999615
11	0.999605	0.999595	0.999584	0.999574	0.999563	0.999553	0.999542	0.999531	0.999520	0.999508
12	0.999497	0.999486	0.999474	0.999462	0.999450	0.999438	0.999426	0.999414	0.999402	0.999389



13	0.999377	0.999364	0.999351	0.999338	0.999325	0.999312	0.999298	0.999285	0.999271	0.999258
14	0.999244	0.999230	0.999216	0.999202	0.999187	0.999173	0.999158	0.999144	0.999129	0.999114
15	0.999099	0.999084	0.999069	0.999053	0.999038	0.999022	0.999006	0.998991	0.998975	0.998959
16	0.998942	0.998926	0.998910	0.998893	0.998876	0.998860	0.998843	0.998826	0.998809	0.998792
17	0.998774	0.998757	0.998739	0.998722	0.998704	0.998686	0.998668	0.998650	0.998632	0.998613
18	0.998595	0.998576	0.998558	0.998539	0.998520	0.998501	0.998482	0.998463	0.998443	0.998424
19	0.998404	0.998385	0.998365	0.998345	0.998325	0.998305	0.998285	0.998265	0.998244	0.998224
20	0.998203	0.998182	0.998162	0.998141	0.998120	0.998099	0.998077	0.998056	0.998035	0.998013
21	0.997991	0.997970	0.997948	0.997926	0.997904	0.997882	0.997859	0.997837	0.997815	0.997792
22	0.997769	0.997747	0.997724	0.997701	0.997678	0.997654	0.997631	0.997608	0.997584	0.997561
23	0.997537	0.997513	0.997490	0.997466	0.997442	0.997417	0.997393	0.997369	0.997344	0.997320
24	0.997295	0.997270	0.997246	0.997221	0.997196	0.997170	0.997145	0.997120	0.997094	0.997069
25	0.997043	0.997018	0.996992	0.996966	0.996940	0.996914	0.996888	0.996861	0.996835	0.996809
26	0.996782	0.996755	0.996729	0.996702	0.996675	0.996648	0.996621	0.996594	0.996566	0.996539
27	0.996511	0.996484	0.996456	0.996428	0.996400	0.996373	0.996344	0.996316	0.996288	0.996260
°C	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9

28	0.996232	0.996203	0.996174	0.996146	0.996117	0.996088	0.996059	0.996030	0.996001	0.995972
29	0.995943	0.995913	0.995884	0.995854	0.995825	0.995795	0.995765	0.995735	0.995705	0.995675
30	0.995645	0.995615	0.995584	0.995554	0.995523	0.995493	0.995462	0.995431	0.995401	0.995370
31	0.995339	0.995307	0.995276	0.995245	0.995214	0.995182	0.995151	0.995119	0.995087	0.995056
32	0.995024	0.994992	0.994960	0.994928	0.994895	0.994863	0.994831	0.994798	0.994766	0.994733
33	0.994700	0.994667	0.994635	0.994602	0.994569	0.994535	0.994502	0.994469	0.994436	0.994402
34	0.994369	0.994335	0.994301	0.994268	0.994234	0.994200	0.994166	0.994132	0.994097	0.994063
35	0.994029	0.993994	0.993960	0.993925	0.993891	0.993856	0.993821	0.993786	0.993751	0.993716
36	0.993681	0.993646	0.993610	0.993575	0.993540	0.993504	0.993468	0.993433	0.993397	0.993361
37	0.993325	0.993289	0.993253	0.993217	0.993181	0.993144	0.993108	0.993072	0.993035	0.992998
38	0.992962	0.992925	0.992888	0.992851	0.992814	0.992777	0.992740	0.992703	0.992665	0.992628
39	0.992591	0.992553	0.992515	0.992478	0.992440	0.992402	0.992364	0.992326	0.992288	0.992250
40	0.992212	0.992174	0.992135	0.992097	0.992058	0.992020	0.991981	0.991942	0.991904	0.991865
41	0.991826	0.991787	0.991748	0.991708	0.991669	0.991630	0.991590	0.991551	0.991511	0.991472
42	0.991432	0.991392	0.991353	0.991313	0.991273	0.991233	0.991193	0.991152	0.991112	0.991072
43	0.991031	0.990991	0.990950	0.990910	0.990869	0.990828	0.990787	0.990747	0.990706	0.990665

44	0.990623	0.990582	0.990541	0.990500	0.990458	0.990417	0.990375	0.990334	0.990292	0.990250
45	0.990208	0.990167	0.990125	0.990083	0.990040	0.989998	0.989956	0.989914	0.989871	0.989829
46	0.989786	0.989744	0.989701	0.989658	0.989616	0.989573	0.989530	0.989487	0.989444	0.989401
47	0.989358	0.989314	0.989271	0.989228	0.989184	0.989141	0.989097	0.989053	0.989010	0.988966
48	0.988922	0.988878	0.988834	0.988790	0.988746	0.988702	0.988657	0.988613	0.988569	0.988524
49	0.988480	0.988435	0.988390	0.988346	0.988301	0.988256	0.988211	0.988166	0.988121	0.988076
50	0.988030	0.987985	0.987940	0.987894	0.987849	0.987804	0.987758	0.987712	0.987667	0.987621
51	0.987575	0.987529	0.987483	0.987437	0.987391	0.987345	0.987298	0.987252	0.987206	0.987159
52	0.987113	0.987066	0.987020	0.986973	0.986926	0.986879	0.986833	0.986786	0.986739	0.986692
53	0.986644	0.986597	0.986550	0.986503	0.986455	0.986408	0.986360	0.986313	0.986265	0.986217
54	0.986170	0.986122	0.986074	0.986026	0.985978	0.985930	0.985882	0.985833	0.985785	0.985737
55	0.985688	0.985640	0.985591	0.985543	0.985494	0.985446	0.985397	0.985348	0.985299	0.985250
56	0.985201	0.985152	0.985103	0.985054	0.985004	0.984955	0.984906	0.984856	0.984807	0.984757
57	0.984708	0.984658	0.984608	0.984558	0.984509	0.984459	0.984409	0.984359	0.984308	0.984258
°C	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
58	0.984208	0.984158	0.984107	0.984057	0.984007	0.983956	0.983905	0.983855	0.983804	0.983753

59	0.983702	0.983652	0.983601	0.983550	0.983499	0.983448	0.983396	0.983345	0.983294	0.983242
60	0.983191	0.983140	0.983088	0.983036	0.982985	0.982933	0.982881	0.982829	0.982778	0.982726
61	0.982674	0.982621	0.982569	0.982517	0.982465	0.982413	0.982360	0.982308	0.982255	0.982203
62	0.982150	0.982098	0.982045	0.981992	0.981939	0.981886	0.981834	0.981780	0.981727	0.981674
63	0.981621	0.981568	0.981515	0.981461	0.981408	0.981354	0.981301	0.981247	0.981194	0.981140
64	0.981086	0.981032	0.980979	0.980925	0.980871	0.980817	0.980763	0.980708	0.980654	0.980600
65	0.980546	0.980491	0.980437	0.980382	0.980328	0.980273	0.980219	0.980164	0.980109	0.980054
66	0.980000	0.979945	0.979890	0.979835	0.979780	0.979724	0.979669	0.979614	0.979559	0.979503
67	0.979448	0.979392	0.979337	0.979281	0.979226	0.979170	0.979114	0.979058	0.979002	0.978946
68	0.978890	0.978834	0.978778	0.978722	0.978666	0.978610	0.978553	0.978497	0.978441	0.978384
69	0.978328	0.978271	0.978214	0.978158	0.978101	0.978044	0.977987	0.977930	0.977874	0.977816
70	0.977759	0.977702	0.977645	0.977588	0.977531	0.977473	0.977416	0.977358	0.977301	0.977243
71	0.977186	0.977128	0.977070	0.977012	0.976955	0.976897	0.976839	0.976781	0.976723	0.976665
72	0.976607	0.976548	0.976490	0.976432	0.976374	0.976315	0.976257	0.976198	0.976140	0.976081
73	0.976022	0.975963	0.975905	0.975846	0.975787	0.975728	0.975669	0.975610	0.975551	0.975492
74	0.975432	0.975373	0.975314	0.975255	0.975195	0.975136	0.975076	0.975017	0.974957	0.974897

75	0.974838	0.974778	0.974718	0.974658	0.974598	0.974538	0.974478	0.974418	0.974358	0.974298
76	0.974237	0.974177	0.974117	0.974056	0.973996	0.973935	0.973875	0.973814	0.973753	0.973693
77	0.973632	0.973571	0.973510	0.973449	0.973388	0.973327	0.973266	0.973205	0.973144	0.973083
78	0.973021	0.972960	0.972899	0.972837	0.972776	0.972714	0.972653	0.972591	0.972529	0.972468
79	0.972406	0.972344	0.972282	0.972220	0.972158	0.972096	0.972034	0.971972	0.971910	0.971847
80	0.971785	0.971723	0.971660	0.971598	0.971535	0.971473	0.971410	0.971348	0.971285	0.971222
81	0.971159	0.971096	0.971034	0.970971	0.970908	0.970844	0.970781	0.970718	0.970655	0.970592
82	0.970528	0.970465	0.970402	0.970338	0.970275	0.970211	0.970148	0.970084	0.970020	0.969956
83	0.969893	0.969829	0.969765	0.969701	0.969637	0.969573	0.969509	0.969445	0.969380	0.969316
84	0.969252	0.969188	0.969123	0.969059	0.968994	0.968930	0.968865	0.968800	0.968736	0.968671
85	0.968606	0.968541	0.968477	0.968412	0.968347	0.968282	0.968216	0.968151	0.968086	0.968021
86	0.967956	0.967890	0.967825	0.967760	0.967694	0.967629	0.967563	0.967497	0.967432	0.967366
87	0.967300	0.967234	0.967169	0.967103	0.967037	0.966971	0.966905	0.966838	0.966772	0.966706
°C	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
88	0.966640	0.966574	0.966507	0.966441	0.966374	0.966308	0.966241	0.966175	0.966108	0.966042
89	0.965975	0.965908	0.965841	0.965774	0.965707	0.965640	0.965573	0.965506	0.965439	0.965372

90	0.965305	0.965238	0.965170	0.965103	0.965036	0.964968	0.964901	0.964833	0.964765	0.964698
91	0.964630	0.964562	0.964495	0.964427	0.964359	0.964291	0.964223	0.964155	0.964087	0.964019
92	0.963951	0.963882	0.963814	0.963746	0.963677	0.963609	0.963541	0.963472	0.963404	0.963335
93	0.963266	0.963198	0.963129	0.963060	0.962991	0.962922	0.962854	0.962785	0.962716	0.962646
94	0.962577	0.962508	0.962439	0.962370	0.962300	0.962231	0.962162	0.962092	0.962023	0.961953
95	0.961884	0.961814	0.961744	0.961675	0.961605	0.961535	0.961465	0.961395	0.961325	0.961255
96	0.961185	0.961115	0.961045	0.960975	0.960905	0.960834	0.960764	0.960694	0.960623	0.960553
97	0.960482	0.960412	0.960341	0.960271	0.960200	0.960129	0.960058	0.959988	0.959917	0.959846
98	0.959775	0.959704	0.959633	0.959562	0.959490	0.959419	0.959348	0.959277	0.959205	0.959134
99	0.959062	0.958991	0.958920	0.958848	0.958776	0.958705	0.958633	0.958561	0.958489	0.958418
100	0.958346	0.958273	0.958201	0.958129	0.958057	0.957985	0.957913	0.957840	0.957768	0.957696

## 16 Appendix C – Air Density Table

°C	Density in g/cm <sup>3</sup> at the pressure in mbar (=hPa)							
	900	920	940	960	980	1000	1013.25	1050
-10	0.001192	0.001219	0.001245	0.001272	0.001298	0.001325	0.001342	0.001391
-5	0.001170	0.001196	0.001222	0.001248	0.001274	0.001300	0.001317	0.001365
0	0.001148	0.001174	0.001200	0.001225	0.001251	0.001276	0.001293	0.001340
5	0.001128	0.001153	0.001178	0.001203	0.001228	0.001253	0.001270	0.001316
10	0.001108	0.001132	0.001157	0.001182	0.001206	0.001231	0.001247	0.001293
15	0.001088	0.001113	0.001137	0.001161	0.001185	0.001210	0.001226	0.001270
20	0.001070	0.001094	0.001117	0.001141	0.001165	0.001189	0.001205	0.001248
25	0.001052	0.001075	0.001099	0.001122	0.001145	0.001169	0.001184	0.001227
30	0.001035	0.001058	0.001081	0.001104	0.001127	0.001150	0.001165	0.001207
35	0.001018	0.001040	0.001063	0.001086	0.001108	0.001131	0.001146	0.001187
40	0.001001	0.001024	0.001046	0.001068	0.001090	0.001113	0.001127	0.001168
45	0.000986	0.001008	0.001029	0.001051	0.001073	0.001095	0.001110	0.001150
50	0.000970	0.000992	0.001014	0.001035	0.001057	0.001078	0.001093	0.001132
55	0.000956	0.000977	0.000998	0.001019	0.001041	0.001062	0.001076	0.001115
60	0.000941	0.000962	0.000983	0.001004	0.001025	0.001046	0.001060	0.001098
65	0.000927	0.000948	0.000968	0.000989	0.001010	0.001030	0.001044	0.001082
70	0.000914	0.000934	0.000954	0.000975	0.000995	0.001015	0.001029	0.001066
75	0.000901	0.000921	0.000941	0.000961	0.000981	0.001001	0.001014	0.001051
80	0.000888	0.000908	0.000927	0.000947	0.000967	0.000986	0.000999	0.001036
85	0.000875	0.000895	0.000914	0.000934	0.000953	0.000973	0.000986	0.001021
90	0.000863	0.000882	0.000902	0.000921	0.000940	0.000959	0.000972	0.001007

Air density is affected by the air pressure, temperature and humidity. The density of the air is reduced by decreased air pressure, increased temperatures and increased moisture. Putting this relationship on a table could only be done using 3-D graphing, or using a separate graph for each of the three parameters. One can also calculate air density at various temperatures using the formula

$$\text{Density} = \frac{0.0012930}{1 + 0.00367 \times t} \times \frac{\text{Pressure in mbar}}{1013.25}$$

Where t is temperature in °C. Relative Humidity is not accounted for in this formula as it assumes DRY air.



## 17 Appendix D – Printers Supported by Windows Embedded

According to the Windows Embedded Standard 7 documentation, the following printer drivers have been included in the Windows build:

### Epson Printers:

EPSON_PX-V630_(M)
Epson_Stylus_C67_Series_(M)
Epson_Stylus_C68_Series_(M)
Epson_Stylus_C87_Series_(M)
Epson_Stylus_C88_Series_(M)
Epson_Stylus_D68_Series_(M)
Epson_Stylus_D88_Series_(M)

### Hewlett Packard Printers:

HP_910
HP_915
HP_Business_Inkjet_1000
HP_Business_Inkjet_1200
HP_Business_Inkjet_2200/2250_(HPA)
HP_Business_Inkjet_2230/2280_HPA
HP_CM8000_Color_MFP_Series_PCL6
HP_Color_Inkjet_cp1700
HP_Color_LaserJet_2700_Series_PCL6
HP_Color_LaserJet_2800_Series_PS
HP_Color_LaserJet_9500_PCL_6
HP_Color_LaserJet_CM3530_MFP_PCL6
HP_Color_LaserJet_CM6030_MFP_PCL6
HP_Color_LaserJet_CM6040_MFP_PCL6
HP_Color_LaserJet_CP1510_Series_PCL6
HP_Color_LaserJet_CP2020_Series_PCL6
HP_Color_LaserJet_CP3505_PCL6
HP_Color_LaserJet_CP3525_PCL6
HP_Color_LaserJet_CP4005_PCL6
HP_Color_LaserJet_CP5220_Series_PCL6
HP_Color_LaserJet_CP6015_PCL6

HP_DeskJet_450
HP_DeskJet_460_Series
HP_DeskJet_5100
HP_DeskJet_5550
HP_DeskJet_5600
HP_DeskJet_6940
HP_DeskJet_6940_Series
HP_DeskJet_6980
HP_DeskJet_6980_Series
HP_DeskJet_9800_Printer
HP_DeskJet_D1300_Series
HP_DeskJet_D1400_Series
HP_DeskJet_D1500_Series
HP_DeskJet_D2300_Series
HP_DeskJet_D2400_Series
HP_DeskJet_D2500_Series
HP_DeskJet_D2600_Series
HP_DeskJet_D4100_Series
HP_DeskJet_D4200_Series
HP_DeskJet_D4300_Series
HP_DeskJet_D730
HP_DeskJet_F2100_Series
HP_DeskJet_F2200_Series
HP_DeskJet_F300_Series
HP_DeskJet_F4100_Series
HP_DeskJet_F4200_Series
HP_DeskJet_F4400_Series
HP_DeskJet_F735
HP_Digital_Copier_410
HP_LaserJet_2200_Series_PCL_5
HP_LaserJet_2300_Series_PS
HP_LaserJet_2300L_PS
HP_LaserJet_3050_PCL5
HP_LaserJet_3052_PCL5
HP_LaserJet_3055_PCL5
HP_LaserJet_3390/3392_PCL5
HP_LaserJet_4100_Series_PCL6
HP_LaserJet_4200/4300_PCL6

HP_LaserJet_4250_PCL6
HP_LaserJet_5200_Series_PCL_5
HP_LaserJet_5200L_Series_PCL_5
HP_LaserJet_9050_mfp_PCL6
HP_LaserJet_CP6015_PCL6
HP_LaserJet_M3027_mfp_PCL6
HP_LaserJet_M3035_mfp_PCL6
HP_LaserJet_M4345_mfp_PCL6
HP_LaserJet_M5025_mfp_PCL6
HP_LaserJet_M5035_mfp_PCL6
HP_LaserJet_M9040_MFP_PCL6
HP_LaserJet_M9050_MFP_PCL6
HP_LaserJet_P2015_PCL6
HP_LaserJet_P2050_Series_PCL6
HP_LaserJet_P3004_PCL6
HP_LaserJet_P3005_PCL6
HP_LaserJet_P3011/P3015_PCL6
HP_LaserJet_P4014/P4015_PCL6
HP_LaserJet_P4515_PCL6
HP_OfficeJet_4300_Series
HP_OfficeJet_5600_Series
HP_OfficeJet_6000_E609a_Series
HP_OfficeJet_6000_E609n_Series
HP_OfficeJet_6100_Series
HP_OfficeJet_6200_Series
HP_OfficeJet_6300_Series
HP_OfficeJet_6500_E709a_Series
HP_OfficeJet_6500_E709n_Series
HP_OfficeJet_7100_Series
HP_OfficeJet_7200_Series
HP_OfficeJet_7300_Series
HP_OfficeJet_7400_Series
HP_OfficeJet_D_Series
HP_OfficeJet_H470_Series
HP_OfficeJet_J3500_Series
HP_OfficeJet_J3600_Series
HP_OfficeJet_J4500_Series
HP_OfficeJet_J4660_Series

HP_OfficeJet_J4680_Series
HP_OfficeJet_J5500_Series
HP_OfficeJet_J5700_Series
HP_OfficeJet_J6400_Series
HP_OfficeJet_K7100_Series
HP_OfficeJet_Pro_8000_A809_Series
HP_OfficeJet_Pro_8500_A909a_Series
HP_OfficeJet_Pro_8500_A909g_Series
HP_OfficeJet_Pro_8500_A909n_Series
HP_OfficeJet_Pro_K5300_Series
HP_OfficeJet_Pro_K5400_Series
HP_OfficeJet_Pro_K550_Series
HP_OfficeJet_Pro_K850_Series
HP_OfficeJet_Pro_K8600_Series
HP_OfficeJet_Pro_L7300_Series
HP_OfficeJet_Pro_L7400_Series
HP_OfficeJet_Pro_L7500_Series
HP_OfficeJet_Pro_L7600_Series
HP_OfficeJet_Pro_L7700_Series
HP_Photosmart_2600_Series
HP_Photosmart_2700_Series
HP_Photosmart_3100_Series
HP_Photosmart_3200_Series
HP_Photosmart_3300_Series
HP_Photosmart_8100_Series
HP_Photosmart_8200_Series
HP_Photosmart_8400_Series
HP_Photosmart_8700_Series
HP_Photosmart_A310_Series
HP_Photosmart_A320_Series
HP_Photosmart_A430_Series
HP_Photosmart_A440_Series
HP_Photosmart_A510_Series
HP_Photosmart_A520_Series
HP_Photosmart_A610_Series
HP_Photosmart_A620_Series
HP_Photosmart_A710_Series
HP_Photosmart_A820_Series

HP_Photosmart_B8500_Series
HP_Photosmart_C309a_Series
HP_Photosmart_C3100_Series
HP_Photosmart_C4100_Series
HP_Photosmart_C4200_Series
HP_Photosmart_C4340_Series
HP_Photosmart_C4380_Series
HP_Photosmart_C4400_Series
HP_Photosmart_C4500_Series
HP_Photosmart_C4600_Series
HP_Photosmart_C5100_Series
HP_Photosmart_C5200_Series
HP_Photosmart_C5300_Series
HP_Photosmart_C5500_Series
HP_Photosmart_C6100_Series
HP_Photosmart_C6200_Series
HP_Photosmart_C6300_Series
HP_Photosmart_C7100_Series
HP_Photosmart_C7200_Series
HP_Photosmart_C8100_Series
HP_Photosmart_D5060_Series
HP_Photosmart_D5100_Series
HP_Photosmart_D5300_Series
HP_Photosmart_D5400_Series
HP_Photosmart_D6100_Series
HP_Photosmart_D7100_Series
HP_Photosmart_D7200_Series
HP_Photosmart_D7300_Series
HP_Photosmart_D7400_Series
HP_Photosmart_D7500_Series
HP_Photosmart_Pro_B8300_Series
HP_PSC_1500_Series
HP_PSC_1600_Series

Lexmark:

Lexmark_E120n_(MS)
Lexmark_E232_(MS)
Lexmark_E234_(MS)

Lexmark_E234n_(MS)
Lexmark_E238_(MS)
Lexmark_E240_(MS)
Lexmark_E240n_(MS)
Lexmark_E250d_(MS)
Lexmark_E250dn_(MS)
Lexmark_E260_(MS)
Lexmark_E260d_(MS)
Lexmark_E260dn_(MS)
Lexmark_E323_(MS)
Lexmark_E330_(MS)
Lexmark_E332n_(MS)
Lexmark_E340_(MS)
Lexmark_E342n_(MS)
Lexmark_E350d_(MS)
Lexmark_E352dn_(MS)
Lexmark_E360d_(MS)
Lexmark_E360dn_(MS)
Lexmark_E450dn_(MS)
Lexmark_E460dn_(MS)
Lexmark_E460dw_(MS)
Lexmark_T650_(MS)
Lexmark_T652_(MS)
Lexmark_T654_(MS)

## 18 Table of Figures

Figure 3-1 - Items Supplied with the Instrument.....	19
Figure 4-1 - Optional and Spare Parts.....	24
Figure 5-1 - Back View of RRA AlcoTest®.....	25
Figure 5-2 - Side View of Drying Hose .....	26
Figure 5-3 - Side View of Filling Nozzles.....	27
Figure 5-4 - Checking the Filling Nozzles for Air Tightness.....	27
Figure 5-5 - AlcoTest® Optics Box Module – shown with presser installed.....	29
Figure 5-6 – OBM to Display Base (on right) and Optics Box to Presser cable (on left) .....	29
Figure 5-7 – Main Screen Features.....	30
Figure 5-8 - Home - Main Screen - Access Menu .....	31
Figure 5-9 - Password Entry Dialog – Default Password is ‘123’ .....	32
Figure 5-10 - Virtual Keyboard .....	32
Figure 5-11 - Main Menu .....	33
Figure 5-12 - System Information .....	33
Figure 5-13 - Starting a Measurement.....	35
Figure 5-14 – Main Screen during Measurement .....	36
Figure 5-15 - Abort Measurement .....	36
Figure 5-16 - View of VideoView™ .....	37
Figure 5-17 - Magnified View of AlcoTest® VideoView™ .....	37
Figure 6-1 - Main Screen – Method Selection .....	40
Figure 6-2 - Load Method Screen .....	41
Figure 6-3 - Main Menu – Method Management .....	45
Figure 6-4 - Edit Method Button .....	46
Figure 6-5 - Method Settings – Measurement Parameters.....	47
Figure 6-6 - Auto Dry Feature .....	49
AlcoTest® .....	51
Figure 6-7 - Display Parameters – AlcoTest® ABV Group Selected .....	51
Figure 6-8 - Available Groups .....	53
Figure 6-9 - Method Management Option .....	56
Figure 6-10 - Method Management – ADD a new Method .....	56
Figure 6-11 - Add new Custom Method.....	57
Figure 6-12 - Specify Method Name.....	58
Figure 6-13 - Measurement Parameters screen.....	58
Figure 6-14 - Display Settings – Method ADD.....	59
Figure 6-15 - Custom Polynomial Setup.....	61
Figure 6-16 - Adding a Custom Polynomial.....	61
Figure 6-17 - Configuring the Custom Polynomial.....	62

Figure 6-18 - Offset Parameters.....	63
Figure 6-19 - Custom Parameter screen .....	64
Figure 6-20 - Adding a Custom Parameter.....	64
Figure 6-21 - Display Parameters selection of a Custom Parameter from the Custom Group .....	65
Figure 6-22 - AlcoCalc® Methods and Display Groups– optional .....	66
Figure 6-23 - Dilution by Volume Input screen .....	67
Figure 6-24 - Dilution by volume - result.....	68
Figure 6-25 - Dilution by Weight – input screen .....	68
Figure 6-26 - Dilution by weight - result.....	69
Figure 7-1 - Touch Panel On-Screen Keypad .....	70
VideoView™ .....	72
Figure 7-2 - VideoView™ Display.....	72
VideoView™ .....	72
Figure 7-3 - VideoView™ Scan .....	72
Figure 7-4 - Placing a sample on the Prism .....	74
Figure 7-5 - Sample Clean Prism      Sample not correctly applied      Sample Correctly applied .....	74
Figure 7-6 - Air Pump Control .....	75
Figure 7-7 - Operational Parameters Menu .....	76
Figure 7-8 - Accessing the Windows 7 Embedded Control Panel .....	77
Figure 7-9 - Windows Control Panel - Devices and Printers .....	77
Figure 7-10 - Selecting the Method to Edit .....	78
Figure 7-11 - Configuring the Print Parameters.....	79
Figure 7-12 - Choosing the Print Parameters.....	79
Figure 7-13 - Communications Settings Menu .....	80
Figure 7-14 - Print Settings .....	81
Figure 7-15 - Browse for logo.....	81
Figure 7-16 - Footer settings.....	82
Figure 7-17 - General settings.....	83
Figure 7-18 - Export Parameters.....	84
Figure 7-19 - Export Settings .....	85
Figure 7-20 - Auto Export Settings Dialog .....	85
Figure 7-21 - Choosing a location for the Exported Data file.....	86
Figure 7-22 - Previous Stored Results Window .....	87
Figure 7-23 - Filter Settings.....	88
Figure 7-24 - Filter by Date .....	89
Figure 7-25 - Filter results output display .....	89
Figure 9-1 - Calibration Menu.....	97
Figure 9-2 - Calibration Password.....	97



Figure 9-3 - Backup/Restore Calibration .....	98
Figure 9-4 - Calibration Verifications List.....	99
Figure 9-5 - Calibration Adjustment Menu.....	100
Figure 9-6 - Calibration Adjustment Setting dialog .....	101
Figure 9.7 – Calibration Adjustment – local Air Pressure based on Altitude.....	<b>Error!</b>
<b>Bookmark not defined.</b>	
Figure 9-7 - Calibration Adjustment – local Air Pressure based on Altitude .....	101
Figure 9-8 - Calibration Adjustment - AIR.....	102
Figure 9-9 - Calibration Adjustment – Water Measurement .....	102
Figure 9-10 - Temperature Verification with a certified Fluke-Hart Thermometer.....	103
Figure 9-11 - Verify Temperature .....	104
Figure 9-12 - Calibration Menu.....	105
Figure 9-13 - Calibration Adjustment – Temperature Calibration .....	106
Figure 9-14 - Temperature Calibration .....	107
Figure 9-15 - Viscosity Calibration .....	108
Figure 9-16 - Viscosity Adjustment Settings.....	108
Figure 9-17 - Perform Viscosity Calibration.....	109
Figure 9-18 - Viscosity Calibration wizard .....	109
Figure 9-19 - Accessing the Refractometer Application .....	110
Figure 9-20 - Refractometer Application.....	111
Figure 9-21 - Default Validation.....	111
Figure 9-22 - Validation Wizard.....	112
Figure 9-23 - Validation Wizard start.....	112
Figure 9-24 - Validation Pass/Fail .....	112
Figure 9-25 - Menu Functions .....	114
Figure 9-26 - Calibration Menu.....	115
Figure 9-27 - Two Point Calibration.....	116
Figure 9-28 - Two Point Calibration.....	117
Figure 9-29 - 2 Point Calibration – Step 2 .....	118
Figure 9-30 - 2 Point Calibration .....	119
Figure 9-31 - 2 Point Calibration - Confirmation .....	120
Figure 9-32 - Calibration Completed .....	120
Figure 10-1 – Enter Menu Password (if required) .....	122
Figure 10-2 - Select Operational Parameters.....	123
Figure 10-3 - Instrument Configuration.....	123
Figure 10-4 - Accessing the Windows Control Panel .....	124
Figure 10-5 - Turning Off Disk Protection.....	124
Figure 10-6 - Turn Off Disk Protection - Confirmation Dialog .....	125
Figure 10-7 - Disk Protection Status Indicator.....	125
Figure 10-8 - Accessing the Windows 7 Embedded Control Panel .....	126

Figure 10-9 - Windows Control Panel.....	126
Figure 10-10 - Devices & Printers .....	127
Figure 10-11 - Connected devices and Printers .....	128
Figure 10-12 - Set default Printer .....	128
Figure 10-13 - Found new Hardware wizard .....	130
Figure 10-14 - Found New Hardware Wizard.....	130
Figure 10-15 - Search for Driver in Specific Locations .....	131
Figure 10-16 - New Hardware Wizard Printer List.....	132
Figure 10-17 - Control Panel – Devices and Printers .....	132
Figure 10-18 - Set default Printer .....	133
Figure 10-19 - Select the Add a Printer option .....	134
Figure 10-20 - Add a non plug-n-play local printer .....	134
Figure 10-21 - Add a serial printer – COM Port Selection .....	135
Figure 10-22 - Add Printer.....	136
Figure 10-23 - Install custom Driver .....	136
Figure 10-24 - Install specific driver from location .....	137
Figure 10-25 - Name the new Printer .....	137
Figure 10-26 -- Set for no Share .....	138
Figure 10-27 - Print a Test Page .....	138
Figure 10-28 - Adding a Network Attached printer .....	141
Figure 10-29 - Adding a Network Printer .....	142
Figure 10-30 - Select Printer Driver.....	142
Figure 10-31 - Add Printer by TCP/IP.....	143
Figure 10-32 - Network Printer Configuration.....	144
Figure 10-33 - Local Printer – TCP/IP port.....	144
Figure 10-34 - Configure Local TCP/IP port settings.....	145
Figure 10-35 - Driver selection .....	146
Figure 10-36 - Confirmation .....	146
Figure 10-37 - Printing a Test Page .....	147
Figure 10-38 - Open Windows Explorer .....	149
Figure 10-39 - Open Computer .....	149
Figure 10-40 - Mapping the Network Drive.....	150
Figure 10-41 - Choosing the local drive designation .....	151
Figure 10-42 - Connecting using Username and Password .....	151
Figure 10-43 - Operational Parameters Menu .....	154
Figure 10-44 - Instrument Configuration.....	154
Figure 10-45 - Service / Data .....	156
Figure 10-46 - Backup/Restore Configuration .....	156
Figure 10-47 - Backup Configuration Menu.....	157
Figure 10-48 - Backup completed .....	157

Figure 10-49 - Restore Configuration .....	158
Figure 10-50 - Restore older configuration .....	158
Figure 10-53 – Configuration file .....	160
Figure 10-51 - Configuration file .....	160
Figure 10-52 - Restoration success .....	160
Figure 10-53 - Operational Parameters .....	161
Figure 10-54 - Instrument Configuration .....	161
Figure 10-55 - Service / Data .....	163
Figure 10-56 - Data/Database Configuration Settings .....	163
Figure 10-57 - Configuration Menu .....	164
Figure 10-58 -Config Database Backup .....	164
Figure 10-59 - Backing up the Database .....	166
Figure 10-60 - Backup Settings configuration .....	167
Figure 10-61 - Restoring a Database .....	167
Figure 10-62 - Restoring the Backed Up Database .....	168
Figure 10-63 - Selecting the Database to Restore .....	169
Figure 11-1 - System Information .....	170
Figure 11-2 - Factory QC Results .....	171
Figure 11-3 - Help Button .....	172
Figure 11-4 - Digital Copy of User Manual .....	173
Figure 13-1 - Accessories menu .....	179
Figure 13-2 - Automation not installed message .....	180
Figure 13-3 - The ECS – Easy Clean System .....	181
Figure 13-4 - Peristaltic Pump option .....	182
Figure 13-5 - Peristaltic Pump Body Connections .....	183
Figure 13-6 - Flow of Sample into system via the Pump operation and thence to Waste Jar .....	183
Figure 13-7 - Pump Flow Diagram .....	184
Figure 13-8 - Accessing the Accessories Menu .....	185
Figure 13-9 - Accessing the Peristaltic Pump Menu .....	185
Figure 13-10 - Peristaltic Pump Settings – Standard Fill Mode .....	186
Figure 13-11 - Peri-Pump Pressure Fill Settings .....	187
Figure 13-12 - PeriPump Pressure Fill Menu .....	188
AlcoTest® .....	189
Figure 13-13 - AlcoTest® Main Screen with AutoFill® .....	189
Figure 13-14 - Lift the AutoFill®'s Lid and Pour your Sample into Cup. ....	189
Figure 13-15 - AutoFill® Control Screen .....	190
Figure 13-16 - AutoFill® Sample Loaded .....	191
Figure 13-17 - Measurement is Completed .....	191
Figure 13-18 - AutoFill® Rinse/Dry Cycle .....	192

Figure 13-19 - Adding Solvent/Rinse Fluid to the AutoFill® Cup.....	192
Figure 13-20 - AutoFill® Cycle Complete.....	193
Figure 13-21 – AutoFlex® Auto-sampler with J Series Automatic Refractometer and Automatic Polarimeter in tandem with AlcoTest® .....	194
Figure 13-22 - Automation Feed Kit Parts Illustration.....	195
Figure 13-23 - Automation Interface.....	196
Figure 14-1 - Table F.1.....	198

