CANNON
INSTRUMENT COMPANY®

MiniAV®-HT

High Temperature Automatic Viscometer

Instruction & Operation Manual

CONTENTS

3   CALIBRATING THE miniAV   29

4   USING THE miniAV SOFTWARE   37

5   OPERATING, MAINTAINING AND SERVICING THE miniAV   75

6   ANALYSIS CONFIGURATION OPTIONS   85

7   CAV DATA TABLE   93

8   STANDARD VI TABLE ANALYSIS   99

9   SAMPLE DATA EXPORT ANALYSIS   103

10   VI DATA EXPORT ANALYSIS   109

11   ERROR DATA EXPORT ANALYSIS   115

12   ERROR LOG TABLE ANALYSIS   121

13   USING THE DATABASE MANAGER   125

This page intentionally left blank.

INTRODUCTION/INSTALLATION

The miniAV® Automatic Viscometer

The miniAV ® Automatic Viscometer is designed to automate the time-consuming sample testing and cleaning operations required for determination of kinematic viscosity in accordance with ASTM D 445 specifications. The operator places the test sample(s) in small vials in the sample holder(s), enters sample identification information from the computer keyboard, and initiates testing with software keypad commands. Without any further operator involvement, the miniAV determines kinematic viscosity and cleans the capillary tube(s) in preparation for the next test. All pertinent test data can be saved to a computer database for future retrieval and reporting.

Manual

This manual is designed to provide the operator with information about:

- VISCPRO® software installation and operation

- MiniAV equipment, installation and operation

- Calibration, service and maintenance procedures

Applications

MiniAV instruments are appropriate for many kinematic viscosity measurement applications in R&D laboratories, refinery quality control laboratories, blending plants, and independent testing laboratories. The miniAV is ideally suited for the analysis of both transparent and opaque samples. A variety of materials, such as used oils, marine fuels, residual fuels, and crude oils can be tested with ease.

Precision

Precision for the kinematic viscosity determination of the miniAV equals or exceeds that specified in ASTM Method D 445. This method is required by the Society of Automotive Engineers (SAE) Engine Oil Viscosity Classification SAE J300.

The miniAV™

Measuring kinematic viscosity

Kinematic viscosity is a measure of the internal resistance to flow of a fluid under gravity with the pressure head being proportional to the density of the fluid. For any particular viscometer, the time of flow of a fixed volume of fluid is directly proportional to its kinematic viscosity.

Units of measure

An accepted unit of kinematic viscosity is one centimeter squared per second, which is called one stoke. The centistoke (which is equivalent to $1 \text{ mm}^2/\text{s}$) is the unit of measure most frequently used.

Methodology

ASTM Methods D 445 and D 446, included with this manual, describe appropriate test methodologies and instruments for glass capillary viscometry.

Manual viscometers

Sections 9-11 of ASTM D 445 provide detailed instructions for using manual viscometers. ASTM D 446 suggests a minimum flow time of 200 seconds for nearly all the glass capillary viscometers (see tables in ASTM D 446).

Automatic viscometers

For automatic viscometers, ASTM D 445 Section 6.1.2 states, "Automated apparatus may be used as long as they mimic the physical conditions, operations or processes of the manual apparatus they replace ... The automated apparatus shall be capable of determining kinematic viscosity of a certified viscosity reference standard within the limits stated ..."

Thus, automated viscometers can be used with flow times less than 200 seconds, as long as the kinetic energy correction and precision requirements are met.

miniAV tube characteristics

Each standard miniAV viscometer tube has two bulbs, each of which has its own calibration. The normal flow times for each bulb are 40-400 seconds. Each tube has a hundredfold measurement range (for example, range from 2-200 cSt or 20-2000 cSt for each tube).

NOTE

CANNON® Instrument Company has not recommended the use of longer flow times with the miniAV, as shorter flow times allow greater productivity. With longer flow times, the sample throughput would be significantly reduced. However, the viscometer and software design does permit longer efflux times (up to 600 seconds) as desired by the user.

Safety cautions

Please observe the following safety procedures and notices for proper operation of the miniAV:

■ Do NOT lift the unit by the side panel "ears". Always support the unit from the base when moving or lifting.

■ Make sure that your unit is operated only by qualified personnel.

■ Make sure that you read and understand all operating instructions and safety precautions listed in this manual before installing or operating your unit. If you have questions regarding instrument operation or documentation, contact **CANNON**® Instrument Company.

■ Do not deviate from the installation, operation or maintenance procedures described in this manual. Improper use of the miniAV instrument may result in a hazardous situation and may void the manufacturer's warranty.

■ Handle and transport the unit with care. Sudden jolts or impacts may cause damage to components.

■ Observe all warning labels.

■ Never remove warning labels.

■ Never operate damaged or leaking equipment.

■ Never operate the unit without appropriate levels of approved bath fluid in the bath.

■ Do not fill the bath vessel higher than the cold fill level.

■ Unless procedures specify otherwise, always turn off the unit and disconnect the mains cable from the power source before performing service or maintenance procedures, or before moving the unit.

■ Never operate the equipment with damaged mains power cables.

■ Refer all service and repairs to qualified personnel.

General Caution

In addition to the cautionary statements listed previously, additional cautions may be posted throughout this manual. These cautions, identified by the caution symbol (see left) indicate important operational procedures. Read and follow these important instructions. Failure to observe these instructions may void warranties, compromise operator safety, and/or result in damage to the miniAV unit.

Hot Surface Caution

Hot surface cautions may be attached on or near hot surfaces of the miniAV. Avoid touching hot surfaces, particularly when operating the miniAV at bath temperatures exceeding 50°C.

Protective Conductor

The Protective Conductor Terminal symbol is used to indicate required ground connections for your instrument electrical supply.

WARNING

When supplying power to this instrument, ensure that the protective ground (earth) terminals of the instrument are connected to the protective conductor of the (supplied) line (MAINS) power cord. Use only the manufacturer-supplied power cord, which should be inserted in a socket outlet (receptacle) which is also provided with a protective ground (earth) contact. Do not use an extension cord (power cable) without a protective conductor (grounding).

~ MAINS

AC Power Input Symbol

The ~MAINS symbol indicates instructions or connections for the AC power supply. The AC Power input must match the electrical specifications listed on the label on the rear panel of the instrument. The supplied

AC Mains power cord must be attached to the connector labelled ~MAINS. This connection serves as a means of disconnect and should be readily accessible.

(**O**)

Supply OFF Symbol

The (**O**) symbol indicates the OFF position for the electrical switches for your unit (AC Mains or accessories).

Hazardous materials

Routine miniAV operation may require the use and handling of hazardous chemicals and solutions. **CANNON**® Instrument Company strongly urges the operators and technicians working with the miniAV to take proper safety precautions when working with these materials. These safety procedures can be found in the Material Safety Data Sheets which accompany the solutions.

Specifications

miniAV Specifications/Compliance	
Part # & Electrical	miniAV Model # 9725-A80: 115 volts AC, 50/60 Hz miniAV Model # 9725-A81: 230 volts AC, 50/60 Hz miniAV Model # 9725-A82: 100 volts AC, 50/60 Hz
miniAV Dimensions	254 mm wide x 264 mm deep x 518 mm high (10 x 10.5 x 20.5")
Power Supply Dimensions	330 mm wide x 356 mm deep x 159 mm high (13 x 14 x 6.25")
Weight	miniAV bath unit: 14 kg (31 lbs); Power Supply: 11 kg (24 lbs); Waste Receiver: 6 kg (13 lbs)
Shipping Weight	51 kg (113 lbs) with all units/accessories
Operating Conditions	15°-30°C, 10%-90% RH non-condensing, Installation Category II, Pollution degree 2
Fuse Rating	115V & 100V Units: M 250V 8A, 1-1/4 x 1/4"; 230V Unit: M 250V 4A, 1-1/4 x 1/4"
Compliance	CE Mark: EMC directive (89/336/EEC); Low voltage directive (73/23/EEC); HI-POT (1900 VDC, 60 sec.)

Installation

MiniAV setup can be accomplished in just a few minutes by following the instructions below. Use the diagram on the facing page to assist with the setup. Fill the miniAV bath per the instructions in Chapter 5.

Required installation components

1 User-supplied solvent container w/ G38 threads for lid
2 CANNON®-supplied Nalgene® waste bottle with lid
3 Waste Receiver Assembly
4 Blue transparent Vacuum line (6 mm FEP) ▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪
5 Pressure and Solvent lines (1/8" FEP) ▬ ▬ ▬ ▬ ▬ ▬ ▬ ▬

6 Power Supply unit
7 RS-232 serial cable
8 DC Power cable
9 Power cord
10 Vacuum Pump unit power cable
11 Exhaust tubing (1/4" blue opaque polyethylene)

User-supplied solvent vessel

To computer

To optional drying solvent (B)

Waste-Vac Ring

to user ventilation system

To MAINS power
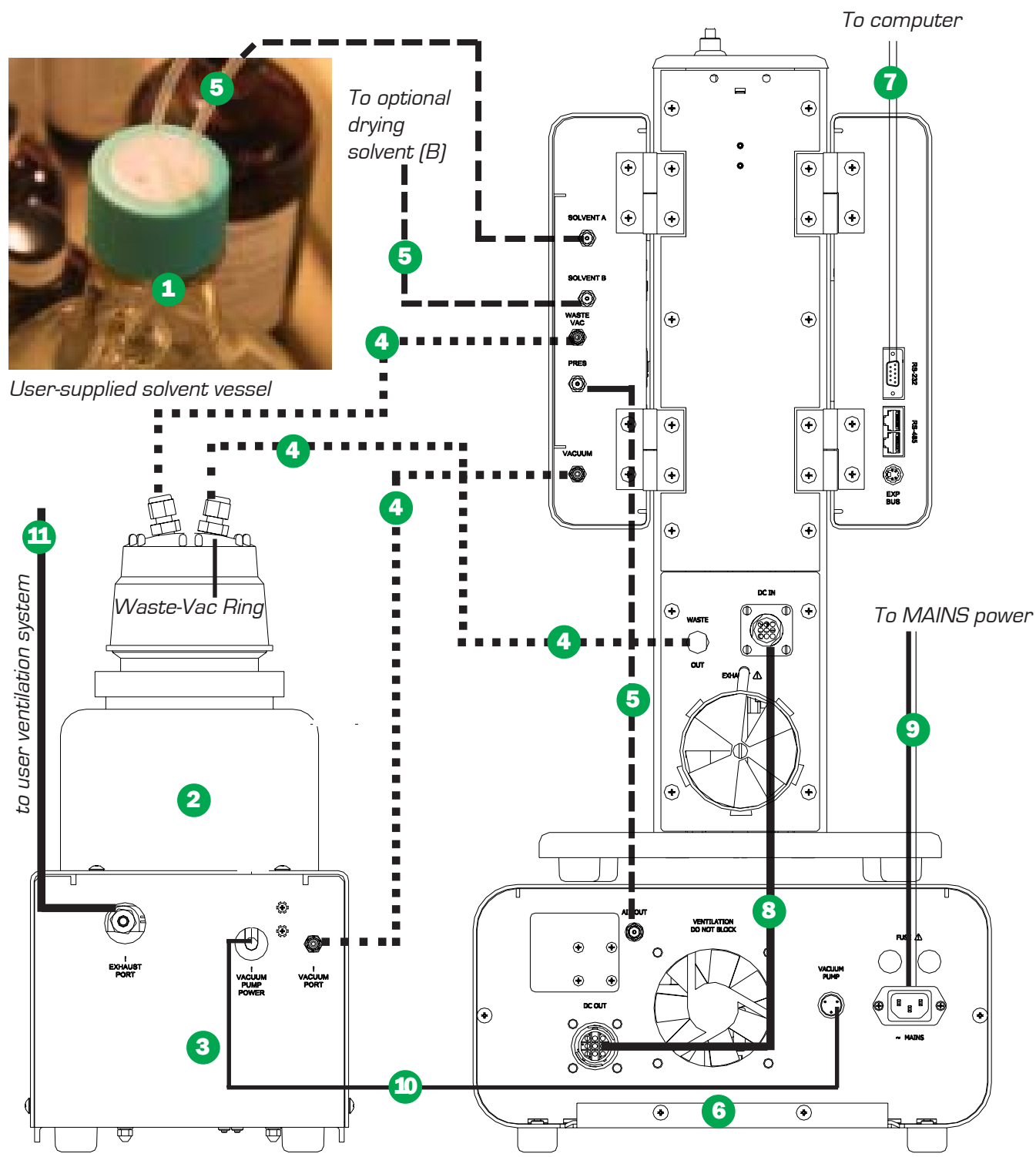
⚠️ **CAUTION**   *When moving or positioning the miniAV unit, do not lift it by the side panel units ("ears"). Hinges on these modular components are designed for easy removal. Always support the miniAV unit from the base.*

Vacuum Pump unit connections

- Use the 1/4" blue opaque polyethylene tubing to vent exhaust from the Waste Receiver Assembly Exhaust port to the user ventilation system.
- Use the 6 mm FEP tubing to connect the Vacuum Port to the bath unit Vacuum connector.
- Use the Waste Receiver Assembly power cable to provide AC power to the Vacuum Pump from the female Power Supply Vacuum Pump AC connector.

Bath unit connections

- Use the 1/8" FEP line to connect from the Solvent A fitting to the user-supplied solvent container. Insert the end of the solvent tube through the bottle cap (see NOTE below) and screw the 20-micron filter onto the tube end. If using two solvents, do the same for the (optional) Solvent B fitting.

NOTE   *CANNON provides two G-38 reagent bottle caps for user solvent containers.*

- Use the 6 mm FEP tubing to connect the 6 mm Waste Vac port to the 6 mm Waste/Vacuum fitting on the waste bottle lid.
- Use the 1/8" FEP to connect the Pres[sure] barbed fitting to the Air Out barbed fitting on the Power Supply unit.
- Use the RS-232 cable to connect from the RS-232 port to the computer connection. For multi-unit RS-485 connections, see APPENDIX A.
- Use the 6 mm FEP union to connect the protruding 6 mm FEP waste tube from the bath unit to the 6 mm FEP tubing. Then connect the other end of the 6 mm FEP tubing to the 6 mm fitting on the Waste Receiver lid.
- Use the DC power cable to connect the bath unit DC IN to the DC OUT on the power supply.
- Use the MAINS power cord to connect the Power Supply to the MAINS power outlet matching the voltage specifications on the Power Supply rear panel

VISCPRO® for Windows® XP®

VISCPRO® is a powerful software product designed to provide a generic instrument interface for controlling and operating your **CANNON**® instrument(s) via computer. All instrument functions necessary for testing are controlled via computer. VISCPRO® also includes reporting/analysis modules for processing and displaying sample data.

Installing VISCPRO® software

To install the VISCPRO® software, follow the instructions below in the sequence presented. Make certain that you complete the sections on checking instrument settings and initial calibration data. If you encounter difficulties at any stage in the installation process, call **CANNON®** service at 814-353-8000.

Computer requirements

Consult **CANNON®** Instrument Company at 814-353-8000 for current computer specifications. The computer should be a PC with a working version of the Windows® XP® operating system installed.

Windows® XP® installation

1. Turn on your computer. Wait for the Windows® software to load.

2. Insert the VISCPRO® installation CD-ROM into the disk drive. If the installation program does not begin automatically, click the Control Panel option from the Windows® Start Bar. Then double-click the Add/Remove Programs icon and follow the Windows® prompts to complete the installation procedure. The executable file for VISCPRO® software installation is SETUP.EXE.

Installation actions

The installation program will:

■ create a directory for your program files. The default directory is C:\Program Files\Cannon Instrument\VISCPRO.
■ write SETUP information to the Windows® registry.
■ copy the software executable file and other necessary files to the directory you specify.
■ update other files in your Windows® directories to versions fully compatible with the current VISCPRO® software.
■ place a shortcut icon for the VISCPRO® executable file on your Windows® desktop.
■ place a copy of the VISCPRO database in the appropriate directory for your operating system (see table below). The installation CD-ROM copy of the SAMPLES.MDB file contains initial factory calibration data unique to that instrument.

Operating System	Default Data Directory (recommended)
Windows 2000, XP	C:\Documents and Settings\All Users\Application\CannonInstrument\ViscPro\2.0\
Windows NT	C:\WinNT\Profiles\All Users\Application Data\ CannonInstrument\ViscPro\2.0\
Windows 98, ME	C:\Windows\All Users\Application Data\CannonInstrument\ViscPro\2.0\
Windows Vista, 7	C:\ProgramData\CannonInstrument\ViscPro\2.0\
NOTE: You can also search for the **samples.mdb** *file on the C:\ drive to locate this information for your specific computer. If directories are not visible, make certain the "Show hidden files and folders" option is selected for your viewer.*	

Running the software

the VISCPRO II icon

Provide power to the miniAV instrument, and verify serial connections to the computer. To load your newly-installed VISCPRO® software, double-click on the VISCPRO® icon on your Windows® desktop (Windows® NT® users can click Start/All Programs/VISCPRO/VISCPRO 2.0).

If you received a configuration disk with your installation package, the software may have already been preconfigured with instrument settings unique to your laboratory, including instrument type(s), tube range and serial #, and calibration constants. In a moment, we will verify these settings. The image below demonstrates a typical screen configuration:

Title Bar
Menu Bar

Sample Input window

Status bar

Analysis window
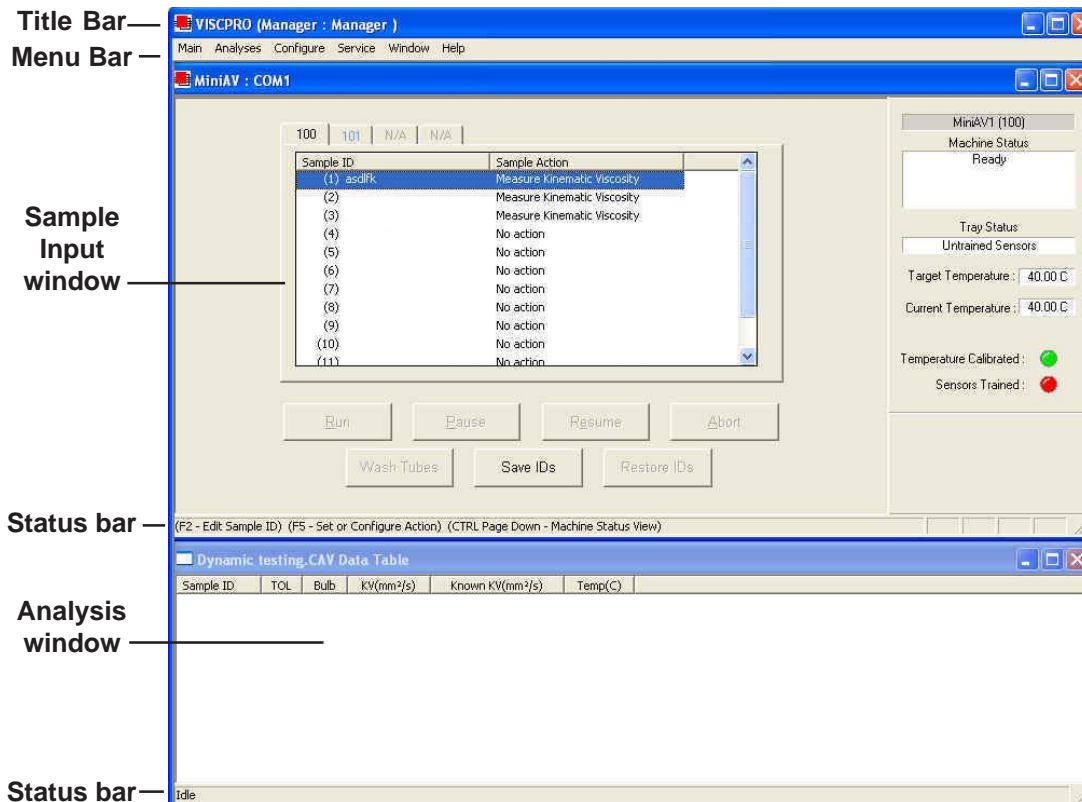
Status bar

The VISCPRO® primary display

The VISCPRO® primary display window is framed on the top by the VISCPRO® title bar and menu bar, and on the bottom by the VISCPRO® status bar. The application window can be user-configured to include child windows (Sample Input or Machine Status windows, Analyses) which can be opened and closed independently. The Sample Input window describes your **CANNON**® instrument and provides controls for running tests. The Analysis window presents data from miniAV tests.
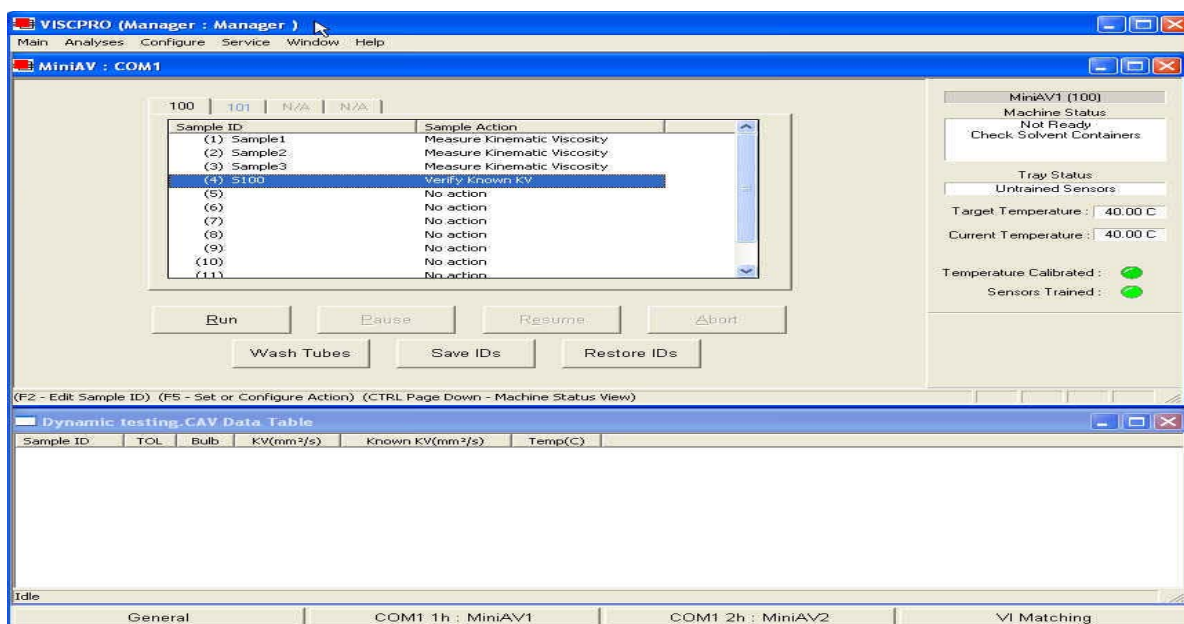
The Sample Input window

NOTE	*If the Sample Input window does not appear when the software loads, click* View Instrument *from the Main menu, then click the desired instrument group (type of instrument, e.g. miniAV, CCS, AV-2100) from the list of available instruments and click* OK. *If the* Available Instruments *list box is blank, your miniAV instrument may not be on-line. Check cable connections and make certain the unit power switch is ON.*
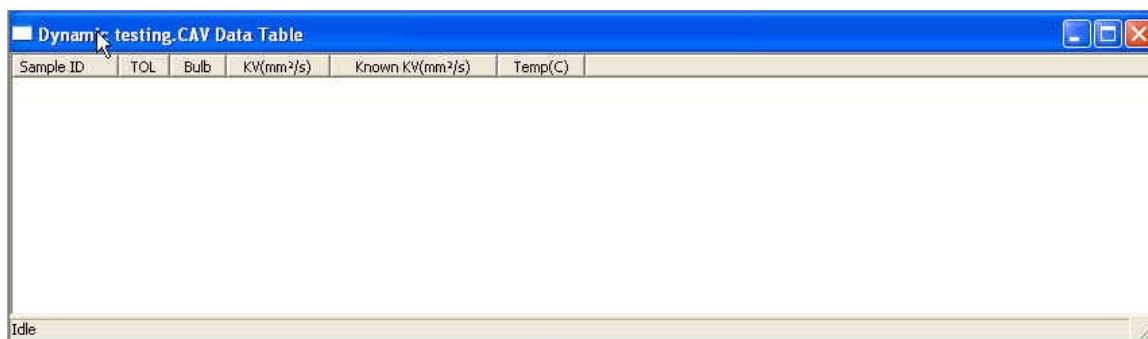
The Data Table analysis/report window (displays data from completed tests)

Checking configuration

Initial configuration

The installation CD-ROM copy of the SAMPLES.MDB file contains initial factory calibration data unique to that instrument.

Follow the procedures in the next several sections of this chapter to verify/edit the instrument and calibration settings to ensure that they conform to the actual characteristics of your **CANNON**® instrument.

Configuration protection

It is not necessary to log in to view current instrument settings. However, to change the configuration settings, you must log in to the security system as a manager. The software is installed with a default Manager account. This account has no password, allowing any operator access to manager-level software functions as long as the password is not activated/changed. If you would like to engage the full-release security options, see *Security Options* in Chapter 4 for instructions.

Logging in

1. Use your mouse to click Main from the VISCPRO® menu bar.

2. Click Log In from the Main menu options.

3. Click on the ▼ (arrow) on the right side of the User Name: list box to display the list of registered users.

4. Click Manager. Do NOT enter a password unless you have previously set up the Manager account with a password.
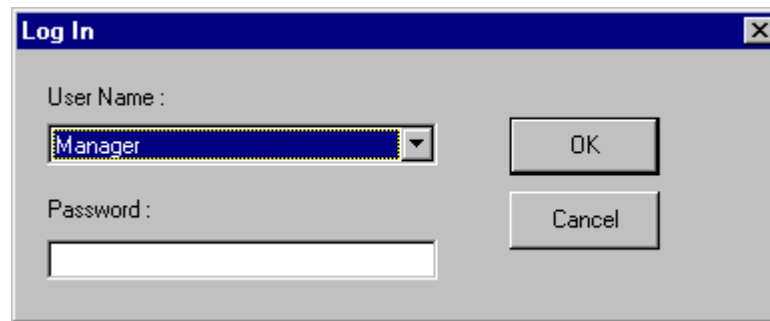
5. Click OK. The Log In window will close automatically and you will be logged in as management personnel.

Checking Instrument Settings

1. Use your mouse to click (select) Configure from the VISCPRO® menu bar.

2. Select your instrument from the list of available instruments (there may be only one instrument in the list).

3. Select Instrument Settings from the list of configuration options. The Instrument Settings window will appear.

Instrument Settings...

You will use the Instrument Settings window (see below) to describe and control miniAV instrument operational features. These settings affect the instrument as a whole. Check the instrument settings for your instrument per the instructions below, and make any necessary changes:
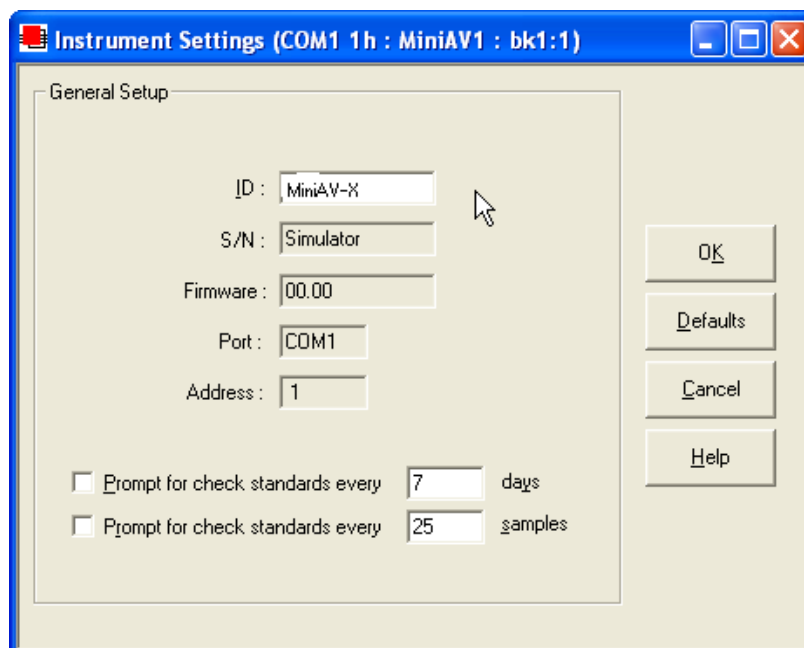
The Instrument Settings window

ID :   CAV--LAB1

Use the ID field to input instrument identification information using up to 16 alphanumeric characters.

S/N :   4502

The S/N: field (non-editable) indicates the serial number from the label on the miniAV rear service panel.

Prompt options

The *Prompt for Check Standards* options permit you to set a computerized "alarm clock" which will pop up a message reminder to run a check standard based on the schedule you set with the control. Notice that you can specify a reminder after "x" number of days and/or "x" number of samples. Click the check box(es) to enable/disable each reminder.

When you have verified all settings, click OK.

Viewing/editing setup information

1. Click Configure from the VISCPRO® menu bar.

2. Select your instrument group and instrument from the list of available instruments.

3. Select Tray Settings: Tube and Bath from the list of configuration options. The Tray Settings: Tube and Bath window will appear.
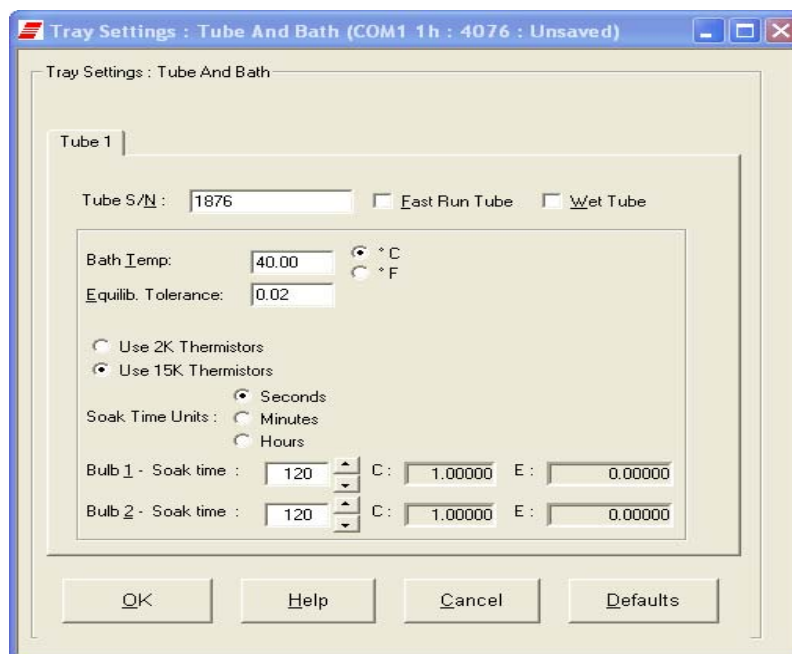
The Tray Settings: Tube and Bath window

The Tray Settings: Tube and Bath window contains setup information for each tube associated with your instrument. On multiple-tube CANNON instruments, you can click on the tube tabs to see the setup information for different tubes.

4. Verify that the tube serial number (Tube S/N) is correct. If it is not, input the correct serial number in the text box. <u>Each tube should have a unique serial number</u>!

5. Verify the presence of calibration values (C and E) for each bulb. If calibration data is not available, the default values are C=1 and E=0.

Sample calibration constants

Manually changing tube calibration constants

If you discovered any errors in the values of the calibration constants (see previous section), follow the directions in this section to manually correct them using calibration information previously obtained for your unit. If the calibration values are correct, instrument setup is complete.

NOTE

*This procedure for manually entering/changing calibration constants bypasses the normal calibration procedure. To ensure the most accurate viscosity readings, **CANNON**® Instrument Company recommends that the instrument be calibrated per the calibration procedure outlined in Chapter 3.*

1. Log in as a Manager and click Configure from the VISCPRO® menu bar.

2. Select your instrument from the list of available instruments.

3. Select Calibration from the list of configuration options. The Calibration window will appear (see next page).

The Calibration window provides controls for calibrating each bulb of any viscometer associated with your instrument. You can click on the bulb spin controls to display current constants and valid check standard data available for calibration of each bulb.

Procedure

1. Make sure that the spin controls for Bulb are set to "1":
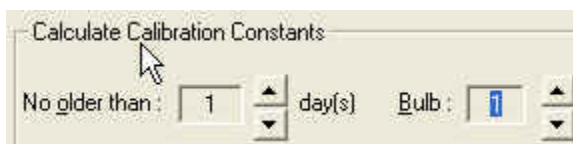
This corresponds to the bottom bulb in the tube.

2. Check the values for the calibration constant(s) as they appear at the bottom of the window:
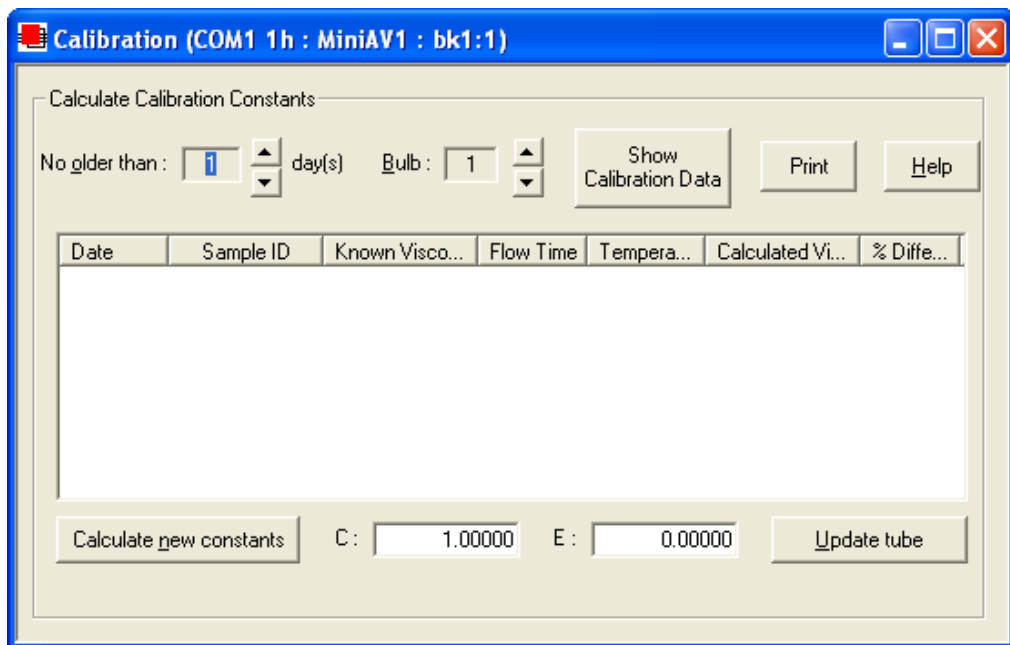
The Calibration window

Compare this value to your archive of the calibration constant data (if available) for bulb 1. The values should be identical.

3. If they are not, place your cursor in the appropriate field, delete the entry, then type the correct values for the constant in the text box.

4. Click Update tube [Update tube] .

5. Use the bulb spin controls [⬆⬇] to select the other bulb(s) for which you noted calibration constant errors. Input the correct values for each. Make certain to click Update Tube after you have corrected **C** and **E** calibration values for each bulb BEFORE selecting the next bulb.

6. When you have entered corrected constant values for each bulb on both tubes, click [✖] to exit the Calibration window.

You have verified the software configuration of VISCPRO®. To test samples with your instrument, follow the instructions in Chapter 2. For additional details regarding operating procedures for your instrument or software, consult the appropriate section of this manual.

Checking Wash and Advanced Settings

To check Wash Settings for your miniAV instrument, click Configure from the VISCPRO menu options and select the desired instrument. Then click Tray Settings: Wash. The Tray Settings: Wash window will appear.
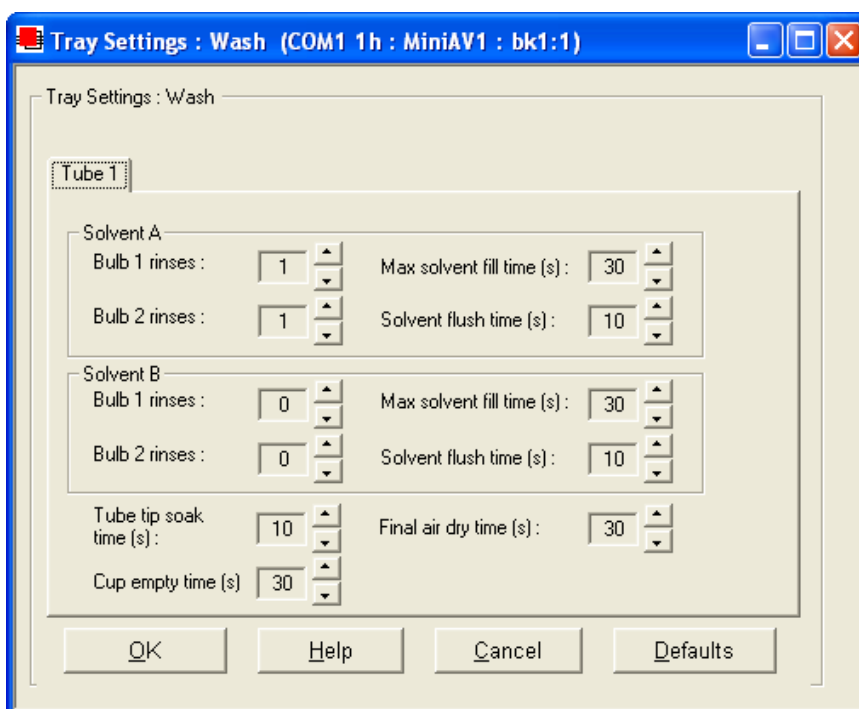
Compare the values in the Tray Settings: Wash window with your archived values and make any necessary changes; then click OK.

To check Advanced Settings for your miniAV instrument, click Configure from the VISCPRO menu options and select the desired instrument. Then click Tray Settings: Advanced. The Tray Settings: Advanced window will appear.
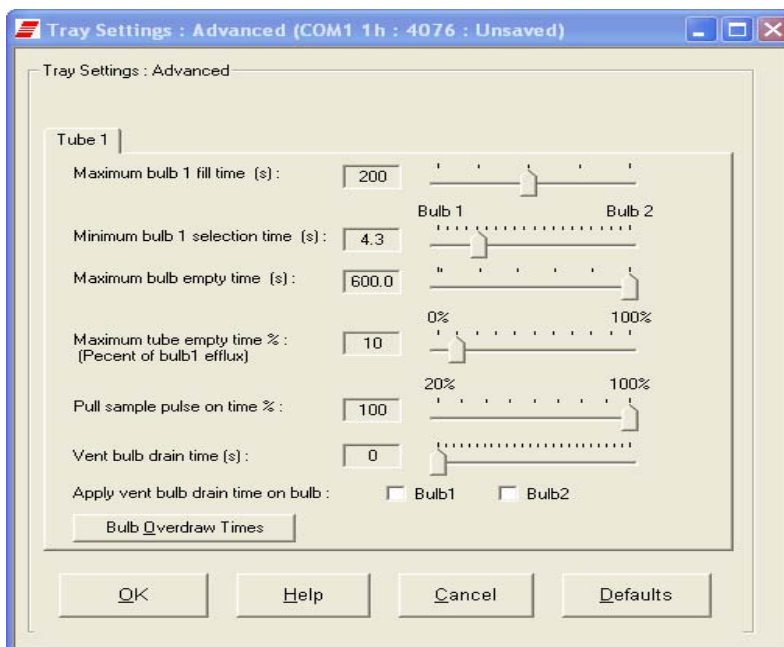
Compare the values in the Tray Settings: Advanced window with your archived values and make any necessary changes; then click OK.

Preparing the miniAV for testing

Inserting the miniAV temperature probes/reference thermometer

Inserting the probes

The temperature probe and thermal fuse probe are semi-permanently installed. Initial installation or replacement requires removal of the top cover of the bath unit. The probes are inserted through the narrow aperture on the top bath flange and held in place with a sliding metal plate (friction fitting) secured with a thumbscrew.

miniAV top bath flange
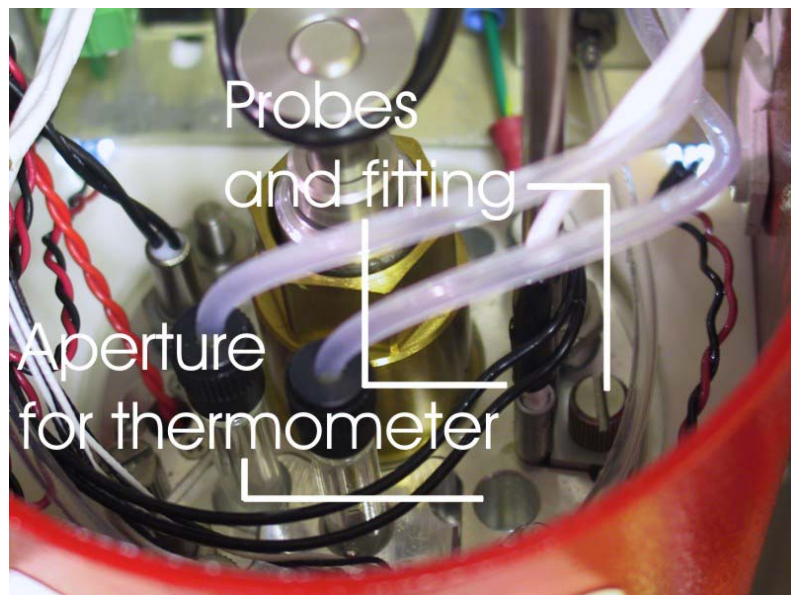
Inserting the thermometer

The ASTM reference thermometer/adapter assembly can be inserted through the grommet in the bath top cover and through the larger circular aperture on the top bath flange (see photo image above). The assembly includes a stop collar with set screw that can be adjusted to vary the thermometer height.

⚠ **CAUTION** *Do NOT insert a reference thermometer while the miniAV bath impeller is operating, as damage to the thermometer and/or viscometer tube may result. Make certain to insert the appropriate reference thermometer for the current bath temperature! Use appropriate safety procedures when handling the thermometer, as it contains mercury.*

NOTE	*If using the ERTCO-HART 12" temperature probe in place of the ASTM thermometer, it will be necessary to remove the grommet in the bath top cover prior to inserting the probe. The probe will seat properly in the aperture left by the grommet removal.*

Adjusting Vacuum/Pressure settings

To adjust the vacuum setting for the miniAV, click Service from the VISCPRO menu options and select the desired instrument group and instrument. Then click Adjust Vacuum/Pressure to open the Adjust Vacuum/Pressure window.
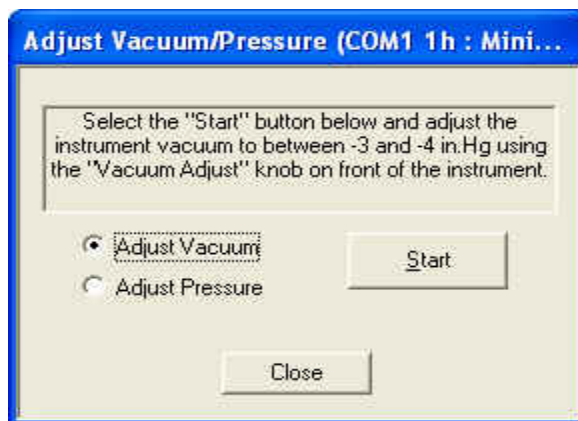
Select the desired adjustment (vacuum or pressure) and then follow the screen prompts to complete the adjustment procedure, using the appropriate controls on the instrument side ("ear") panel. The prompts will display recommended vacuum/pressure settings and will also indicate how adjustments may be made to alter the settings.

Setting bath temperature

⚠ ***WARNING*** *Prior to setting the bath temperature, ensure that the reference thermometer in the bath is suitable for the desired temperature range. If not, remove thermometer from the bath. If the bath temperature rises above the range of the thermometer, it may be damaged. Mercury thermometers pose particular problems, since mercury from a damaged thermometer may circulate with bath fluid.*

To set the temperature:
1. Load the VISCPRO® software and click Configuration.

2. Select the miniAV from the list of available instruments and click Tray Settings: Tube and Bath.
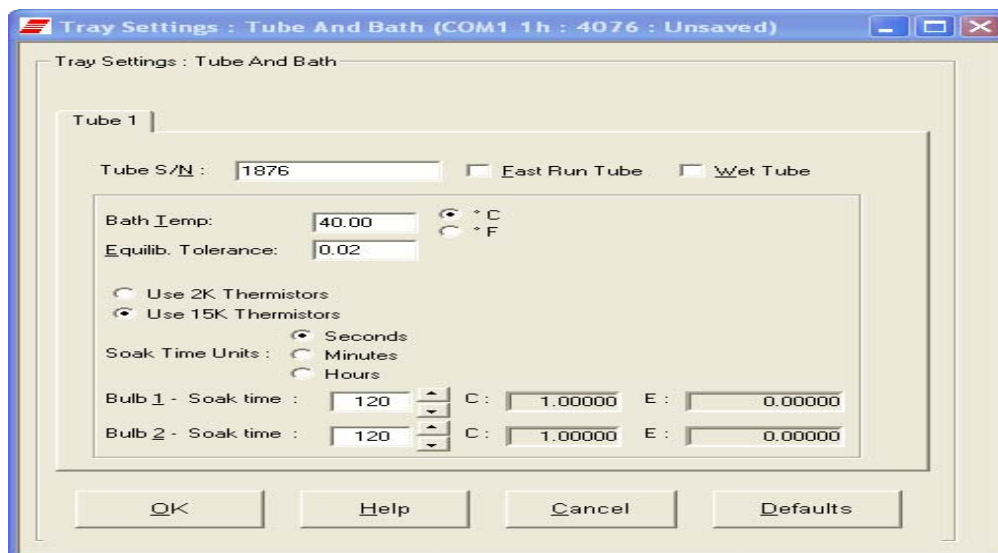
3. Select the desired unit of temperature measurement (°C or °F).

4. Type the desired temperature in the Bath Temp: field. Acceptable values are any numbers between 20°C and 100°C. If necessary, you may use the decimal point key to input temperature to the nearest 0.01°C. Press OK to save the temperature setting.

NOTES   *The miniAV will not allow sample testing until the instrument has equili-brated temperature at the test temperature.*

To cancel temperature selection before completing the procedure, click Cancel*.*

After the target temperature has been set, the miniAV bath temperature will be adjusted to the target temperature and the bath will equilibrate at the test temperature. The VISCPRO II software always displays the current and target bath temperature in the Sample Input window.

Checking wash functions

To ensure function of the solvent wash system, follow the procedure below:

1. Place an empty vial in the sample vial holder and raise the holder assembly to its highest position.

2. Select Wash viscometer tube to open the Wash viscometer tube window.

3. Click Begin Wash to initiate the wash cycle. The Status: indicator will display and update current actions.

Bypass .... option   To begin washing an evacuated sample cup, click the option box to make certain that the Bypass initial cup evacuation option is selected. Do not use this option with a filled cup or the cup will overflow.

Release Cup

Click the Release Cup option to lower the sample vial to its rest position.

4. When the Wash cycle has been completed, click Done to exit the Wash viscometer tube window.

NOTES

The Wash operation cannot be executed if the tube is currently running a sample. To terminate the Wash cycle at any time, click Abort Wash.

⚠️ **CAUTION**

The Wash viscometer tube *function overrides automatic miniAV software operations. Verify that the tubes are clean and dry before initiating computer-controlled sample testing.*

Training tube sensors

MiniAV tube sensors must be trained in order for the instrument to properly perform test functions. To train miniAV sensors, follow the instructions in Chapter 3. Also, temperature should be calibrated before training.

Calibrating the miniAV

To ensure accurate test results, your instrument may need to be calibrated. If necessary, follow the instructions in Chapter 3 to calibrate your miniAV temperature probe and viscometer tube.

Notes on computer-directed miniAV operation

A computer is required for miniAV operation. The computer provides for automatic control of miniAV functions using the VISCPRO® controlling software. Computer control permits data entry of up to a dozen different sample IDs. Each of the identified samples can then be tested with the miniAV instrument.

Reporting data

Test data for the samples is automatically saved to the VISCPRO® database for future reporting/data collection. Additionally, several reports (analyses) may be used to calculate and display kinematic viscosity and viscosity index (VI) values. See the chapters on VISCPRO® analyses for further information.

All analyses provide a dynamic reporting option which can dynamically display and transmit test results as testing is completed. Data can be sent to your computer screen, printer, and/or serial port for in-house data collection. See Chapter 6 for more information on configuring analyses.

This page intentionally left blank.

CHAPTER 2

TESTING SAMPLES WITH THE miniAV AUTOMATIC VISCOMETER

This chapter of the manual will provide information on testing samples using the miniAV. Observe the safety cautions noted in the introductory chapter when operating equipment. The miniAV should only be operated by qualified personnel.

Turning on the miniAV

Turn on the miniAV Bath Unit using the power switch on the power supply unit.

Testing samples

Loading software

1. Turn on the computer and load the miniAV software by double-clicking the VISCPRO® icon on the Desktop.

NOTES

If the software is already loaded, use your computer mouse to click Main *from the menu bar and click* Poll for Instruments *from the* Main *menu options. This will establish communications between the computer and the on-line instrument.*

Permit the bath to stabilize at test temperature before testing samples.

2. Pour sample material into the glass vial(s). For 20 mL vials, fill only half full, as the viscometer tube will displace sample in the vial. Approximately 10 mL of sample should be sufficient for testing in either bulb of the viscometer.

NOTES

Do not overfill the vials. Sample overflow may create problems for the tube cleaning cycle.

You should periodically test calibration check standards per your established laboratory procedures. Recalibrate the miniAV (see Chapter 3, Calibration*) if result variance warrants.*

3. Place the sample vial in the holder underneath the viscometer tube.

Filled sample vial

Vial in raised position

4. Raise the holder until the magnetic coupling engages (see photo image). The viscometer tube tip will be touching the bottom of the sample vial.

5. Check the thermometer in the temperature bath to make sure the bath is holding the proper temperature. If necessary, calibrate the miniAV temperature control probe using the temperature calibration procedure in Chapter 3.

6. Open the View Instrument Group window (if it is not already open) by clicking View Instrument from the Main menu and selecting the desired instrument group from the list box (see Chapter 4 for more information).

The View Instrument Group *window*

7. Select the desired Group Id and Click OK to display the Sample Input View.
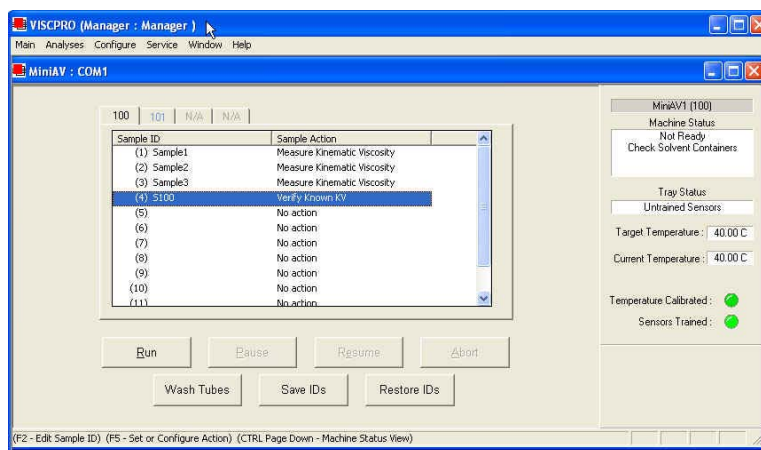
The Sample Input window (miniAV four–bath system)

Then click the Tray tab corresponding with the desired miniAV.

8. Double-click on Sample ID (1) with the left mouse button to access the sample ID data entry field (or press F2).

9. Enter sample ID information in the sample list box using your computer keyboard. After you have typed the sample ID, press the Tab⇆ key to complete the entry and move the cursor to the next Sample ID field. Or press Enter↵ to complete the entry.

NOTE   *Once sample information is entered, the software automatically assigns a sample action,* Measure Sample Viscosity, *for the sample. If you do not enter a sample ID, the sample is automatically labeled* Unknown.

To select or change a sample *action*, highlight the appropriate Sample ID(s) using the mouse or arrow keys, then click the RIGHT mouse button to access sample action options:

```
0 No action
1 Measure Kinematic Viscosity
2 Verify Known KV

Configure
```
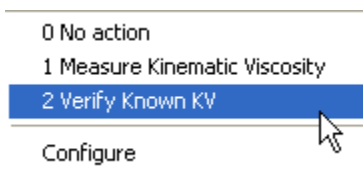
Then you may select the desired action by highlighting it with the mouse and clicking the left mouse button.

NOTE   *For additional information on software data entry features, including multiple sample selection and cut & paste options, see* Testing samples—software options *in Chapter 4.*

Running check standards   If Verify Known KV is selected as the test option for a sample, the Viscosity Action window will open automatically. Enter the necessary check standard data, including the Check Standard viscosity from the standard bottle, and click OK to complete data entry. To revise or confirm standard data, right-click on the desired sample ID from the list box and select Configure from the popup menu choices.

NOTE   *See Chapter 4 for additional information on the* Viscosity Action *window.*

10. Continue entering sample information for all desired trays. When sample ID data entry is complete, check the Tray Status window to verify that all trays are ready for testing.

11. Click on the RUN button at the bottom of the Sample Input window. The Select Trays window will open if more than one miniAV instrument is online.

12. If necessary, click on the check box(es) to select the desired prepared "tray" (sample sequence) for automatic testing. For the miniAV, a tray corresponds to the miniAV instrument. Then click OK to begin the miniAV test(s).

Pausing a test

To temporarily halt testing for a given tube/sample, click the Pause button from the Sample Input window. Then select the desired tray (miniAV instrument) and pause action(s) from the Select Trays window (Pause Now will immediately pause test actions; Pause after current sample will pause testing after the current test is complete). Click OK to pause testing for the selected tray(s).

NOTE   *If the test was paused prior to the initiation of the* Wash *cycle, drop time data for that sample will be discarded.*

Resuming a test

To resume test actions for paused trays, click the Resume button from the Sample Input window. Then select the desired trays from the Select Trays window. Click OK to resume sample testing (see note above).

Aborting a test

To permanently halt testing for a given tube/tray, click the Abort button from the Sample Input window. Then select the desired trays from the Select Trays window. Click OK to abort testing for the selected tray.

NOTE   *Aborting a test clears all sample test information for that tray. If test actions are aborted, it is the responsibility of the user to restore the instrument to a safe state before running tests (see* Service menu options *in chapter 4 for more information on tube washing and drying).*

Concluding a test

After automatic testing has been completed, make certain that:

1. the sample vial carrier is in the lowered position.

⚠ *CAUTION*   *Use appropriate procedures when handling warm sample vials to avoid the possibility of burns.*

2. the Machine Status (as indicated in the VISCPRO® Sample Input **Machine Status** window), is READY, and

3. the Tray Status for the tube, as indicated in the VISCPRO® Sample Input **Tray Status** window, is IDLE. Kinematic viscosity for any tested samples will be displayed in the Sample Action column in the action list for the selected tube.

Then press Resume to clear data and begin testing the next sample.

If necessary, wipe any excess oil from the base of the miniAV, sample vial and vial holder using an absorbent paper towel. If necessary, clean these components before reuse by wiping with a paper towel wetted with appropriate solvent.

Working with Instrument Groups

VISCPRO II provides a convenient interface for working with multiple CANNON instruments simultaneously. Rather than requiring the user to open individual Instrument Views for each online instrument, the Sample Input window (formerly the Instrument View window in VISCPRO) provides individual tabs for each viscometer tube, making it easy to enter sample information for up to four different instruments. The Machine Status window makes it possible to monitor the performance of all instruments in an Instrument Group simultaneously.

Here's how it works: Just click Main/View Instrument from the VISCPRO II interface to open the View Instrument Group window, which displays all CANNON instrument types communicating with your computer. Then select the desired instrument group (all instruments in a single group communicate with the computer via the same COM port).

Once you have opened the desired instrument group, the Sample Input window will appear. Individual TABBED PAGES now make it possible to enter sample information for any viscometer in the instrument group.
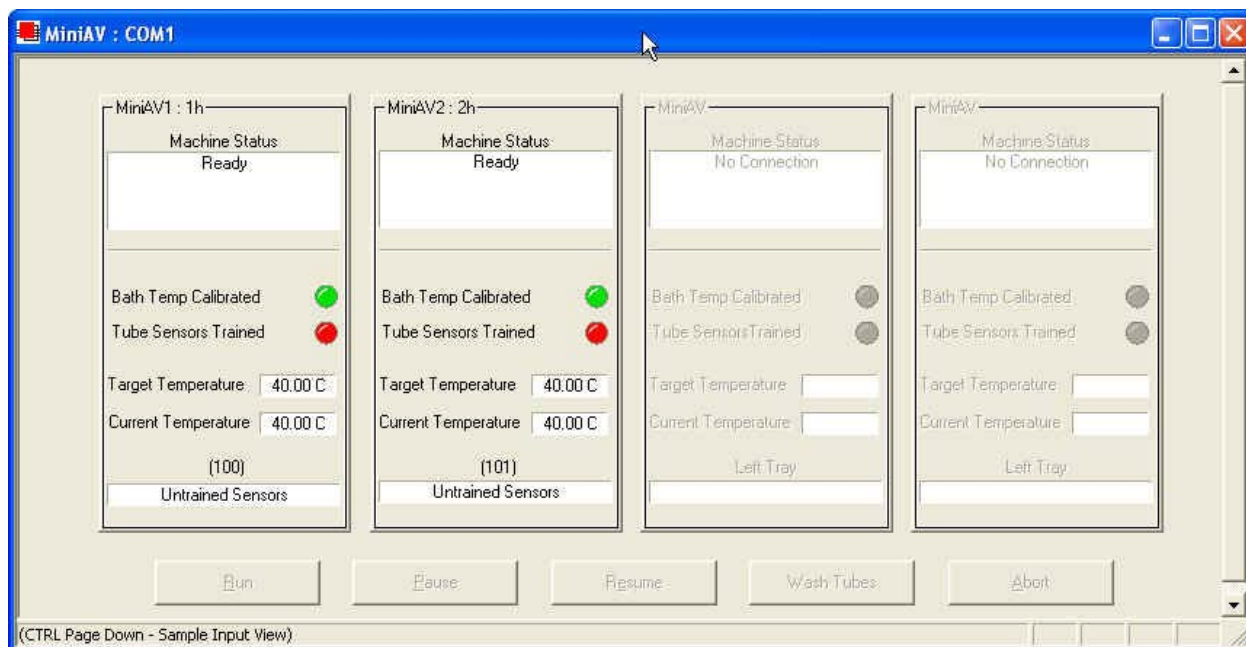
The Machine Status window

You can toggle back and forth between the Sample Input window and the new instrument group Machine Status window by pressing Ctrl-Page Down.

Monitoring instrument status   You can monitor the status of all instruments in an instrument group by pressing Ctrl-Page Down from the Sample Input window to display the Machine Status window. To return to the Sample Input window, press Ctrl-Page Down again. In the image above, instruments three and four do not exist but could be accommodated in this instrument group. The "placeholders" for these instruments are grayed out to indicate that additional machines are not yet online for the group.

If additional instruments are online but are not appearing in the correct instrument group, check network connections and make certain that each instrument is turned on and functioning normally. Then click Main/Poll for Instruments to refresh communication with online instruments.

Group configuration

If your laboratory had 3 miniAV instruments with RS-485 connections, all could communicate with the computer via a single COM port, provided that they were all assigned different instrument addresses. Each instrument group provides its own Instrument View customized for that instrument type. The number of instruments that can be assigned per group varies per instrument type. The Cold-Cranking Simulator (CCS) design allows only one instrument per group for that instrument type.

When a new type of instrument is found on a port, the VISCPRO software automatically creates a group for that instrument. The maximum number of instruments that can exist on that port is determined by the nature of the instrument. A single COM port may be used for communication with multiple instrument types as long as the total number of instruments associated with the port does not exceed the maximum number of instruments capable of being displayed in the group that can contain the least number of instruments (usually four).

Configuring the Machine Status window to correspond with multiple-instrument placement

It is desirable to configure your miniAV instruments so that the VISCPRO software computer interface display for the instrument group (Machine Status window) corresponds with the actual physical placement of the multiple instruments in the laboratory.

Use a screwdriver to adjust the arrow on the instrument address dial (inside the miniAV left wing panel) to assign each instrument in the group a unique address using numbers 1-4 from left to right.

NOTE	*Do not use "0" or "9" as an instrument address for this configuration option.*

When configured per the above instructions, the instruments will always be displayed in the same "sequence" in the Machine Status window even if a single instrument in the series is not online.

Viewing test results

Data obtained from all miniAV instruments during sample testing is promptly displayed in the Sample Input window (Sample Action column). It is also stored in the central VISCPRO® database. To view historical data, you must create an analysis requesting the desired sample information.

The following analyses are shipped with the software:

- AV Data Table—displays test information of your choosing.
- Error Log Table–lists error messages and related data.
- Standard VI Table—provides a report of matched samples according to configuration information you provide.
- Error Data, Sample Data and VI Data Export Analyses–configures data for output to a file, parallel port, or serial port.

Creating an analysis

The following procedure creates a standard AV Data Table which will be updated as samples are tested. For additional information on analyses, consult the manual chapter corresponding to the desired analysis.

1. Select Analyses from the VISCPRO® primary menu options.

2. Select View Analysis ... from the Analyses menu. The Choose Analysis window will appear.

3. Double-click on Basic Package.

4. Click on AV Data Table to reveal the available analyses.

5. Click on the Define and Open New Configuration radio button ⊙ (or verify that the option is selected).

6. Click OK. The Sample Analysis Configuration window will appear. The Sample Analysis Configuration window consists of tabbed pages with filter options appropriate for the analysis.

7. Click on Date Filter and then click the Use Dynamic Update check box. This option will update the displayed analysis with new data as samples are tested.

NOTE	*For additional information on analysis filter options, consult the manual chapter corresponding to the desired analysis.*

8. Click on the spin controls ⊞ to select a value for the sample time window (the time parameter you desire for the report of recent test data).

9. Configure any other report options (see Chapter 7 for details). Then click OK. The program will prompt you to save the analysis configuration.

10. Click Yes. (*OR* click NO to display the analysis without saving it.)

11. If Yes was selected, use your keyboard to type the name you wish to use for the analysis in the text box.

12. Click OK. The analysis will be saved and data obtained during the selected time window will be displayed.

Configuring the VI Matcher (optional)

VI Matching with VISCPRO®   The VI Matcher is a VISCPRO® software feature that functions in tandem with the VI analyses to enable Viscosity Index (VI) calculation from sample data residing in the VISCPRO® database. To configure the VI Matcher, see *Configuring the VI Matcher* in Chapter 4.

3

CALIBRATING THE miniAV

Calibration is essential for the proper operation of the miniAV. The miniAV is calibrated before it is shipped to the customer. It should be calibrated again after installation. Frequency of recalibration is at the discretion of the user. There are two types of calibrations—the temperature calibration ensures that the temperature probe readings conform to the reference thermometer, and the standard calibration ensures that the mathematical constants used in calculation of kinematic viscosity from sample flow times accurately reflect the unique properties of the viscometer tube. The temperature calibration should be performed first.

Calibrating temperature

Periodically, the temperature display of the miniAV Bath Unit should be verified using a reference thermometer for that temperature. The miniAV temperature control system permits the calibration of the bath temperature to agree with any temperature reference standard, including an ASTM thermometer mounted within the bath. The bath can be calibrated by the user whenever the bath temperature is stable for any given target temperature in degrees Celsius or Fahrenheit.

NOTE   *The calibration data is stored in the VISCOPRO II software database.*

It is important to remember when moving the miniAV from one PC to another, the samples.mdb file should also be copied to the new PC to keep from having to recalibrate the instrument. After calibrating the temperature (or changing any configuration setting) the user should save the instrument and tray settings-Save Instrument and Tray Settings under the Configure menu. [This will insure that the proper settings will be available if something happens, such as the serial port is changed.]

Calibration procedure

NOTE   *Depending on security level settings, it may be necessary for you to log in as a manager to complete the calibration.*

1. Set the bath to the desired calibration temperature and make certain the reference thermometer temperature has stabilized.

2. Click Service/Temperature Calibration for the desired instrument.

3. To calibrate temperature, enter the current temperature reading to the nearest 0.01°C into the Temperature: field, subject to the following:

■   A decimal point MAY be included as an entry. It should be preceded by at least two numbers or a "0".

■ The entered actual temperature must not cause a correction in temperature greater than +/- 5.0 degrees.

Multiple corrections

Multiple or successive entries of correction for any temperature are permissible. A newly entered corrected temperature is mathematically compensated with the previously entered correction and is stored in memory by the onboard microprocessor as the latest correction.

Data entry errors

The miniAV will not accept temperature reference data outside the parameters noted previously. If the amount of the correction (delta to displayed temperature) is too large, the correction will not be accepted.

General/Current Offsets

The General Bath Offset is factory-preset value affecting temperature control at all temperatures and should not ordinarily be changed. The Current Offset is the temperature adjustment applied to a particular temperature to conform bath temperature control to your temperature reference . Always click the radio button for the Apply As Current Option when calibrating for a specific temperature.

Training sensors

It is necessary to train instrument sensors in preparation for sample testing at a specific temperature. The training procedure establishes the proper power levels for sensor detection of the sample meniscus. The sensor training data is then stored by the miniAV instrument, and recalled when testing at that temperature. The sensor training procedure requires approximately 30 minutes (longer at lower temperatures).

NOTE

You will be prompted to train sensors by the instrument hardware or software whenever a new temperature is selected for miniAV operation. You will be unable to test samples until the training has been completed. Sensor training data remains valid until the sensors are retrained at the same temperature. Retraining is necessary only when the viscometer tube is changed, or if sensor performance changes over time.

Train Tube Sensors

To train tube sensors, click Service menu and select the Train Tube Sensors menu for the desired instrument. The Train Tube Sensors window will open.

Select the desired training parameters as follows:

Prewash option: Click the Prewash option if the tube is not clean and dry. VISCPRO will initiate a cleaning cycle using current wash configuration settings prior to initiating the sensor training procedure.

Trip Points Only option: Click the Trip Points Only option to adjust the senor trip points without setting the voltages. This is useful if it is necessary to adjust trip points on sensors for which voltages have already been set.

After selecting the desired training options click Start and follow the software prompts to complete the sensor training.

Standard tube calibration

During standard calibration, the software uses check standard data obtained from miniAV tests to perform the mathematical calculations necessary to derive new constants for each timing bulb of the viscometer tube. Then the VISCPRO software displays the new constants and computes a viscosity (in cSt) for each sample using the actual flow time of the check standards. The resulting viscosity calculation is compared with the known viscosity of the standard; absolute and comparative data is displayed on the computer screen.

NOTES

The software allows the operator to manually change the constants if necessary to more closely match the known viscosities of the standards.

A separate calibration must be performed for each temperature at which samples will be tested.

Calibration procedure

1. Assemble a group of **CANNON**® standard oils with known kine-matic viscosities for calibration. Use at least two different standards for each bulb. Refer to the following table when choosing the appro-priate standards.

Calibration Oil Selection Table	
TIMING BULB 1 (thermistors 2-1)	**TIMING BULB 2 (thermistors 3-1)**
10-100 x lower cSt limit	1-10 x lower cSt limit

2. Complete sample ID data entry for each standard.

3. After entering each sample ID, click on the highlighted ID entry using the RIGHT mouse button (or press F5). Then select Verify Known KV from the popup window. The Viscosity Action window will appear.

4. Enter the viscosity (in centistokes) for each sample from the standard bottle, along with other desired configuration settings; then click OK.

NOTE   If a check standard viscosity has NOT been entered (or if the default viscosity value of 1.000 has not been accepted by the user), a yellow arrow (current sample) or red circle caution symbol will appear to the left of the sample ID:

⚠ *CAUTION*   Make certain to enter the correct check standard viscosity (in centistokes) BEFORE running the standards. *Incorrect data entry may skew future calibration results.*

5. Click Run, then select the appropriate sample trays to test the standards.

6. When testing is completed, use the VISCPRO® software to log on as a Manager (Main/Log In) in order to access the calibration menu.

7. Select the desired miniAV instrument from the Configure menu; then select Calibration.
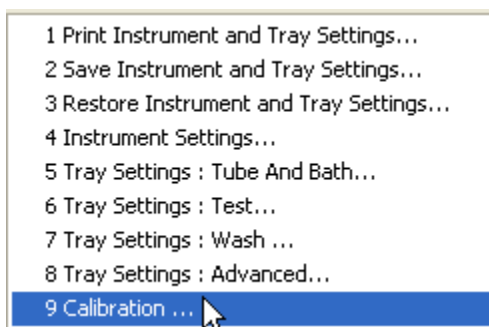
The Calibration window will open.

8. Select the date range for acceptable calibration data by using the No older than [x] days spin controls 🔼 to set the date search parameters (if "1" is selected, only data from the standards run in the last 24 hours will be listed). Any check standards from the time frame you specified which are appropriate for calibration calculations will appear in the window list box.
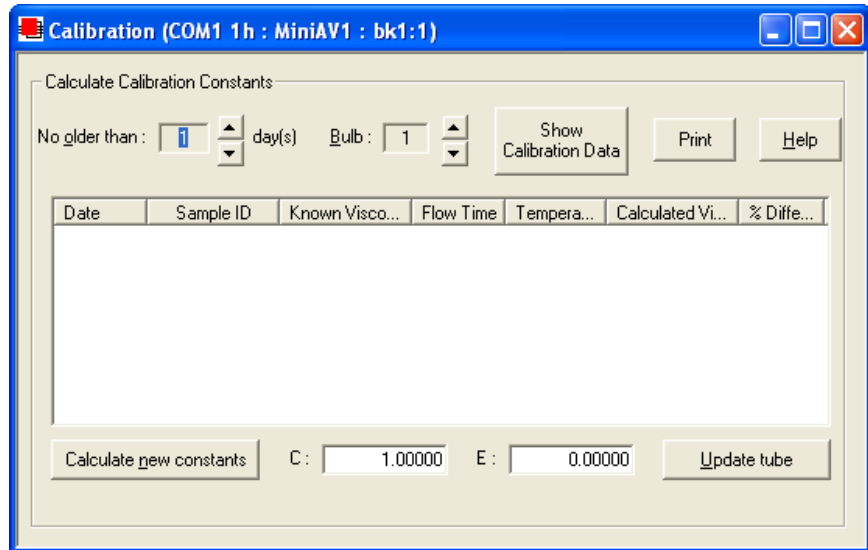
The miniAV Calibration window

9. Use the spin controls to select the desired Bulb for calibration.

Selecting samples

10. Select (or deselect) the specific sample entries you desire to use for calibration from the displayed list by clicking on them. To select a range of samples, highlight the first sample and click on the last sample while simultaneously pressing the Shift key. To select several individual samples for calculation, hold down the Ctrl key and click on each of the desired samples.

NOTE — You must select at least two entries or the software will not recalculate the constants.

11. When the desired samples have been selected, click on Calculate New Constants. The new constant(s) for that bulb, **C** and **E**, will be displayed in their respective fields at the bottom of the window.

You may evaluate the accuracy of the new calibration constants by comparing the known viscosity for the standard with the calculated viscosity for each standard selected for the new calibration. This difference is displayed as a percentage in the last column (% Diff) of the updated sample list box.

Comparing current/new data — The Show Calibration Data button is a toggle that will permit you to compare current and new calibration data and constant information. Press the Show Calibration Data button once to view the current calibration information. Note that the button name will change to Display Sample Data. Press the button again to display the new calibration parameters.

When/if you are satisfied with calculation results, click on Update Tube to save calibration values for the current configuration.

If the difference is still too great, repeat the calibration process until the difference falls within acceptable limits (refer to the precision statement in ASTM D 446). If the tube calibration fails repeatedly, refer to Chapter 5 for miniAV maintenance/service information.

12. When the new calibration constants are acceptable, click on Update tube to save the constants for the current instrument.

NOTES   *Once the* Update tube *button is pressed, the updated calibration constants are associated with the selected instrument, and will remain the same regardless of the instrument configuration defined for that instrument.*

You must click Update tube *before changing bulbs if you wish to save the new calibration constants for that bulb.*

13. Repeat steps 8-12 for all the timing bulbs. When the proper constants for all the timing bulbs have been determined, close the Calibration window.

14. Test several standards to verify a successful calibration.

Saving a calibration

When calibration is complete, the calibration information is saved to the current instrument configuration and will be displayed in the Tray Settings: Tube and Bath window. This calibration information will remain in effect until the instrument is recalibrated at that same temperature, or until instrument and tray settings from a previously-saved instrument configuration are restored.

To avoid losing valid calibration data, **CANNON**® recommends saving the instrument configuration settings after completing a new calibration (see *Saving a configuration*, chapter 4). The name for the instrument configuration might ordinarily identify the instrument, the calibration date, and the temperature:

EXAMPLE: `miniAV JAN10  40C`

After the instrument configuration has been saved, calibration data may be restored at any time using the Restore Instrument & Tray Settings option from the Configure menu. Note that the Restore Instrument Settings and Restore Tray Settings check boxes must both be selected to restore instrument calibration data:
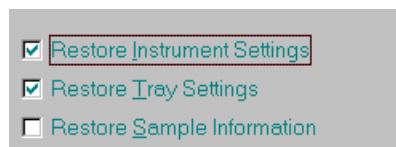
NOTE   *The* Restore Instrument Settings *and* Restore Tray Settings *options are security-protected at the Manager level.*

miniAV calibration equations

Viscosity calculation equation In the miniAV, viscosity is calculated by using the viscosity calculation equations as described in ASTM Methods D 445 and D 446. Because samples running in the miniAV can have short flow times, the kinetic energy correction term (E / t^2) is used as prescribed in the aforementioned ASTM methods. The VISCPRO® software for Windows® XP® performs all necessary calculations to derive constants **C** and **E**. These constants are used by the software when determining values for kinematic viscosity using sample drop times measured by the miniAV.

Kinematic Viscosity equation: $v = C\,t - E / t^2$

Where:
v = kinematic viscosity (cSt)
C = calibration constant (cSt/s)
E = kinetic energy correction (cSt·s^2)
t = flow time (seconds)

NOTE *When calibrating the miniAV, the operator should analyze the viscosity standard using double determinations to obtain two flow times for each standard. The **average** of the two flow times is used as input data for the calibration program.*

This page intentionally left blank.

USING THE miniAV SOFTWARE

VISCPRO® *generic instrument interface*

Your software for Windows® XP® is comprised of a generic instrument interface (VISCPRO®) and a collection of instrument/analysis-specific modules. This chapter of the manual will explain the software options for the VISCPRO® program and other modules commonly bundled with the instrument software. Additional software modules, customized software, and any additional documentation for add-on software options (if available), may be provided separately.
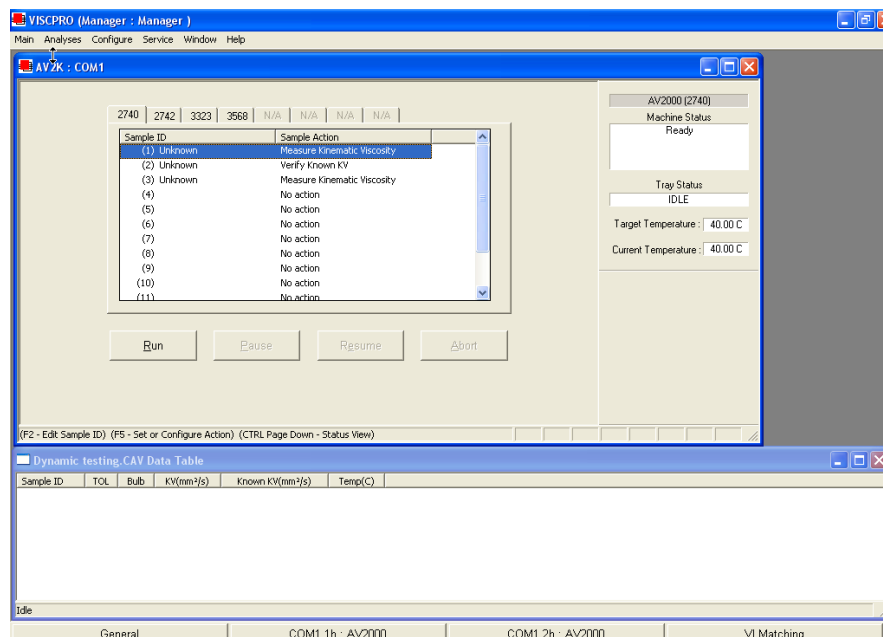
VISCPRO® *primary display with Instrument View and Analysis windows*

HELP system

Your software supports a complete HELP system. To access HELP for the software, click the HELP option from the VISCPRO® primary display. For context-sensitive HELP support for your interface, press F1 or click on the HELP buttons provided.

NOTE

Because the VISCPRO® *software is security-protected, some documented menu options may not be visible to technician-operators.*

Main Menu

View Instrument...

The View Instrument menu item opens the View Instrument Group window which permits you to select the desired test instrument type from the list of online instruments.

View Instrument Group

Available Instrument Groups :

Group ID	Type
COM1	AV2K
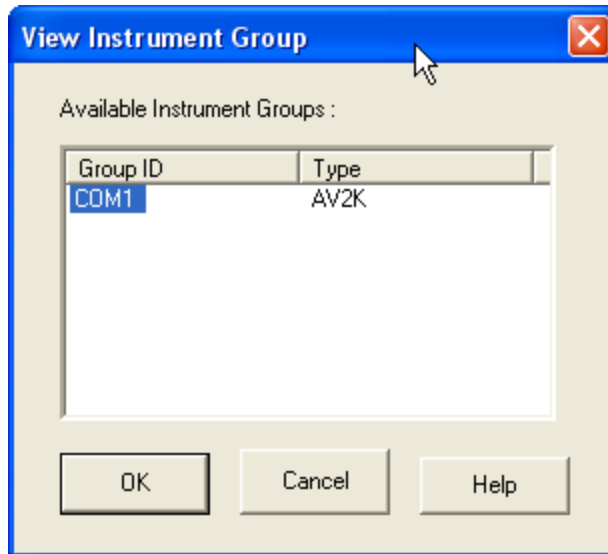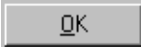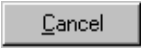
[OK]   [Cancel]   [Help]

The View Instrument Group window

The View Instrument Group window is comprised of:

■ The Instrument Group list box
■ Three button options (OK, Cancel, and Help).

View Instrument Group window button options:

[OK]   Opens the Sample Input window for the selected instrument group and restores any configuration settings for that group.

[Cancel]   Closes the View Instrument Group window without opening a Sample Input window.

[Help]   Accesses context-sensitive help.

Available Instruments: The Instrument Group list box in the View Instrument window displays a list of all on-line instruments.

To use the View Instrument Group window to open the desired instrument group from the list, click the GROUP ID associated with the desired instrument(s) to select it; then click OK.

Poll for Instruments

The Poll for Instruments menu item queries the hardware interface to establish communications with ***CANNON***® instruments attached to the host computer.

Use Poll for Instruments to establish a computer connection with instruments which may have come "on line" after the software has been in operation. When the connection has been verified by the controlling software via the hardware interface, the instrument name will be added to the status bar at the bottom of the VISCPRO® window.

Security options

The VISCPRO® application offers a level-based security system with a log in procedure. This system ensures that available software functions are appropriate for the security level of the user.

Initial security settings will be completed during miniAV installation. Following installation, security options may be accessed and changed from the VISCPRO® Main menu by individuals who have the manager password.

Each user can be assigned a security level, which is used to determine permitted operations. Three security levels are defined by the software: *Technician* (least privileged), *Manager* (intermediate privilege), and *Service* (maximum privilege–reserved for ***CANNON***® Instrument Company service personnel).

Users log in when using the software by typing their name and (optional) password in the Log In window (see next section). Different security levels offer different miniAV use options. Technicians are permitted to access operational features required for testing samples and performing other routine operations. Managers may access all advanced configuration and reporting options. The Service level permits access to all instrument and security parameters.

Initial security setup

The VISCPRO® software installation creates a security account for one manager with a blank password. After VISCPRO® installation, a password should be assigned for the manager using the Change Password menu option from Main. Managers may add or change accounts for technician status personnel.

Log In...

Use the Log In feature to identify the miniAV operator and/or access security functions.

NOTE

Once an operator is logged in, that operator's name is associated with any sample data obtained during that VISCPRO session. The operator name may be included in analyses.

Procedure

1. Click Log In from Main.

2. Select the desired name from the drop-down list box.

3. Type the password in the Password field for the individual selected.

4. Click OK.

Change Password...

Use the Change Password feature to change the current user password.

Procedure

1. Log in to the VISCPRO® software using the Log In command from Main.

2. Select Change Password from the Main menu options.

3. Type in the new password in the Password field.

4. Retype the password in the Confirm Your New Password field.

5. Click OK to save the new password and close the Change Password window.

Update User Information...

Use the Update User Information feature to update the security list of authorized miniAV technicians and managers. User information can only be updated by an individual logged in with a higher security clearance than the user for which information is to be altered. Manager status is necessary to change Technician information. Service status is necessary to change Manager information. To obtain Service status, it is necessary to select user CANNON Instrument Company from the Log In window and to type in the current *CANNON*® password. For the current password call *CANNON*® at (814) 353-8000.

Procedure

1. Click Log In from Main.

2. Select your Manager or Service level user name from the User Name list box. Input the correct password in the appropriate field.

3. Click OK.

4. Click Update User Information from Main.

5. Select the desired user from the User Name list box.

NOTE

To delete a user, just click Remove User *after selecting the user name. The account will be immediately and permanently removed.*

6. Enter and verify the desired password, and select user security status using the appropriate list boxes.

7. Retype the password in the Confirm Password field.

8. Click Add or Update User to save your changes.

9. Click Done to exit the Change User List window.

Log Out

To use the Log Out feature, click Log Out from Main. The current user will be logged out of the security list of authorized miniAV technicians and managers. The software will automatically reset to the lowest security level. Any ongoing test operations will continue.

Adjusting Security Settings

VISCPRO® provides an interface to customize security settings for your facility. To adjust the security settings for your VISCPRO® software, complete the procedure below:

1. Log in as a Manager.

2. Click Service and select the desired instrument. Then click Set Security Levels.
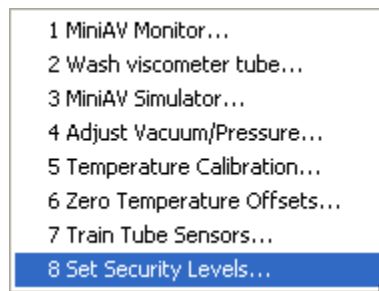
The Set Security Levels window will open.

3. To make changes to security settings displayed in the window, click the current security level for the software option you want to change; then click the desired setting (Technician or Manager) from the drop-down box displaying the security levels. When you are done, click OK to save your settings or click Cancel to exit the Set Security Levels window without making changes.
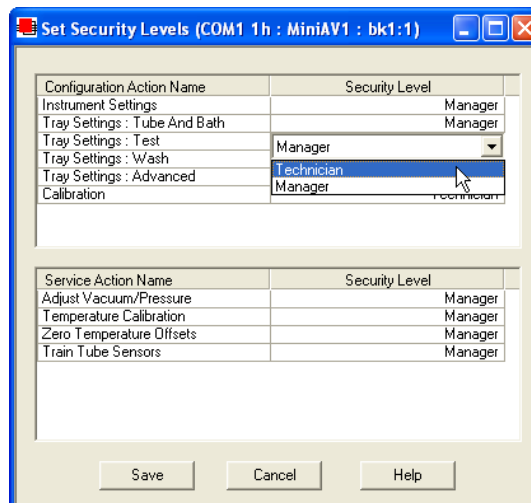
The Set Security Options window

Print/Print setup menu items

Print... Ctrl+P	Select this standard Windows® print option to access the Windows® print window. Then select print menu item for the currently-active analysis/ report (see *Analysis options*).
Print Setup...	Select this standard Windows® print menu item to access the print setup window. Check your printer driver documentation for additional information on print setup options.
Exit	Select the Exit option to exit VISCPRO. Or you may click ☒ on the application title bar.

⚠ **CAUTION**   *Exiting the application aborts current tests. It is the responsibility of the user to restore the miniAV to a safe state using* Wash Viscometer Tube *functions from the* Service *menu before resuming miniAV testing.*

Analyses Menu

Data obtained from all instruments during sample testing is stored in the central VISCPRO® database. To view data, you must create an analysis configuration requesting the desired sample information in the desired format. Analysis configurations can be saved and later restored. The analysis configuration options provide powerful tools for reporting sample information. Refer to Chapter 6 of this manual for general information on using the analysis options. For specific information regarding the individual analysis packages shipped with your software (e.g., *AV Data Table*, *VI Matching*), consult the manual chapter for that particular analysis.

Each analysis generates a report based on instrument data in the VISCPRO® database. The following analyses are shipped with the software:

Analysis types

- Error Data Export, Sample Data Export and VI Data Export analyses—configures data for output to a file, parallel port, or serial port.
- Error Log Table—lists error messages and related data.
- AV Data Table—displays test information and selected calculated data.
- Standard VI Table—provides a report of matched samples according to configuration information you provide.

Analyses menu options

The following VISCPRO® menu options are used to create and manage analyses:

- ■ View Analysis—opens the Choose Analysis window. See View Analysis, below, for more details.
- ■ Report Title—opens the Designate Report Title window. Permits data entry of up to three lines of text for the report title.
- ■ Configure Analysis—Accesses Configuration options. For information on configuring analyses, consult Chapter 6 and the manual chapter corresponding to the particular analysis.
- ■ Save Configuration—Opens the Save Configuration window. Type the desired file name in the Save As: field and click OK to save the configuration.

NOTE   *The* Configure Analysis *and* Save Analysis *options are only available from the Analyses menu when an analysis window is open.*

View Analysis ...

Select View Analysis to select an analysis from a list of available analyses or define a new analysis.

To display an analysis, click the View Analysis menu item from the Analyses menu. The Choose Analysis window will appear. The Choose Analysis window provides a list of available analyses in a list box on the left side of the window. The analyses are organized into similar groups using a directory tree structure.
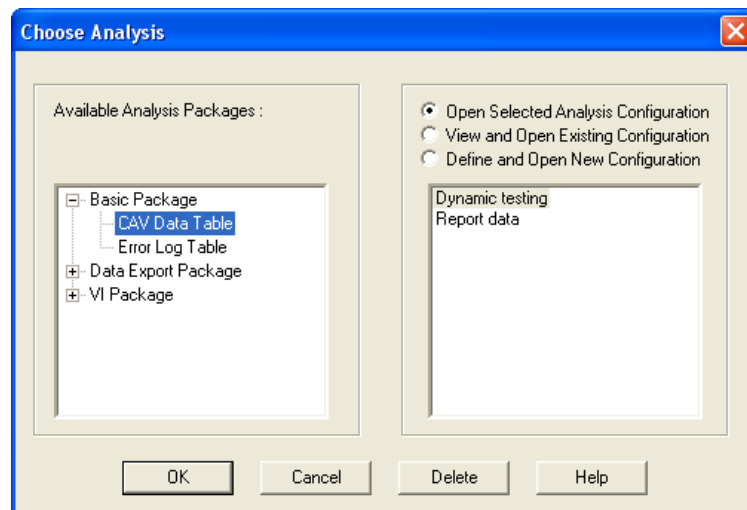
The Choose Analysis window

NOTE   *"Unopened" report directories identified with the ⊞ symbol contain one or more analysis packages. Click on the ⊞ to reveal or conceal the list.*

Select the desired analysis from the directory tree. After an analysis has been selected, you can configure the analysis to display the information you want from the central VISCPRO® database. The Choose Analysis window provides three options for doing this:

○ Open Selected Analysis Configuration
○ View and Open Existing Configuration
○ Define and Open New Configuration

Radio button options for analysis configuration

Click the appropriate radio button ⊙. Then select the desired saved configuration (if any) and click OK:

■ Select Open Selected Analysis Configuration if you wish to create and display the selected analysis using the saved configuration highlighted in the list box on the right side of the Choose Analysis window.

■ Select View and Open Existing Configuration if you wish to open the configuration window for the analysis configuration highlighted in the list box on the right side of the Choose Analysis window.

■ Select Define and Open New Configuration to open the configuration window using default settings for the selected analysis.

NOTE

For more information on defining and using configurations, see Chapter 6.

Window Menu

The Window menu provides options for scaling and arranging multiple windows/icons for screen display. In VISCPRO® you can also save and restore a specific window configuration.

Arrange Icons

Select this standard Windows® display menu item to arrange any minimized analysis/report or instrument windows at the bottom of the primary application window.

Tile

Select this Windows® display menu item to resize and regroup all open windows to view multiple on-screen reports/instruments. You may select *horizontal* or *vertical* tiling for more convenient viewing of data.

Cascade

Select this standard Windows® display menu item to resize and regroup all open windows in an overlapping format which provides more space for the active window.

Save Window Layout

Select this security-protected Manager-level menu item to save the current VISCPRO® screen configuration, including any currently-open analyses and Sample Input windows. To restore the saved configuration to the VISCPRO® display, click Restore Window Layout (see below).

Restore Window Layout

This menu item restores the saved VISCPRO® screen configuration. Any currently-open <u>analysis</u> windows will be closed before the saved configuration is loaded. Also note that currently-open <u>Sample Input/Machine Status</u> windows may be obscured by the restored configuration. To view these obscured windows, either click Window from the VISCPRO® primary display and select the desired instrument view OR right-click the appropriate group button on the status bar on the bottom of the primary window. Restoring a saved window configuration does not affect current miniAV sample testing operations.

miniAV module menu options

In addition to the VISCPRO® general instrument menu functions, unique software application modules for each type of **CANNON**® instrument generate additional interface options. The modules determine the characteristics, function and appearance of VISCPRO® software menus and windows. These instrument-specific software options (under the Configure and Service menus) permit user control of important miniAV operations.

Configure menu

The Configure menu provides the user with a powerful tool for description of miniAV instrument capabilities, and for customizing miniAV test procedures. Once configuration settings have been determined for optimum performance, the settings can be saved and restored using the Save Instrument (Configure menu) and View Instrument (Main menu) functions.

Initial factory configuration settings may be supplied on a configuration floppy disk. Additional configurations can be created to enhance test performance with different types of samples.

Configuration settings will need to be updated when instrument specifications or components change (sample tray types, viscometer tubes, tube types, etc.).

Each of the configuration menu items is explained in detail in the following sections. To access the configuration options, click Configure from the VISCPRO® primary display and select the desired instrument group and instrument.

Print Instrument and Tray Settings

Print instrument settings

The Print Instrument and Tray Settings menu item prints instrument and tray settings. When you select this item, a standard Print window is opened. Select the desired print settings and click OK to print out a hard copy of the instrument and tray settings. You may wish to retain the printout for diagnostics, verification and record-keeping purposes.

Restore Instrument and Tray Settings...

The Restore Instrument and Tray Settings option from the Configure: menu allows you to restore Instrument Settings, Tray Settings and/or Sample Information from saved configurations for the current instrument.

To access all Restore: options, log into VISCPRO as a Manager. Then click the Restore Instrument Settings check box if you want to restore all Instrument Settings for the highlighted saved configuration (see *Instrument Settings* section in this chapter). Instrument settings apply to the instrument as a whole.

Click the Restore Tray Settings check box if you want to restore all tray settings for the highlighted saved configuration (see *Tray Settings: ...* sections in this chapter). Tray configuration settings apply to the individual sample trays for an instrument.

Click the Restore Sample Information check box if you want to restore all sample ID information for the highlighted saved configuration. Sample information includes individual sample IDs and actions.

Save Instrument...

The Configure: Save Instrument Settings option from the Configuration menu opens the Save Configuration window. The Save Configuration window permits you to save all current instrument information for any selected instrument, including Instrument Settings, Tray Settings and Sample settings, to the database. Once saved, the instrument information may be restored at any time using the Restore options from the Configure menu (see above).

To use the Save Configuration window, select the desired instrument by clicking on the instrument name in the Available Instruments list box. Then enter a name for the configuration in the Save As: field.

NOTE

If you wish, you may choose to overwrite an existing configuration with current settings by clicking on the name of the existing configuration in the Configuration list box. The Configuration name will be transferred to the Save As: *field.*

Click OK to store the new configuration. To exit the Save Instrument window without saving the configuration, click Cancel.

Saved Configurations: The Saved Configurations list box allows you to make changes to the current configuration for any networked *CANNON*® instrument by restoring any or all elements (Instrument, Tray or Sample) of a saved configuration. To restore saved configuration settings, select the instrument from the Available Instruments window and then click on the desired configuration from the list of saved configurations. Then click on the desired Restore ... options (see below) and click OK.

NOTE   *If you wish to permanently delete a saved Configuration, highlight it and click the DELETE button or press the* ⌊Delete⌋ *key. Click Yes at the Confirm Delete prompt to immediately and permanently delete the configuration.*

| 2 Print Calibration Certificate... |

Select Print Calibration Certificate to print calibration parameters for your current instrument configuration. CANNON Instrument Company recommends archiving calibration data each time a new calibration is performed. Note that after you select the Print Calibration Certificate option, the standard Windows Print dialog will be displayed. After you have selected your print options, the VISCPRO software will display the Save Calibration Data window. Input the file name and location if you wish to save an electronic archive of your printed calibration certificate to disk. Then click Save to save the data, or Cancel to exit the Save Calibration Data window without saving the information. The calibration certificate will be printed after you exit the Save Calibration Data window.

| 3 Save Instrument and Tray Settings... |

Select Save Instrument and Tray Settings to save certain current instrument information, including instrument specifications and calibration data (Instrument Settings), basic and advanced operational parameters (Tray Settings), and previously-entered Sample ID information.

When you click the Save Instrument and Tray Settings menu item, the Save Configuration window will open.
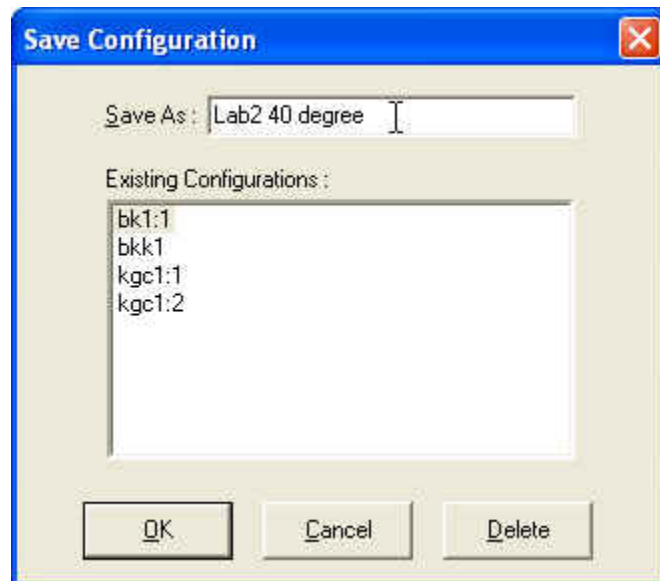
The Save Configuration window

Choose a name for the Configuration by entering it in the Save As: field. You may also click on existing (saved) Configuration by clicking on the Configuration name in the Existing Configurations list box.

When you have selected a Configuration name, click OK to save the Configuration and exit the Save Configuration window. Or click Cancel to exit the window without saving the Configuration. You can also delete existing configurations by selecting them from the Existing Configurations list box and pressing the Delete button.

Select Restore Instrument and Tray Settings to restore certain instrument information, including instrument specifications and calibration data (Instrument settings) basic and advanced operational parameters (Tray Settings), and previously-entered Sample ID information.

When you click the Restore Instrument and Tray Settings menu item, the Restore Configuration window will open.

The Restore Configuration window

This is a security-protected feature. Depending on the user-set configuration options, technician-level personnel may only be able to restore Sample ID information. Individuals logged in to VISCPRO as a Manager will be able to restore Instrument Settings and Tray Settings. To restore information, click on the check boxes corresponding to the desired parameters. Then click OK.

Instrument Settings

Select Instrument Settings to open the Instrument Settings window, which provides features for describing the miniAV and controlling the instrument. These settings apply to the instrument as a whole.

ID : `CAV--LAB1`

Use the ID field to input instrument identification information using up to 16 alphanumeric characters.

S/N : `4502`

The S/N: field displays the instrument serial number stored by the operational firmware of the miniAV. This is a non-editable field.
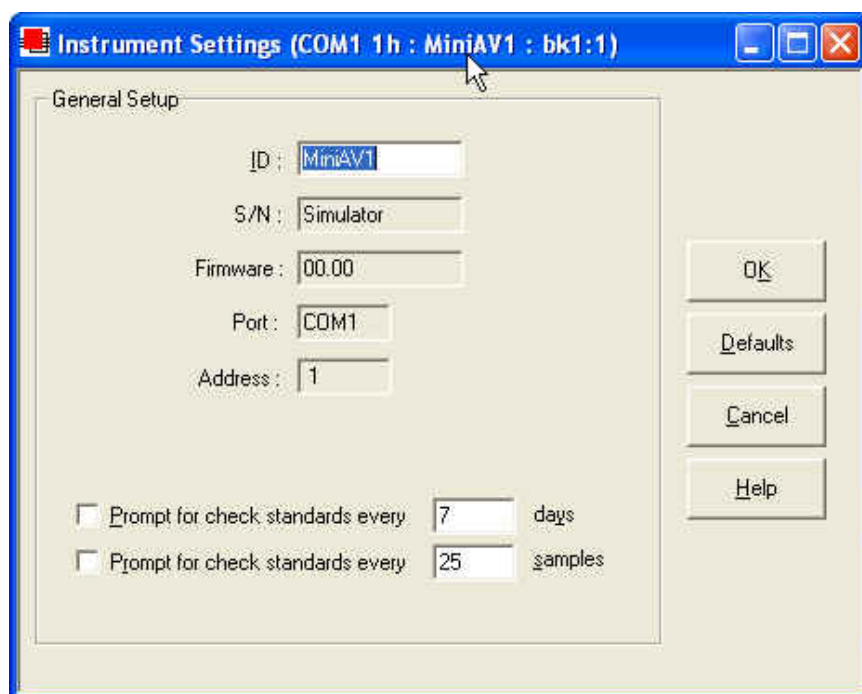
The miniAV Instrument Settings window

☐ **Prompt for check standards every** `7` days

Click on this check box to activate a software counter which will generate a warning for a tube whenever the specified number of days have elapsed without performance of the Verify Known KV sample action. Enter the number of days in the appropriate field.

☑ **Prompt for check standards every** `25` samples

Click on this check box to activate a software counter which will generate a warning whenever the specified number of samples have been tested without performance of the Verify Known KV sample action. Enter the number of samples in the appropriate field.

Instrument Settings window button options:
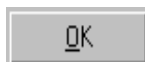
OK · saves the current instrument settings and exits the Instrument Settings window·
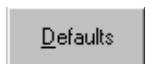
Defaults · restores the default configuration settings for several instrument options

Cancel · closes the Instrument Settings window without saving any configuration changes.

Tray Settings: Tube and Bath

Tray Settings : Tube And Bath...

Use the Tray Settings: Tube and Bath window to describe and control test parameters for the viscometer tube. Alter the settings using the instructions below. When you have achieved the desired configuration, save the current instrument settings by clicking OK. To exit the configuration screen without saving your changes, click Cancel. To restore software defaults, click Defaults.
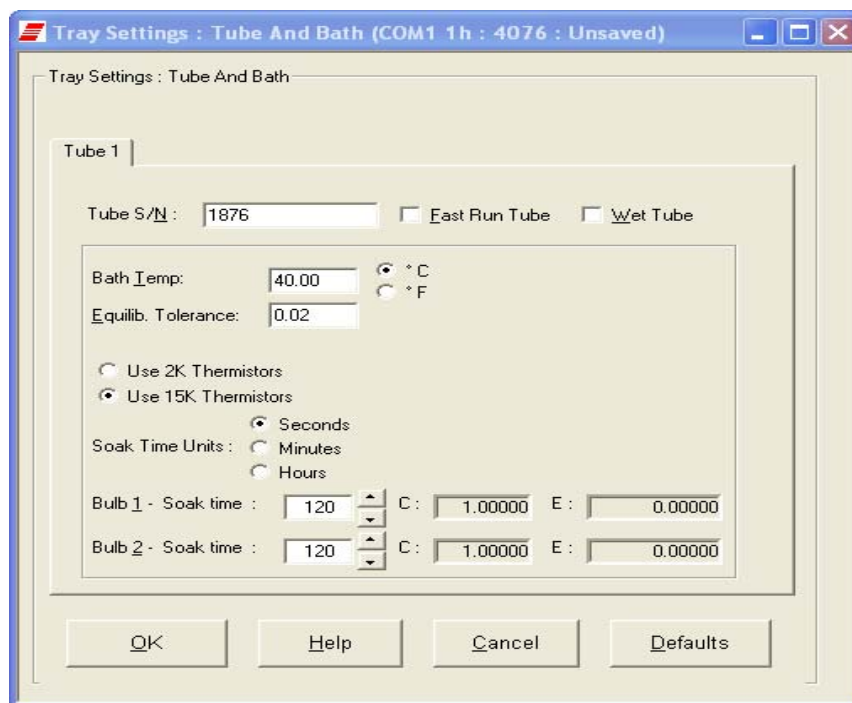
The Tray Settings: Tube and Bath window

Tube S/N : E264

To complete the tray configuration: Use the Tube S/N: field to input the identifying tube serial number.

NOTE   *For reporting and calibration purposes, each tube serial number value should be unique for all instruments attached to a single computer.*

☐ Fast Run Tube

Click on the Fast Run Tube check box if the viscometer tube is the fast run type. The Wet Tube option is required for some viscosity determination protocols. If this option is checked, the miniAV automatic determination will be preceded by an untimed sample drop, coating the inside of the capillary with the sample material.

NOTE   *Settings for soak times may need to be reconfigured when the bath temperature setting is changed.*

Bath Temp: 40   ⦿ °C   ○ °F

Bath Temperature

Input the desired temperature for the miniAV Bath corresponding to the selected tube in the Bath Temp: field and select the desired unit of temperature measurement by clicking on the corresponding radio button.

⚠ **CAUTION**   *Changing bath temperature may necessitate removing the reference thermometer from the Bath Unit. See Inserting/removing the reference thermometer in Chapter 2 for information on the procedure. Damaged thermometers may contaminate the bath fluid.*

Equilib. Tolerance: 0.02

Equilib. Tolerance

Input the desired Equilib. Tolerance for the miniAV.   The Equilib. Tolerance is when the target temperature is reached, and remains within the Equilibration Tolerance for least 30 seconds. The default and recommended value is 0.02.

Thermistors Radio Buttons

○ Use 2K Thermistors
⦿ Use 15K Thermistors

Select 2K or 15K depending on the thermistor value used in the installed tube.

Soak Time Units Radio Buttons

Soak Time Units :   ⦿ Seconds   ○ Minutes   ○ Hours

Select the desired unit of time by clicking on the corresponding radio button.

Bulb <u>2</u> - Soak time (s) :   [50]

Soak time

Input the desired sample soak times for each bulb of the viscometer tube. The soak time is the length of time in which the sample will remain in the viscometer tube before being dropped. The soak time is important to ensure temperature equilibration of the sample. The range is from 0 to 240 based on which units of time the user selected from Soak Time Units.

C : [1.00000]   E : [0.00000]

Constants

The Tray Settings: Tube and Bath screen displays the calibration constants (**C** and **E**) for each bulb of the viscometer tube. These values cannot be edited from the Tray Settings . . . screen. For information on determining bulb constants for viscometer tubes, see *Calibration* later in this chapter.

NOTE

When you have completed the configuration and saved the current tray settings, you may wish to permanently store the current instrument settings using the Save Instrument *and Tray Settings* item in the *Configure* menu for a given instrument.

Tray Settings: Test

The Tray Settings: Test window is used to select parameters for miniAV sample testing. Each sample drop is called a determination. Multiple determinations are possible during testing of a single sample. Comparisons of sample drop results permit user regulation of test precision.

The Maximum Absolute Difference option permits you to input the maximum acceptable deviation for multi-drop samples, expressed as the difference in the sample drop times in seconds.

The Maximum % Difference option allows you to input the maximum acceptable deviation for multi-drop samples expressed as a percentage (0.35 is the default percentage difference allowable). Values from 0.01 to 99.99 are acceptable. If the difference between test drop times is greater than the acceptable deviation, the sample will be tested again until the deviation in drop times is less than the Maximum % Difference, or until the maximum number of determinations has been reached.

The Maximum Determinations option permits you to select from 1-20 iterations of the test using the same sample.

Tolerance parameters

Determine if the tolerance for differences between sample run times (determinability) is going to be decided by the absolute difference in drop time values (in seconds) or by the percentage difference between the drop times. Click on the appropriate check box to select your choice(s).

Enter the maximum acceptable difference in measured results when using multiple determinations (the default percent difference value is 0.35 percent and the default absolute difference value is 0.2 seconds).

Use greater

If both tolerance options are selected, the VISCPRO software will apply both criteria *unless* the Use greater option is checked. If Use greater is checked, then the software will apply the less exacting tolerance value when calculating/evaluating test results.
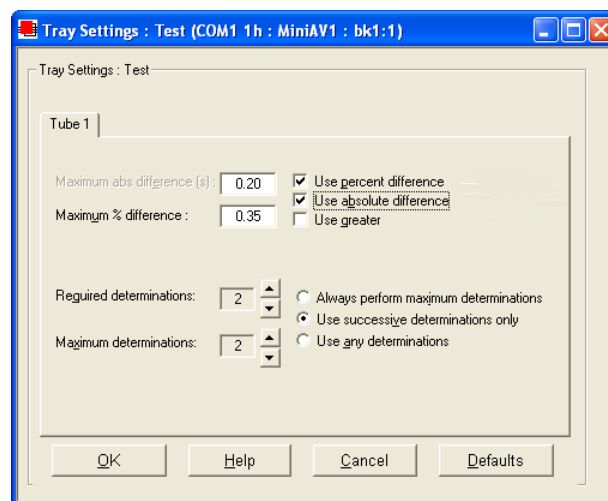
The Tray Settings: Test window

| | The Use spread and Use mean radio button options determine the manner in which the VISCPRO mathematically determines which sample tests have met tolerance parameters. Testing is continued until a group of samples meets the tolerance parameters and the rules for sample drop time determination (see *Determinations*, below). |

Use spread

The Use spread option compares the individual drop time values for each test sample with the individual drop time values of the other samples. If a sample deviates from tolerance parameters when compared with any other sample in a grouping, the sample is eliminated from consideration.

Use mean

The Use mean option compares the individual drop time values for each test sample with the mean (average) drop time represented by all samples in the group. If any sample in the group deviates from the mean by a value greater than the value specified in the tolerance parameters, the group is eliminated from consideration.

Determinations

Select the determination option by clicking on the radio button corre-sponding to the appropriate determination method (Always perform maximum determinations, Use successive determinations only, or Use any determinations).

Selecting sample run required and maximum determination settings

Select the number of Required determinations by clicking on the spin controls (values from 1 to 4 are acceptable). In the same manner, select the Maximum number of determinations which can be run for the tube samples (values from 1 to 20 are acceptable).

NOTES

VISCPRO determines the sample flow time by averaging the values of the sample runs which correspond to the chosen criteria.

If the Always perform maximum determinations *radio button is selected, the last flow times will be used for the viscosity determination.*

When you have completed the configuration and saved the current settings, you may wish to permanently store the settings using the Save Instrument *and Tray Settings.*

Tray Settings: Wash

Tray Settings : Wash ...

Use the Tray Settings: Wash window to determine wash settings. For multi-tube units, different wash settings may be selected for each tube individually.
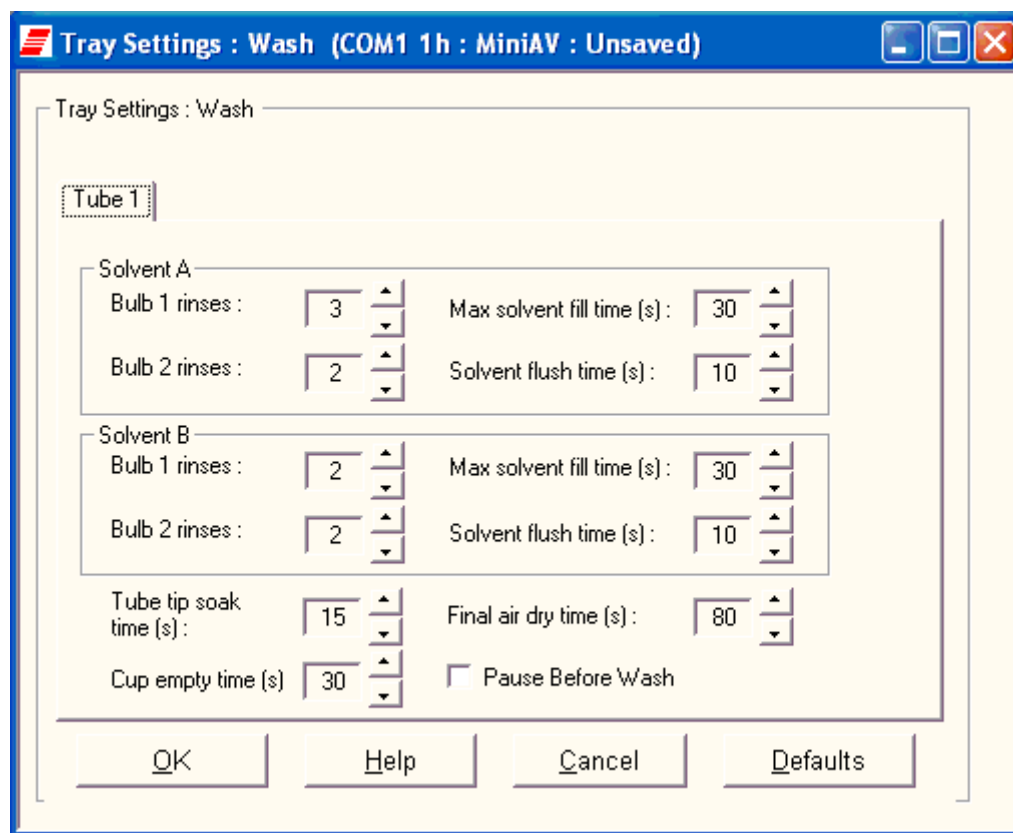
The Tray Settings: Wash window (Dual Solvent options shown)
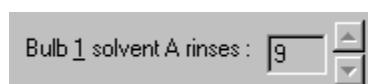
Solvent rinse settings

The solvent rinse settings for Solvent A and (if applicable) Solvent B are determined using the Tray Settings: Wash window. Select a value from 0 to 18 cycles for this option (the "0" setting turns the solvent option off). These settings determine the number of rinse cycles performed by the miniAV instrument after each test. Higher viscosity materials may require more rinses. Lower viscosity materials may require fewer rinses, depending on the effectiveness of the solvent.

Solvent fill time (s) : [2]
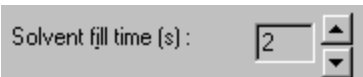
Max Solvent fill time(s)

The Max Solvent fill time(s) setting determines if/when the user receives a screen prompt instructing him to check/refill the external solvent vessel. Select a value from 1 to 60 seconds for this option. The recommended default is 30 seconds. During this time, the VISCPRO software monitors the filling of an internal solvent chamber in preparation for solvent evacuation through the viscometer tube. The default setting should allow adequate time for the required volume of solvent (approximately 12 mL) to be introduced into the internal solvent chamber under normal conditions of vacuum/pressure. If the Max Solvent fill time(s) setting is too low, the internal solvent chamber may not be completely filled with solvent in the time allotted and the screen prompt may be displayed even when the external solvent vessel contains solvent.

Solvent flush time (s) : [2]
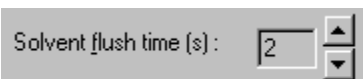
Solvent flush time(s)

The Solvent flush time(s) setting determines the amount of time (in seconds) that the solvent pump will continue to operate after the solvent chamber has emptied all solvent into the sample vial during a wash. This allows time for the lines and viscometer tube to be purged of solvent. Select a value from 1 to 60 seconds for this option. The time will vary with the pressure setting (miniAV right front "ear" panel).

Tube tip soak time (s) : [10]

Tube tip soak time(s)
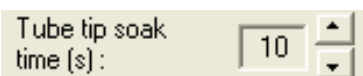
The Tube tip soak time(s): setting determines the length of time that the miniAV tube tip will soak in the solvent after the solvent has been introduced into the sample vial. Select a value from 1 to 120 seconds for this option. This is the amount of time that will be used for both a solvent soak and a final solvent "bubble cleaning" following the evacuation of solvent from the internal solvent chamber.
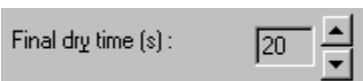
Final dry time (s) : [20]

Final dry time(s)

The Final dry time(s) setting determines the additional amount of time forced air is channeled through the viscometer tube to dry it at the conclusion of the rinse/dry cycle. Select a value from 15 to 300 seconds for this option. The time period selected will be added to the preset dry period of 108 seconds for normal tubes and 36 seconds for fast-run tubes.

Cup empty time (s)   30

Cup Empty Time

The Cup Empty Time option determines the amount of time allotted for evacuation of sample from the sample cup prior to the beginning of the wash sequence. Select a value from 1 to 255 seconds for this option. The evacuation time should be set higher for high viscosity oils and lower for low viscosity oils. Improper adjustment may result in solvent overflow if/when solvent is evacuated into a waste line that still contains sample residue.

⚠ **CAUTION** *Be careful to consider bath temperature(s) and potential solvent hazards when selecting solvents for use with the miniAV instrument.*

Pause Before Wash

When selected, this option permits you to recover used sample prior to initiation of the solvent wash cycle.

The sample vial will drop away from the viscometer tube after the sample has been tested but prior to the wash cycle. A message window will prompt for removal of the sample vial from the vial holder. Follow the on screen prompt to recover the used sample, replace the vial, and continue with the solvent wash.

⚠ **CAUTION** Make certain to replace the sample vial with an empty vial prior to raising the vial holder. Otherwise, solvent may overflow.

NOTE *When you have completed the configuration and saved the current wash settings, you may wish to permanently store the current instrument settings using the* Save Instrument *and Tray Settings.*

Tray Settings: Advanced

Advanced configuration

Select the Tray Settings: Advanced menu item to open the Tray Settings: Advanced window used to define additional operational parameters for sample testing with the miniAV instrument. It may be necessary for you to log in as a Manager to access Advanced settings.

⚠ **CAUTION** *Advanced settings will ordinarily be configured by a technician from* ***CANNON***® *Instrument Company when the instrument is initially installed. Advanced settings should only be adjusted by or in consultation with a representative from* ***CANNON***®*.*
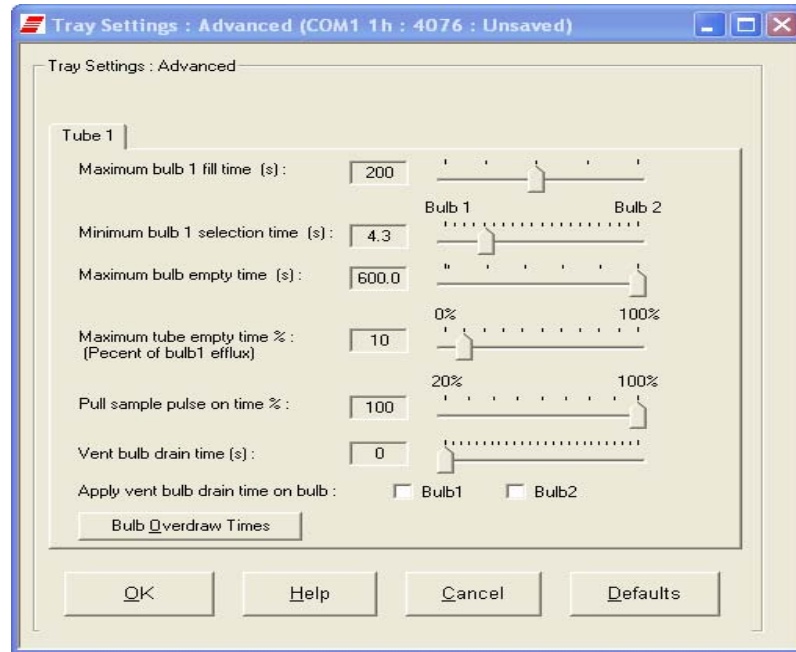
The Tray Settings: Advanced window

Maximum bulb 1 fill time[s]:	Adjust this setting to select the desired maximum fill time for bulb 1. Acceptable values are between 20 and 400 seconds.
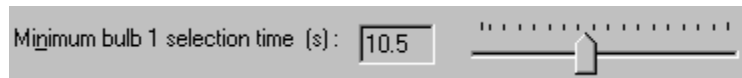
Min. bulb 1 selection time[s]:	Adjust this setting to select the desired minimum time permitted for selection of bulb 1 or bulb 2 for sample testing. Acceptable values are between 0 and 20 seconds. Decreasing the setting will increase the probability that the sample will be tested in bulb 1.
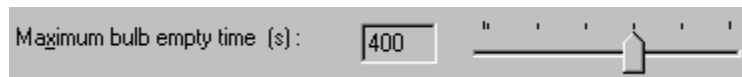
Maximum bulb empty time[s]:	Adjust this setting to select the maximum amount of time for the oil to drop between the target tube sensor and the bottom tube sensor during a sample determination before the sample test is aborted. Acceptable values are between 90 and 600 seconds.

Maximum tube empty time %: Adjust this setting to select the percentage of the drop time between the bottom sensor and the sensor at the top of bulb 1. The default value is 100%.

Pull sample pulse on time % :   100

Pull Sample Pulse On Time Adjust this setting to help eliminate bubbles that can occasionally be formed as the vacuum draws some types of samples into the viscometer tube. The pulse value is a percentage of time that the sample will be drawn up into the tube during each five-second interval of the draw period. A setting of 100% (default setting) will not pulse the sample. A setting of 20 would pull the sample for one second in each five-second interval. Sample pulsing should only be used if it is found to alleviate bubbling during the sample draw period.

Vent bulb drain time (s) :   0

Vent Bulb Drain Time Adjust this setting such that the vent bulb and vent are cleared of sample before the sample menious drops to the top sensor. Acceptable values are between 0 and 250 seconds.

Apply vent bulb drain time on bulb :   ☐ Bulb1   ☐ Bulb2
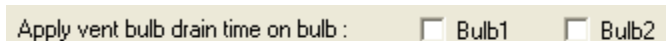
Apply Vent Bulb Drain Time Select which bulb to apply the *Vent bulb drain time parameter*.

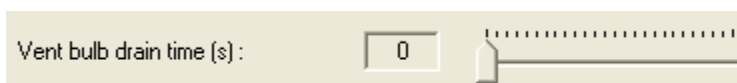*Bulb overdraw* Use the Bulb Overdraw button/window to set the amount of time in seconds that the instrument will draw sample AFTER the sample meniscus has covered the target sensor in the viscometer tube. More viscous materials may require a larger overdraw time to ensure that the sample meniscus does not dip below the target sensor during temperature equilibration.

Proper adjustment of the overdraw can maximize efficiency of the test cycle. Too much overdraw can contaminate vacuum lines and interfere with pump operation. Too little overdraw can interfere with the initiation of sample testing following the temperature equilibration period. Note that lighter oils will be pulled higher in the bulb.

Calibration

The Calibration window provides controls for calibrating each bulb associated with your instrument. You may need to log onto the system as a Manager to access these security-protected calibration functions.

Use the bulb spin controls ⬆⬇ to display current constants and valid check standard data available for calibration of each bulb.

Calibration constants are determined individually for each bulb. Data for automatic calculation of tube calibration constants is derived from check standards run using that tube.

For information regarding the miniAV calibration procedure, see Chapter 3, *Calibrating the miniAV*.

The Calibration window options are described briefly below:

Date selection: The calibration program uses data from previously-run standards to determine the calibration constants. To select the desired standard data, use the No older than [x] days spin controls ⬆⬇ to set the date parameters for the database search (if "1" is selected, only the standards run in the past 24 hours will be used).

Bulb selection: Viscometer bulbs are numbered from the bottom to the top of the viscometer tube. Use the spin controls to select the correct bulb for calibration.

Data selection: Test data from standards run with the miniAV within the specified Date parameter will be automatically displayed in the list box.

To select and deselect the data from the sample runs to be used for the calibration, press and hold the [Ctrl] key and click on the samples to highlight those you wish to include in calibration calculations.

NOTE   *Sample run data from at least two different standards for each bulb at each calibration temperature must be available for calibration calculations to be performed.*

| Calculate new constants |

After you have selected the desired data, release the [Ctrl] key and click Calculate new constants to update values for C and E.

You may evaluate the accuracy of the new calibration constants by comparing the known viscosity for the standard with the calculated viscosity for each standard selected for the new calibration. This difference is displayed as a percentage in the last column (% Diff) of the updated sample list box.

Show Calibration Data   The Show Calibration Data button is a toggle that will permit you to compare current and new calibration data and constant information. Press the Show Calibration Data button once to view the current calibration information. Note that the button name will change to Display Sample Data. Press the button again to display the new calibration data.

| Update tube |

When/if you are satisfied with calculation results, click on Update Tube to save calibration values for the current configuration. The new data will

become the current data.

If the difference is still too great, repeat the calibration process until the difference falls within acceptable limits (refer to the precision statement in ASTM D 445).
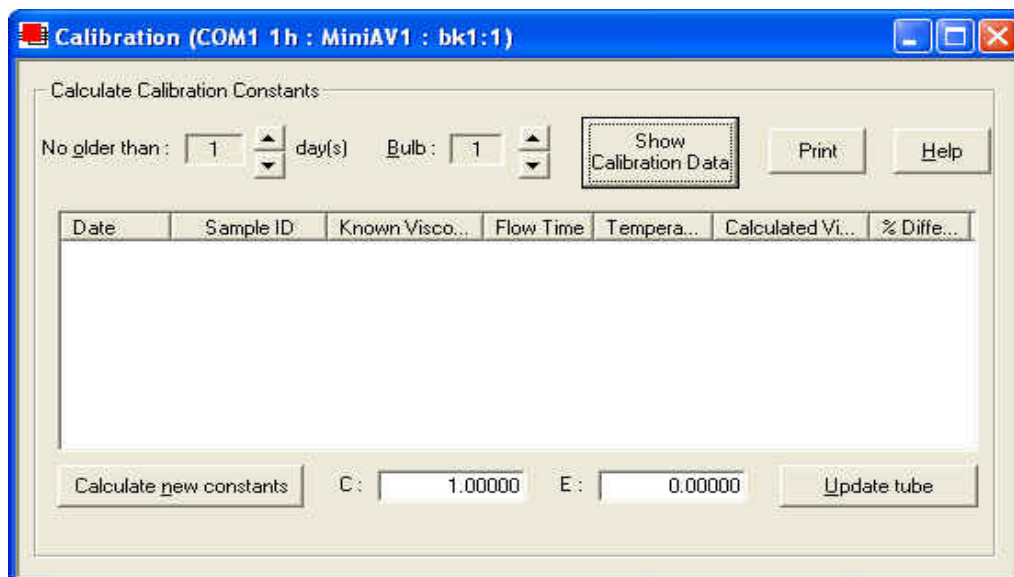
The Calibration window

NOTES   *Once the* Update tube *button is pressed, the updated calibration constants are associated with the selected instrument, and will remain the same regardless of the instrument configuration defined for that instrument.*

You must click Update tube *before changing bulbs if you wish to save the new calibration constants for that bulb. If you close the* Calibration *window without updating the tube, the new calibration information will not be saved.*

*CANNON recommends saving a successful calibration (*Configure/Save Instrument and Tray Settings*) so that it can be restored when desired.*

Service menu

To access the service menu items, click Service from the VISCPRO® primary display and select the desired instrument.

MiniAV Monitor...

The Monitor window permits the user to view current operational values for the miniAV instrument. These settings may be helpful to **CANNON**® technical personnel when troubleshooting difficulties with the miniAV.

Wash viscometer tube

Select Wash viscometer tube to open the Wash viscometer tube window.

Click Begin Wash to initiate the wash cycle. The Status: indicator will display and update current actions.

Bypass .... option

To begin washing an evacuated sample cup, click the option box to make certain that the Bypass initial cup evacuation option is selected.

⚠ **CAUTION** *Do not use this option with a filled cup or the cup will overflow.*

Release Cup

Click the Release Cup option to lower the sample cup to its rest position.

When the Wash cycle has been completed, click Done to exit the Wash viscometer tube window.

NOTES *The Wash operation cannot be executed if the tube is currently running a sample. To terminate the Wash cycle at any time, click Abort Wash.*

⚠ **CAUTION** *The Wash viscometer tube function overrides automatic miniAV software operations. Verify that the tubes are clean and dry before initiating computer-controlled sample testing.*

Adjust Vacuum/Pressure...
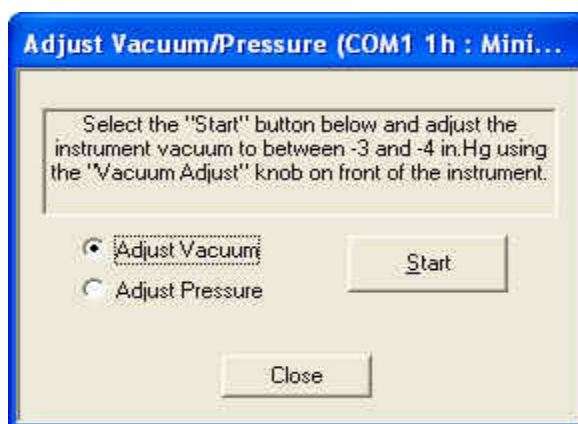
To adjust the vacuum/pressure settings for the miniAV, click Service menu and select the desired instrument group and instrument. Then click Adjust Vacuum/Pressure to open the Adjust Vacuum/Pressure window.

Select the desired adjustment (vacuum or pressure) and then follow the screen prompts to complete the adjustment procedure, using the appropriate controls on the instrument wing panel. The prompts will display recommended vacuum/pressure settings and will also indicate how adjustments may be made to alter the settings.

Temperature Calibration...
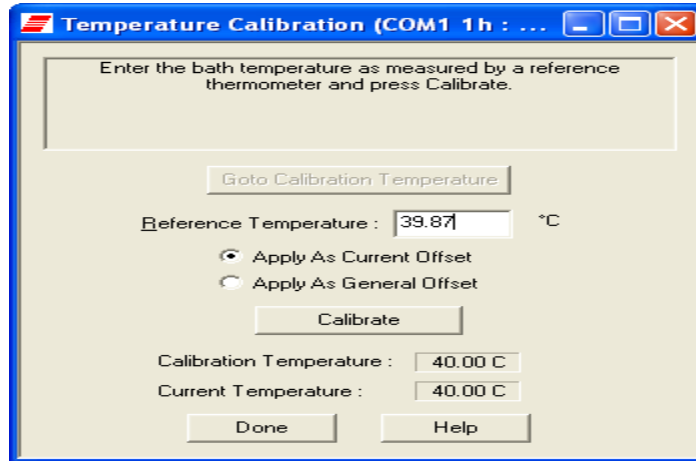
To calibrate for temperature, see Chapter 3 for details. Temperature calibration requires a reference thermometer with an accuracy meeting the precision specification of ASTM D 445.

Zero Temperature Offsets...
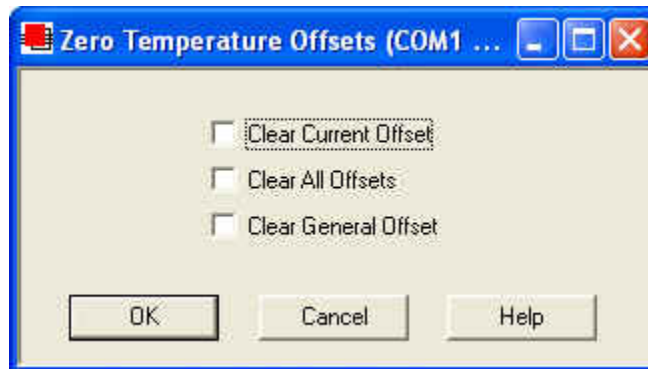
To zero temperature offsets, click the Service/Clear Temperature Offsets menu for the desired instrument. The Zero Temperature Offsets window will open. Click the check box to select each desired action. Then click OK to clear the selected settings.

If the Clear Current Offset option is checked, VISCPRO will clear the calibration point for the current bath temperature.

If the Clear All Offsets option is checked, VISCPRO will clear the calibration point for all temperatures where a specific calibration offset has been saved.

If the Clear General Offset option is checked, VISCPRO will clear the (factory-preset) General Offset for all temperatures for the instrument. This Instrument Setting cannot be restored except from a previously-saved Configuration. It is not recommended that you exercise this option without consulting with CANNON Instrument Company personnel.

Train Tube Sensors...

Train Tube Sensors (COM1 1h : 4076 : Unsaved)

Insert empty sample cup in position 1. Fill another cup
with oil approximately 3 times the lower limit of
viscosity tube and insert cup in position 2. Slide tray
under tube and press the Start button to train tube
sensors.

Target Temperature : 40.00 C
Current Temperature : 40.00 C

☑ Prewash   Top Mid Bot
☐ Trip Points Only   Voltages
                        Opened
    Start   Shorted

Clear All Training Levels

Done   Help

To train tube sensors (required for miniAV operation at each desired temperature setting) click the Service/Train Tube Sensors menu option for the desired instrument. The Train Tube Sensors window will open. Click the check box to select each desired option. Then click the Start button to initiate tube sensor training.

Prewash option

Select this option if the tube needs to be cleaned and dried prior to training. The Prewash option will execute a tube cleaning cycle prior to beginning the sensor training.

Trip Points Only option

Select this option only if the tube sensor has been previously trained and requires only a validation/adjustment of the trip point settings (the electrical current level and fluctuations associated with the passing of the sample meniscus). The Trip Points Only option will reduce the time required to accomplish these functions significantly, but will not check/adjust basic power levels for instrument operation.

NOTE

The miniAV will not test samples until sensor training has been performed at the test temperature.

At the conclusion of the sensor training, the "Learned" indicators for the top, middle and bottom sensors should display in green. If sensor training has not been successfully accomplished, the "Opened" and "Shorted" sensor indicators may provide helpful diagnostic information. Consult with CANNON Instrument Company personnel if problems with sensor training persist.

Set Security Levels...
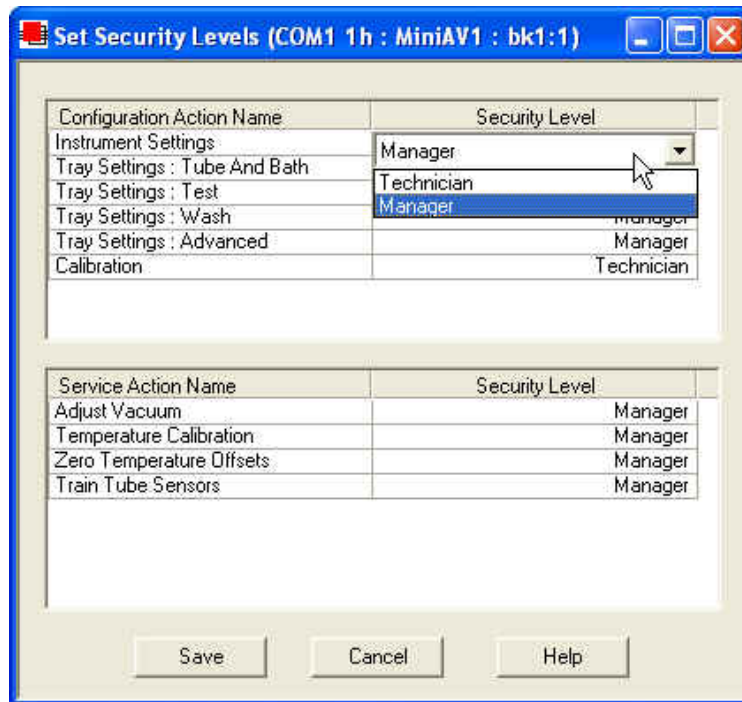
To set security levels, first log into the VISCPRO software as a Manager. This will permit you to determine Manager or Technician accessibility for the following protected menu-accessible functions:

Configuration:

Instrument Settings
Tray Settings: Tube & Bath
Tray Settings: Test
Tray Settings: Wash
Tray Settings: Advanced
Calibration

Service:

Adjust Vacuum
Temperature Calibration (saved as Instrument Settings)
Zero Temperature Offsets (saved as Instrument Settings)
Train Tube Sensors

To make security changes, click Service/Set Security Levels for the desired instrument. The Service/Set Security Levels window will open. Current security settings will be displayed. To change the security level for a protected function, click on the Security Level cell opposite the function name until the Manager/Technician drop-down box is displayed. Then click the desired security level to select it.

When you have finished updating settings, click the Save button to save settings and close the Set Security Levels window. Or click Cancel to close the window without saving changes.

Testing samples—software options

This section of the manual provides information on using the software to perform common miniAV operations. For a step-by-step procedure detailing both hardware and software operations involved in sample testing, refer to Chapter 2.

Entering sample ID information

Procedure

1. From the VISCPRO® primary menu, click on Main.

2. Select View Instrument from the menu.

3. Select the desired instrument group from the list box in the View Instrument window.

NOTE

If you do not see the desired instrument listed in the list box, make certain that the instrument is turned on and is on-line (verify cable connections to the computer). Then click the Refresh *button to scan for additional on-line instruments.*

4. When you are done, click OK. The Sample Input window for the selected instrument will appear.

5. To input sample identification information for the samples to be run, first select the correct tray for the test by clicking on the tab corresponding to the tray.

6. After the tray has been selected, click on the sample number in parentheses (or press F2) to access the sample ID field.

7. Enter the desired sample ID, using up to 21 alphanumeric characters; then press the Tab⇆ or Enter↵ key.

Selecting sample actions

8. Whenever a new sample ID is entered, the sample action defaults to Measure Sample Viscosity. To access all sample action options, highlight the desired sample and right-click the mouse or press F5. The Sample Action popup window will appear.

NOTE

To select more than one sample at a time from the sample list box, highlight the first sample and the press the ⇧ Shift key and click on the last sample, or just press and hold the Ctrl key and click on individual samples to be selected. When you have completed sample selection, right-click the mouse on any of the selected samples to select the desired sample action for all highlighted samples.

9. Select the desired sample action from the window by clicking on it.

Sample actions
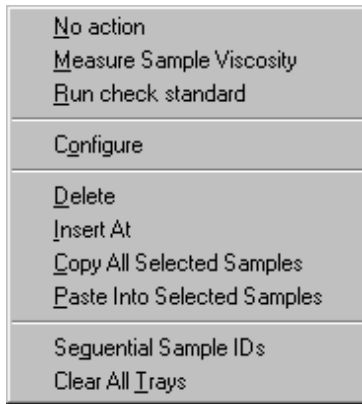
The Sample Action popup

- ■ No action—clears action column for highlighted samples. No testing will take place for this tray position.
- ■ Measure kinematic viscosity—measures sample viscosity.
- ■ Verify Known KV—measures sample viscosity at the conclusion of the automated test and tags data for possible use in calibrations/reports.
- ■ Configure—Opens the Viscosity Action window (see next section) to select test actions for selected individual samples/standards. The Configure options will vary depending on the selected sample action (Measure Sample Viscosity or Verify Known KV).
- ■ Delete—Deletes currently-selected sample data. Samples in succeeding tray positions will be moved up to fill the empty "slot".
- ■ Insert At—Inserts a sample field at the currently-selected location.
- ■ Copy All Selected Samples—copies selected sample IDs
- ■ Paste Into Selected Samples—pastes selected sample IDs
- ■ Sequential Sample IDs—Numbers selected samples automatically.
- ■ Clear All Trays—Clears sample data for all trays.

Viscosity Action window

The Viscosity Action window permits you to set test parameters for individual samples, overriding the general settings. For information on general settings, refer to Tray Settings: Test.
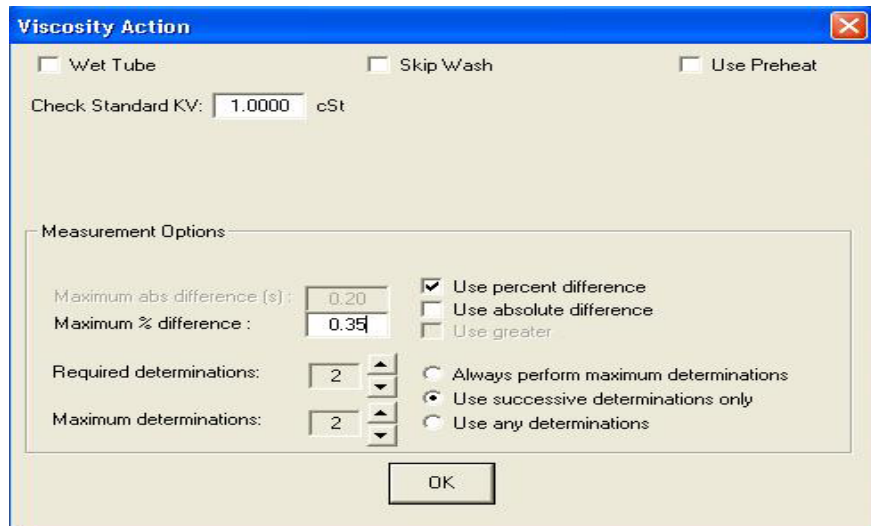
The Viscosity Action window

- ■ Sequential Sample IDs—creates a numeric sequence for the highlighted sample ID(s) in the list box. You have the option of selecting a standard alphanumeric prefix and/or suffix to accompany the sequence numbers, and you also can select the starting numeral in the sequence.

Procedure

1. To use the Sequential Sample IDs feature, highlight the desired sample tray location(s) in the list box (or skip to the next step to select all).

2. Right-click any of the desired ID locations and select Sequential Sample IDs from the Sample Action popup.

3. Enter necessary information in the Assign Sequential Sample IDs window:

Assign Sequential Sample IDs window

Prefix—Input a character string to be used as an identifier

Suffix—Input a character string to be used as an identifier

Starting ID—Input a number to start the numeric sequence

Number of Samples—Select the number of samples in the high-lighted block which are to be sequentially numbered

Use as Format—If checked, this feature activates a "wraparound" function for sequential numbering like an odometer (if 001 was input, the sequence would restart at 001 every 100 samples).

4. When done, click OK.

NOTE *The* VISCPRO® *software "remembers" the last number in the last sequence and will place the next number in the sequence in the* Starting ID *field the next time the* Sequential Sample IDs *option is selected.*

Viscosity Action for viscosity standards

The Viscosity Action window for KV verification is identical to the Viscosity Action window for measurement of kinematic viscosity (see image, previous section), except that there is an additional field provided (Check Standard Viscosity) for input of the known viscosity of the standard.

The viscosity of the standard must be entered in the Check Standard Viscosity field in order that the resultant viscosity determination may be used for verification and calibration.

Copy & Paste Sample ID data entry options

The VISCPRO® Sample ID data entry screen supports Copy and Paste options.

Copying Sample IDs

To copy a Sample ID entry, including the configuration information, highlight the desired line(s) from the Sample List Box and right-click your mouse to access the Sample Action window. Then select Copy All Selected Samples from the menu options. OR you can use the Ctrl-C key combination.

Pasting Sample IDs

To paste previously copied Sample ID entry information into another tray/sample location within the same instrument group, highlight the desired line(s) in the Sample List Box and right-click your mouse to access the Sample Action window. Then select Paste Into Selected Samples from the menu options. OR you can use the Ctrl-V key combination.

Copying/pasting multiple IDs

You may copy or paste a block of (multiple) sample ID entries using the same procedure described above. When pasting multiple entries, make certain to select the same number of sample locations as were initially copied. If you select a larger number, only the original copied number of entries will be pasted. If you select a smaller number, information for the last sample(s) in the block will not be copied.

Inserting/deleting a sample ID in the test sequence

To insert a sample ID into an existing sample run test sequence, highlight the desired sample location in the sample run sequence and press Insert. *OR* highlight the desired ID number, click the right mouse button, and select Insert At from the Sample Action options.

The existing sample entries will be moved down one position in the sequence and you can enter the new sample ID information at the cursor.

⚠ *CAUTION*

If the list box already contains a sample ID for every position on the tray, the sample data for the final position will be discarded when a position is cleared for new data.

To delete one or more sample IDs and move all remaining samples in the sequence up in position, highlight the sample ID(s) you wish to delete and press the Delete key. *OR* you may right-click in the highlighted block and select Delete from the sample action options window. The highlighted sample (or samples) will be deleted and any existing sample entries following the removed items will be moved up to take their place in the sample run sequence.

Saving Sample ID information

Many users will test the same series of samples on a regular basis for trend analysis and other quality control objectives. To save time with Sample ID data entry, VISCPRO provides an option for saving and recalling Sample ID information.

Saving Sample IDs

To save Sample IDs, complete your sample ID data entry (see previous sections) from the Sample Input window, then click the Save Sample IDs button. The Samples window will open.
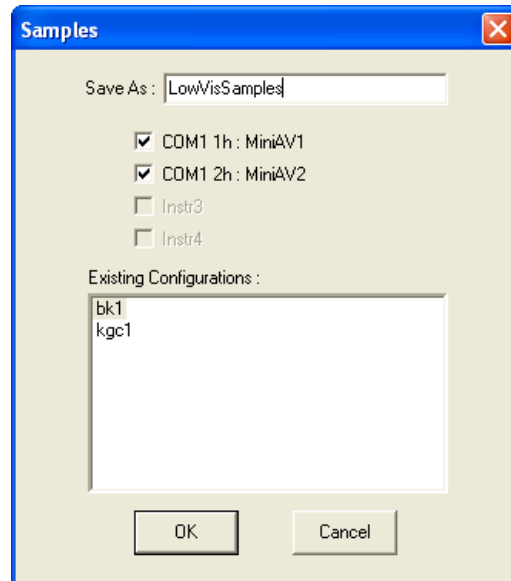
Input an ID for the saved sample sequence in the Save As: field. Then select which instrument(s) to associate with the Sample ID sequence. Then click OK.

Restoring Sample IDs

To restore Sample IDs previously saved, click Configuration and select the desired instrument. Then click Restore Instrument and Tray Settings from the Configuration options. The Load Instrument and Tray Settings window will open.

Select which data is to be restored by clicking on the desired Restore options (Restore Instrument Settings, Restore Tray Settings, and/or Restore Sample Information). The Load Instrument and Tray Settings window permits you to restore the following Instrument Settings: Instrument User ID, check standard prompts, temperature calibration offsets

The Load Instrument and Tray Settings option permits you to restore the following Tray Settings: Tube S/N, tube type, wet tube option, bath temp, and tube calibration constants.

Click the name of the desired configuration to highlight it. Then click OK. Selected settings will be restored.

The Load Instrument and Tray Settings window

miniAV analysis modules

The VISCPRO® software is shipped with several analysis modules which can be used to create reports based on sample test data. For general instructions on using analyses, see Chapter 6, *Analysis Configuration Options*. For information on a specific analysis module included with your miniAV package, see the chapter on the particular analysis.

Configuring the VI Matcher

VI Matching with VISCPRO®

The VI Matcher is a VISCPRO® software feature that functions in tandem with the VI analyses to enable Viscosity Index (VI) calculation from sample data residing in the VISCPRO® database.

Viscosity Index calculations require kinematic viscosity data derived from samples tested at a high and a low temperature. The VI Matcher permits the user to define which viscometer tubes are high temperature tubes and which are low temperature tubes.

After the VI Matcher has been initially configured by the user (this is ordinarily done during initial instrument setup), the VI Analysis can be used to automatically scan the VISCPRO® sample database for samples with matching Sample IDs. If samples with an identical Sample ID have been tested on a low temperature tube and a high temperature tube within an 8-hour time span, the VI for those samples can be calculated and displayed on the VI analysis. The VI Matching function is always indicated on the VISCPRO® status bar, whether or not a VI domain (viscometer tube set) has been defined.

Configuration procedure

To configure the VI Matcher:

1. Load the VISCPRO® software.

2. Log on to the system as a Manager (a password may be required) to access the VI Matcher function, which is security-protected.

NOTE   *For more information on the security log-in procedure, see* Security Options*, this chapter.*

3. Select VI Matching—General Configuration from the Configuration menu options. The General Configuration window will appear.
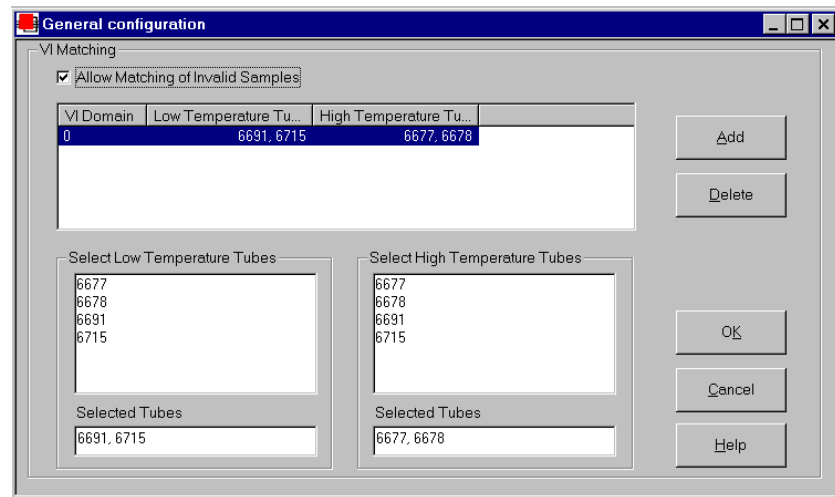
The VI Matcher General Configuration window

4. Click on the Allow Matching of Invalid Samples box if you wish to permit VI matching of samples with flow times exceeding the specified tolerance for repeatability.

NOTE   *The VI Matcher does not match invalid samples UNLESS the* Allow Matching ... *box is checked. The VI Matcher never matches unsuccessful samples (samples with no flow time and a displayed kinematic viscosity of "0"). If one of the samples ran successfully at one temperature but not at the other, the good sample can still be used for VI matching if the failed sample is rerun within the time frame selected for the VI Matching Date Filter for the analysis.*

5. Click on the ADD button to add a new VI configuration.

6. Click on the serial numbers in the Select Low Temperature Tubes list box which correspond to tubes that should be configured as low temperature tubes by the VI Matcher. As you do so, the serial numbers will be added to the Selected Tubes list box.

NOTE   *To "de-select" a selected tube, click again on the highlighted tube serial number*

7. Click on the tubes in the Select High Temperature Tubes list box which correspond to tubes that should be configured as high temperature tubes by the VI Matcher. As you do so, the serial numbers will be added to the Selected Tubes list box.

8. When you have finished adding low and high temperature tubes, click OK to save the configuration and exit the General Configuration window.

NOTES   *To exit the* General Configuration *window without saving the configuration, click* Cancel*.*

For information on creating VI analyses, see the manual chapter corresponding to the desired analysis.

Turning off the VI Matcher

The VI Matcher essentially function as a separate instrument and is indicated as such on the VISCPRO® Status Bar. If you wish to terminate VI matching, you will need to delete any VI domain(s) using the Delete button from the General Configuration window. When no domains are defined, the VI Matcher does not function.

Handling errors

VISCPRO® errors   The miniAV instrument software returns three types of errors during operation: bath errors, fatal errors and tray errors. Bath and tray errors are sample/tray specific, and may affect test results for a given sample. Such results will be indicated as invalid. Fatal errors may be hardware-related, and can produce a FAULT condition (see *Chapter 5, Handling fault conditions*).

This page intentionally left blank.

CHAPTER 5

OPERATING, MAINTAINING AND SERVICING THE miniAV

This chapter of the miniAV Instruction & Operation Manual contains information regarding the operation, service and maintenance of the miniAV instrument. For additional information on required utilities, instrument installation and setup, refer to Chapter 1.

miniAV components

The standard miniAV installation includes these primary components:

- Bath unit
- Waste Receiver assembly
- Power supply
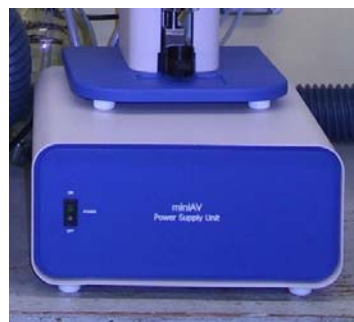
NOTE   *The installation also requires user-supplied solvent vessels. CANNON supplies two G-38 reagent bottle caps (for recommended solvent vessels). The user must ensure solvent compatibility for dual solvent systems, since solvent residue will mix in the system. Additionally, any new solvents should be compatible with previously-used solvents, since residue from original solvents may remain in the solvent lines and/or Waste Receiver.*

Bath Unit

The Bath Unit houses the primary control and operating systems for the miniAV, including modular service components, temperature bath with viscometer tube, sample vial holder, and related hardware.

Bath Unit connections   For information regarding Bath Unit connections, refer to the installation section of Chapter 1.

Solvent Dispensing System

The miniAV is equipped with a solvent system used to wash the viscometer tubes after each sample test. The system consists of the internal and external solvent and drain lines, the user-supplied solvent vessel, and the Waste Receiver assembly (including solvent dispensing unit). Appropriate solvent containers may be acquired from many suppliers, including JustRite® and Nalgene® (see weblinks below).

http://www.justritemfg.com/containes.tpl
http://www.nalgenelabware.com/products/productsIndex.asp

Maintaining the solvent system

The miniAV requires solvent, which is used to wash the viscometer tube and rinse the sample vial after each sample analysis. The solvent system consists of the solvent containers, the solvent distribution and drain lines, and the Waste Receiver.

The user-supplied solvent container(s) provide the solvent necessary to clean the viscometer tubes before and after samples are tested. The solvent delivery lines distribute solvent to the viscometer tube(s). The drain lines collect the waste sample/solvent from the viscometer tubes, and transfer waste materials from the washing station to the Waste Receiver.

Solvents   The miniAV is compatible with aqueous and hydrocarbon-based (heptane, hexane, toluene and acetone) solvents. Please contact CANNON Instrument Company with any questions regarding solvent compatibility with instrument components. The supplied Waste Receiver is polypropylene. This material should be suitable for solvents/samples compatible with the miniAV.

⚠ **CAUTION**   *When configured for dual solvent operation, the miniAV is capable of using both a washing and a drying solvent for certain applications. The solvents are selected by the user. Ensure compatibility of dual solvents at all times. If switching from one solvent to another with potential compatibility problems, make certain to empty the Waste Receiver and flush the solvent lines several times with a neutral solvent. **CANNON**® Instrument Company is not responsible for damage to the solvent system caused by a combination of user-selected solvents.*

⚠ **WARNING**   *Selection, handling and disposal of solvents are the responsibility of the user. **CANNON**® Instrument Company does not make specific solvent recommendations. Refer to the Material Safety Data Sheet (MSDS) provided with the solvent material, and exercise the necessary safety precautions. Use extreme care when working with hazardous solvents.*

Application compatibility The solvent used in a particular viscometer tube must be able to dry at the test temperature of the tube (during the washing cycle). Choose the appropriate solvent accordingly.

Checking solvent levels It is the responsibility of the operator to visually monitor the amount of solvent remaining in the solvent container. Check the solvent container liquid level frequently. When the solvent level drops to within 2.5-5.0 cm (1-2") of the bottom of the solvent container, it should be refilled.

Filling the solvent container(s)

Check the volume of the solvent container(s) at the beginning of every work shift to avoid inadequate washing during testing.

Solvent fill procedure 1. Remove the lid from the user-supplied solvent container.

NOTE *Whenever performing solvent fill procedures, verify secure installation of the 20-micron filter on the end of the solvent line to the miniAV instrument.*

⚠ **WARNING** *Use appropriate precautions when handling the solvent lines. Avoid spilling or splashing solvent. Always use appropriate MSDS procedures when handling samples/solvents.*

2. Refill the solvent container from the solvent source. Do not overfill!

3. Replace the weighted filter end of the miniAV solvent line in the solvent container. Make certain the filter end is at the bottom of the solvent container.

⚠ **WARNING** *Waste sample/solvents can present possible environmental and health hazards. Dispose of all waste materials in accordance with environmental and safety regulations.*

Emptying the Waste Receiver

Check the volume of the Waste Receiver frequently to avoid spillage/overflow.

Procedure 1. Disconnect the Waste Receiver from the cap containing the drain lines.

⚠ **WARNING** *Use appropriate precautions when handling the drain tubes. Avoid spilling or splashing waste material collected in the tubes. Always follow appropriate MSDS procedures when handling samples/solvents.*

2. Pour the collected solvent/sample mixture out of the Waste Receiver into a proper waste storage container.

3. Securely reconnect the cap with drain tubes to the Waste Receiver.

⚠️ ***WARNING*** *Waste sample/solvents can present possible environmental and health hazards. Dispose of all waste materials in accordance with environmental and safety regulations.*

Dual-solvent washing

For testing heavy or hard-to-clean materials, ***CANNON***® Instrument Company recommends a dual-solvent washing system. The dual-solvent washing process uses two different solvents. The first wash might ordinarily use a heavy solvent to clean the sample residue out of the viscometer tubes. The second wash might use a lighter solvent to remove any remaining sample/solvent residue and dry the viscometer tube. Test temperature(s) must be carefully considered when choosing solvents.

Dual-solvent action

To engage the dual-solvent washing, make certain that desired wash options are selected in the VISCPRO® software for Solvent A (washing solvent) and Solvent B (drying solvent). Follow the instructions in the Installation section of this manual to correctly configure the instrument for dual solvent operation.

Viscometer tubes

The miniAV is equipped with a borosilicate glass capillary viscometer tube having a wide viscosity range. The upper viscosity limit is up to 100 times the lower viscosity limit, depending on the tube type. Each 100-fold viscometer tube contains three thermistors used for sensing the level of the sample within the tube.

Thermistor operation

The tube thermistor detects the change in thermistor temperature associated with the passing of the sample meniscus, and records the time accurately to within one-hundredth (0.01) of a second.

Timing bulb determination

As the sample is drawn into the viscometer tube, the VISCPRO® software automatically determines which timing bulb will be used to test the sample.

The sample will be drawn into the bulb above the upper timing thermistor. That bulb will serve as the overflow bulb for that particular test run.

miniAV Bulb Selection Parameters	
Timing Bulb 2	**Timing Bulb 1**
1-10 x lower cSt limit	>10 x lower cSt limit

NOTE *The numbers listed in this table are approximations, not absolute values.*

Temperature bath

The temperature bath is capable of maintaining constant temperatures between 20°C and 100°C. Silicone bath fluid is circulated via a central stirring shaft with twin impellers. The bath also contains stainless steel resistance heating elements. Solid state temperature control circuits provide proportional control with reset. An over-temperature probe is installed to protect all heating elements.

Bath fluid

The temperature bath is ordinarily filled with Dow Corning 200 10 cSt silicone fluid, available from **CANNON**® Instrument Company.
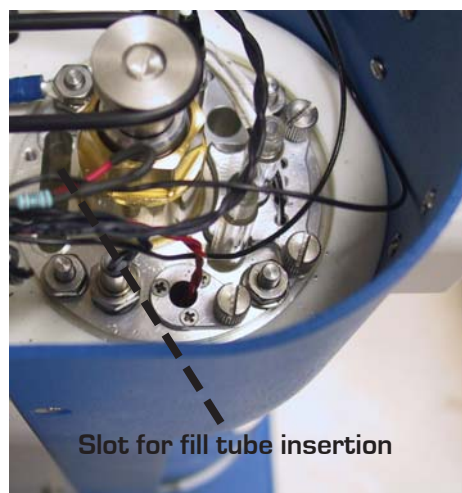
Filling the bath

⚠️ **CAUTION**   *Remove MAINS power from the instrument before beginning the fill procedure. The fill procedure should be performed when the bath fluid is at ambient lab temperature.*

Fill procedure

1. Obtain the (supplied) bottle, Fill Cap Assembly and bath fluid.

2. Remove the top panel of the bath unit to view and access internal components.

3. Fill the bottle with silicone fluid and screw the Fill Cap Assembly onto the bottle. Ensure that the breather tube is positioned with the tube opening at the bottom of the bottle.

Slot for fill tube insertion

miniAV top view with float sensor assembly highlighted

4. Insert the end of the fill tube from the Fill Cap Assembly into the slot in the top of the bath flange.

5. Lift and invert the bottle to begin introducing 900 mL of the appropriate grade of ambient-temperature silicone bath fluid into the bath. Add a small amount first and check for leaks. Then continue filling to the cold fill level, marked by a decal cold fill line. The cold fill line is approximately 3 centimeters (1.25") below the bottom of the top bath flange.

⚠️ **CAUTION**   *Do NOT overfill the miniAV bath, as the liquid level will rise with temperature.*

6. When done, lower and invert the bottle to stop the fluid flow, remove the fill tube from the bath, and detach the Fill Cap Assembly. Store the bottle and Fill Cap Assembly in a safe place for future use.

7. Replace the bath top cover. Check the bath for leaks to complete the fill procedure. Tighten fittings if necessary.

NOTE   *Periodically check the miniAV when the bath fluid is at ambient temperature to ensure that liquid is being maintained at the specified cold fill level.*

Draining the bath

⚠️ ***CAUTION***   *Remove MAINS power from the instrument before beginning the drain procedure. Ensure that the bath has cooled to ambient temperature before draining bath fluid. Hot silicone bath fluid can pose a hazard to laboratory personnel.*

1. Open the "ear" panels of the miniAV to access screws securing the front bath cover.

2. Using a Phillips screwdriver, loosen and remove the four screws securing the front panel to the Bath unit (see photo). Make certain to hold the cover in place when removing the final screws. When the screws have been removed, carefully remove the front cover and set it aside.

miniAV with front cover screws highlighted

3. Attach the drain hose of the appropriate ID to the stainless steel drain tube adjacent to the viscometer tube tip (see photo). The other end of the drain hose should be inserted in an appropriate bath fluid container (or the supplied 900 mL bottle).

4. Loosen the drain plug on the side of the bottom bath flange (see photo) using the supplied 3/16" hex driver. Fluid should begin draining from the bath into the storage container.

6. When fluid has drained from the bath, close the drain valve by tightening the drain plug clockwise to its furthest position. Tighten securely to prevent leaks.

7. Remove the drain hose from the drain tube.

Drain tube with drain hose attached

8. Replace the front panel with the screws previously removed. Then close the ear panels to complete the drain procedure.

miniAV bath vessel with drain plug visible

Bath heaters

The miniAV Bath Unit is equipped with two heating elements (control and auxiliary).

Bath fluid safety features

The miniAV Bath Unit is equipped with a fluid level float sensor suspended from the top bath flange at the front of the bath. If the bath fluid level drops to an unacceptable level, a fluid level float warning will abort bath operations until an acceptable bath fluid level is restored and the miniAV is restarted.

Over-temperature thermistor The miniAV Bath Unit incorporates a Thermal Fuse suspended in the bath fluid from the top bath flange. If the bath fluid temperature rises above acceptable operating temperatures, The Thermal Fuse will abort bath operations. If this occurs contact CANNON Service.

Checking solvent levels

Frequently inspect the user-supplied solvent vessel to ensure a steady supply of cleaning solvent for the viscometer tubes. When the solvent level drops to within 2.5-5.0 cm (1-2") of the bottom of the solvent vessel, it should be refilled.

Solvent/drain lines

See the Installation section of the first chapter for information on solvent/drain lines for the miniAV instrument.

Ventilation

The miniAV requires installation of the supplied 3" ventilation hose to the exhaust shroud on the rear panel of the unit. The shroud must be connected to a customer-supplied exhaust fan/ventilation system. A 3"-4" hose adapter is shipped from CANNON Instrument Company with each miniAV unit. The air flow rate and design of the exhaust fan must be suitable to handle the vapors from the customer-supplied solvent and samples.

Checking bath temperature

After the miniAV has been turned on, you may monitor bath temperature via a reference thermometer in the bath or via the software temperature display (Sample Input window). Temperature should rise until the bath has attained the desired test temperature. Consult the reference thermometer to ensure that the miniAV is controlling at the desired operating temperature. If the computer temperature display does not agree with the reference thermometer, perform the temperature calibration procedure per manual instructions.

Dual-solvent washing

For testing heavy oils or hard-to-clean materials, **CANNON**® Instrument Company recommends a dual-solvent washing system. The dual-solvent washing process uses two different solvents. The first wash might ordinarily use a heavy solvent to clean the sample residue out of the viscometer tubes. The second wash might use a lighter solvent to clean the remaining sample and solvent residue from the viscometer tube. Consult Chapter 1 for information on dual-solvent connections.

Solvent wash by computer

Use the following procedure for computer-controlled solvent washing:

Procedure

1. If the desired tube is testing a sample, wait until the test is complete OR click the Abort button from the Sample Input window and select the tube/tray to abort from the Select Trays window. Then click OK.

2. Proceed with the solvent wash by clicking the Wash Tubes button from the Sample Input or Machine Status windows. Or you may click on Service/Wash Viscometer Tube from the VISCPRO® primary menu options.

3. Click on Begin Wash to initiate a solvent wash using current wash settings. During the wash cycle, the Begin Wash button will change to Abort Wash. If it is necessary to interrupt the wash cycle, click Abort Wash.

4. After the tube has been washed, click Done to close the Wash Viscometer Tube window.

Setting wash parameters

For information on using the computer to select wash parameters, see Chapter 4.

Preventive maintenance

The miniAV is a precision instrument, durably crafted for years of trouble-free operation. Because of the desirability of consistent viscosity measurements over time, preventive maintenance is limited primarily to cleaning and inspection procedures, rather than regular replacement of equipment items.

Following is a recommended PM schedule. You may copy the checklists and use them to track your PM actions. For detailed descriptions of listed procedures, consult related sections of this manual.

Complete?	Daily maintenance
	Check liquid level in the Waste Receiver. Empty if necessary, using appropriate precautions for your solvent/samples.
	Check solvent level(s) in the solvent vessel(s). Refill solvent vessel(s) if necessary.
	Clean instrument surfaces with a damp cloth or absorbant paper towel.
	Run a calibration check standard or reference oil for each bulb to be used for the day's testing. Calibrate if result variance warrants.

Complete?	Frequent maintenance
	Check the silicone bath fluid level in the temperature bath. Add fluid as needed per instructions.
	Check and/or adjust vacuum and pressure settings per manual instructions.

Complete?	Biannual maintenance
	Ensure that the interface cable and tubing are clean, secure, and appropriately routed.
	With mains power off, remove the top cover of the Bath Unit and inspect for fluid residue. If necessary, wipe top bath flange surfaces clean and replace top cover.

miniAV repair/replacement components

The parts included in the list below are the more common repair/replacement components for the miniAV.

When making repairs using these items, make certain to replace obsolete or worn components with matching components.

Installation kit

The installation kit contains all parts required for assembly/installation of the miniAV. Kit replacements may be purchased from **CANNON**® (part #P81.2229).

The installation kit contains the following components:

DC Power Cable • AC Power Cord • (12') 1/8" solvent tubing • (2) solvent filters • (2) bottle caps • (6') VAC waste line (6 mm) • (2') 1/8" air line • 6 mm tubing for waste bottle • RS-232 cable • 9(F)-24(M) cable adapter • bath fluid • 1 gross vial • selected viscosity standards • Bath Fill Cap Assembly • 3"-4" vent coupling adapter • tubing cutter

Spare parts kit

The spare parts kit contains a variety of tools used to accomplish minor service and replacement procedures. Refer to your packing list for a description of kit components. Kit replacements may be purchased from **CANNON**® (part #P81.2230).

The spare parts kit contains the following components:

(4) fuses (8A for 115V, 4A for 230V unit • (2) 6mm SMC fittings • drive belt • 3/16" hex key for drain • (2') drain tubing • 7/64 hex key for elevate sensor

6

ANALYSIS CONFIGURATION OPTIONS

Data obtained from all instruments during sample testing is stored in the central VISCPRO® database. To view data, you must create an analysis configuration requesting the desired sample information in the desired format. Analysis configurations can be saved and later restored. The analysis configuration options provide powerful tools for reporting sample information. Analyses may be displayed on the computer screen, printed, or output via the computer RS-232 port.

Creating an analysis

1. Click Analyses from the VISCPRO® primary menu options.

2. Click View Analysis ... from the Analyses menu options. The Choose Analysis window will appear.
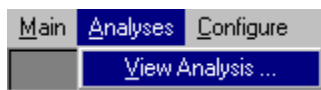
3. Highlight the desired analysis from the list of available analyses.
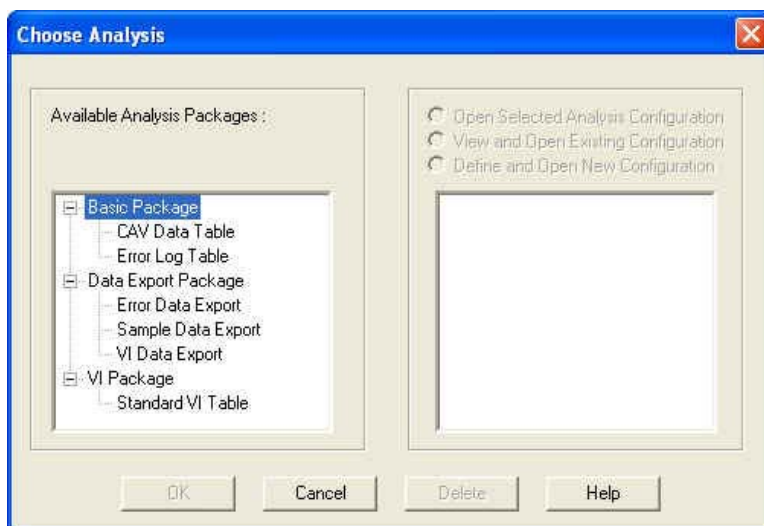
NOTE   *Use the directory tree structure to browse the report options. Click on the ⊞ or ⊟ icons to reveal/hide analyses.*

4. Click on the Define New Analysis radio button ⦿ (or verify that the option is selected).

NOTE

If you have already configured and saved an analysis, its name will appear in the list box on the right side of the window. If you click on an existing configuration and click OK, the analysis will be performed using the selected configuration settings. It will not be necessary to complete the remaining steps in this procedure.

5. Click OK. The analysis Configuration window will appear. The Configuration window consists of tabbed pages with filter options appropriate for the analysis.

6. Click on the tab corresponding to the filter you wish to set and complete the configuration options. For further information on selecting Date, Sample and other Report options, see the following sections of this chapter.

7. When you have completed the configuration, click OK. The program will prompt you to save the configuration.

8. Click Yes to save the configuration. The Save Configuration window will appear. Type the name of the new configuration in the Save As: field. Or double-click the name of a preexisting configuration in the Existing Configurations list box to replace the existing configuration with the new configuration settings.

9. Click OK. The analysis will be performed and displayed using the selected configuration settings.

NOTES

You may click Cancel *from the* Save Configuration *window to exit without saving configuration changes.*

You may display several analyses simultaneously by repeating the instructions above. Use the tiling options available from the Window *menu to display multiple analyses in the desired window format (horizontal, vertical or cascade view options are available).*

Sorting analysis data

After you have displayed an analysis, you may sort alphanumerically by any of the table headings (the default sort for most reports is Time Stamp). To sort, simply click on the desired column heading. The table will be displayed with the new sort order.

NOTE

The Sort *function is only available for an analysis when the* Dynamic Update *mode option is NOT selected. To restore sort functionality for an analysis, reconfigure the analysis by clicking* Configure Analysis *from the* Analyses *menu. Then access the* Date *filter options for the analysis and click the* Use Fixed Date and Time *radio button* ⦿ *. Set the Date/Time parameters and click* OK *to create the new analysis.*

Using the date filter

Use the date filter to select date/time parameters for the analysis. To use the date filter, click the Date Filter tab from the analysis configuration window.

To define a Fixed Date and Time, click the corresponding radio button ⊙. Then use the spin controls ⬍ and/or list box selection options to set the appropriate date/time parameters. All samples tested after the start date/time and before the end date/time, inclusive, will be included.

To automatically update the report with sample data as tests are completed, click the Use Dynamic Update radio button. Click the Do not show previous samples box if you do not wish to display samples run prior to the time the analysis is opened.

Use the spin controls ⬍ to select the Sample Time Window (the desired range of recent samples to be included in the analysis). Data from samples tested within [x] hours will be displayed in the analysis. Note that the analysis sorting options are disabled if you are using Dynamic Update.

EXAMPLE   *If the* Do not show previous samples *box was unchecked and a Sample Time Window value of 5 hours was selected, the analysis (when opened) would display data for all samples tested within the last five hours.*

Using the sample filter

Use the sample filter to limit the analysis to samples which have been tested on certain instruments and tubes, or which have certain Sample ID characteristics.

To filter samples by instrument, tube serial number (S/N) or Sample ID, click the Sample Filter tab from the analysis configuration window.
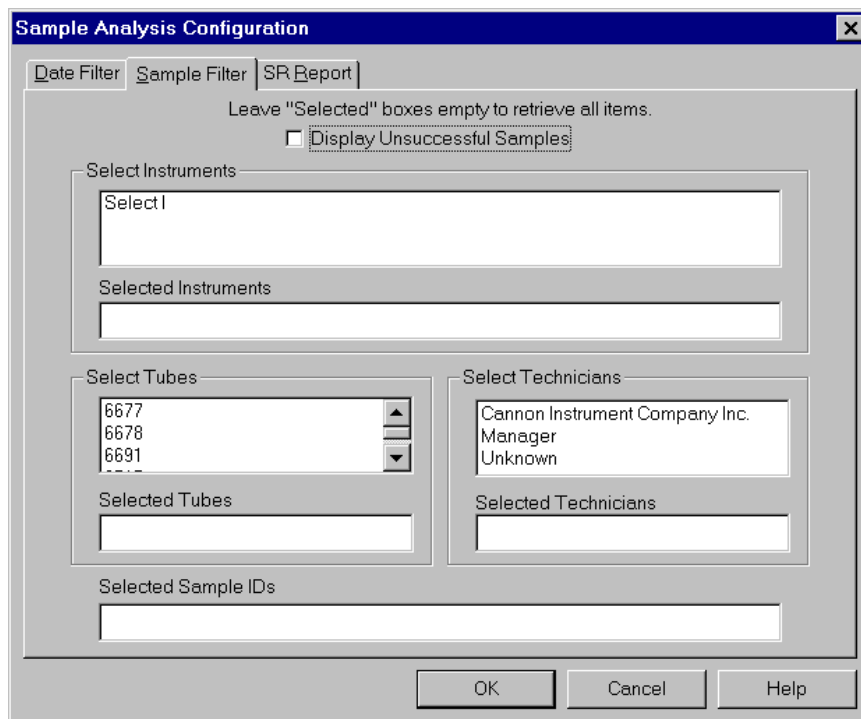
Some (not all) analyses offer an option to display data for samples which did not complete successfully. Click the Display Unsuccessful Samples box if you wish to use this data. Unsuccessful samples, which have no flow time, will be listed with a kinematic viscosity value of "0".

Then select the desired instruments and tubes from their respective list boxes. To select a range of tubes/instruments, click on the first desired item and then hold down the ⬆Shift key while clicking on the last desired item in the sequence. To individually select tubes/instruments from the list boxes and add them to the analysis, hold down the Ctrl key while clicking on each desired tube/instrument.

To filter by Sample ID characteristics, place the pointer/cursor in the Sample ID field and type the desired sample IDs, or leave the field blank to include all sample IDs for the selected instruments/tubes. You may use wildcards (%,_) to select a range of samples. For example, S% would

include data from all samples starting with S. %S% would include data from all samples containing S. The underscore (_) is a single-character wildcard.

You may use multiple IDs separated by a comma. For example, AV%,40C% would display all samples beginning with AV or 40C.

NOTE   *If no instruments/tubes/Sample IDs are selected, the analysis will display data for ALL instruments/tubes/Sample IDs.*

Using the report/port output filter

Use the Report or Port Output filter to determine which data will be calculated and/or included in the analysis, and/or in what sequence that data will be displayed. Report/Port Output filter options will vary depending on the nature of the analysis. For more information on Report/Port Output filter options, please see the chapter on the specific analysis.

Reconfiguring a displayed analysis

An on-screen analysis may be reconfigured using the same filtering tools available when creating a new configuration. To access configuration options for a displayed analysis:

1. Select Analyses from the VISCPRO® primary menu options.

2. Select Configure Analysis from the Analyses options.

3. Select the desired analysis from the available analyses. The Sample Analysis Configuration window will appear.

4. Reconfigure the analysis as desired by clicking the tabs to access the Date, Sample and Report filtering options (see previous sections). When done, click OK.

5. You will be prompted to save the new analysis configuration. After you make your selection(s), the analysis will be performed and displayed using the new configuration settings.

Resizing table columns

To resize columns from a displayed analysis for easier viewing/printing, move your mouse pointer/cursor to the edge of the desired column heading. The mouse pointer will change to a bi-dimensional arrow.

Click and drag the edge of the heading to the new location and then release the mouse button. The entire column will be resized as you drag.

User column size settings will be maintained as long as the analysis window is open.

Saving a current analysis

To save a current analysis configuration:

1. Select Analyses from the VISCPRO® primary menu options.

2. Select Save Analysis from the Analyses menu options.

3. Select the desired analysis. The Save Configuration window will appear. Type the name of the new configuration in the Save As: field. Or double-click the name of a preexisting configuration in the Existing Configurations list box to replace the existing configuration with the new configuration settings.

4. Click OK.

NOTE *You may click* Cancel *from the* Save Configuration *window to exit without saving configuration changes.*

Deleting an analysis configuration

You can delete an existing analysis configuration from the Choose Analysis window by highlighting the desired configuration in the list box and clicking the Delete button or pressing the ⌈Delete⌉ key. The configuration will be immediately and permanently deleted.

Printing an analysis

To print the complete analysis, select Print from the VISCPRO® Main menu while the analysis is being displayed. If multiple VISCPRO® windows are open, click the analysis window for the analysis you want to print to make it the active window <u>before</u> you select Print. Then choose print options from the Windows® Print window and click OK to print the analysis. (Consult your Windows® manual and printer/print driver documentation for more information on print settings).

It is also possible to select individual or multiple samples from an analysis for printing (see next section).

NOTES *The font size for printed analyses will be automatically adjusted to fit data columns to the selected printer paper size. If the font is too small, or if columns of data are missing or truncated, try using print options to set your printer to print in landscape instead of portrait orientation.*

The Print *option from* Main *will not be accessible unless the analysis window is the active window.*

Keystrokes for selecting data for printing

You can print data for a selected sample or samples from an on-screen analysis by highlighting the desired sample data and then using the Print option from the VISCPRO® Main Menu.

To select data for a single sample, click on the line of data associated with the sample on the screen display. To print a sequential range of samples, highlight the first sample in the range, then hold down the ⇧ Shift key and click on the last sample in the range. To individually select test data from the on-screen list box for printing, hold down the Ctrl key while clicking on each desired entry.

When all desired data has been selected, click on Print from the Main menu. Make certain that the Selection radio button ⊙ has been selected from the Print range options. Then click OK to print to the selected printer.

Exporting analysis data

The data export analyses included with the VISCPRO® software provide a convenient method for outputting sample data to laboratory collection systems or to an ASCII file.

There are three different data export analyses. For step-by-step instructions on exporting data from the VISCPRO® database, consult the manual chapter on the specific analysis:

- Error Data Export—Chapter 11 (export of error information)

- Sample Data Export—Chapter 9 (export of sample information)

- VI Data Export—Chapter 10 (export of sample/VI information)

Once the data has been exported, it can be manipulated using database/spreadsheet software packages such as Excel®, Access® or Quattro Pro®. These packages provide additional tools for configuration of report data for such functions as:

- Statistical Process Control

- Long-term Monitoring of Daily Check Standards

This page intentionally left blank.

The AV sample analysis is designed to permit convenient viewing of data collected from samples which have been tested using the Measure Sample Viscosity sample action option.

The sample analysis displays sample data in a tabular format. In addition to Sample identification (ID), the following data may be included:

- INV—Invalid test indication (flow time out of tolerance)
- Tol[erance]—Acceptable difference in multiple test results for the same sample
- Date—Date the sample was measured
- Time—Time the sample was measured
- Tube S/N—Tube serial number (from *Instrument Settings*)
- Tray [Index]—Position of the sample tray in the numeric sequence (left to right)
- Sample Index.—Position of the sample in the sample tray
- Bulb No.—Bulb number (the bulb in which the sample was run—#1 is the bottom bulb)
- Technician—The technician logged on to VISCPRO at the test time
- Instrument Type—Instrument type (AV, CCS, etc.)
- Instrument ID—Instrument Identification (from *Instrument Settings*)
- KV—Average kinematic viscosity (calculated from flow times)
- Known KV—Known kinematic viscosity of the viscosity standard
- % Diff KV—Percent difference between the measured KV and the known KV for viscosity standards
- Temp[erature]—Average bath temperature
- T1-T4—Bath temperature during each sample drop
- % Diff —For multi-drop samples: ((maximum drop time - minimum drop time) / average drop time) * 100
  EXAMPLE: Four drop times: 80.3, 80.4, 80.5, 80.5

  Maximum drop time = 80.5

  Minimum drop time = 80.3

  ((80.5 - 80.3)/80.425) * 100 = 0.2487

- Abs. Diff —For multi-drop samples: maximum drop time - minimum drop time
  EXAMPLE: Four drop times: 80.3, 80.4, 80.5, 80.5

  Maximum drop time = 80.5

  Minimum drop time = 80.3

  |80.5 - 80.3| = 0.2

- ■ {1,10} Efflux%—For multi-drop samples: displays the first 10 sample efflux times
- ■ {1,20} Efflux%—For multi-drop samples: displays the first 20 sample efflux times
- ■ Avg Efflux%—The average efflux time for efflux values used for viscosity calculation
- ■ C, E—The calibration constants used for this determination
- ■ SUS—Saybolt Furol Seconds calculation
- ■ % KE—Percent contribution of the kinetic energy correction to the measured viscosity.

Reporting options

The AV Data Table analysis can present all or any of the above data for samples residing in the database. Several powerful filters may be used to create useful reports. These filters may be used by making selections from the tabbed property sheets found in the Sample Analysis Configuration window. Once the appropriate filters have been designated, the resulting report configuration can be saved for future use.

Configuring the Data Table

For general information on using analyses, see Chapter 6. To access and configure the Data Table, follow the procedure below:

1. Select Analyses from the VISCPRO® primary menu options.

2. Select View Analysis ... from the Analyses menu. The Choose Analysis window will appear.

3. Double-click Basic Package from the list of Available Analysis Packages.

4. Select AV Data Table from the Basic Package report options.
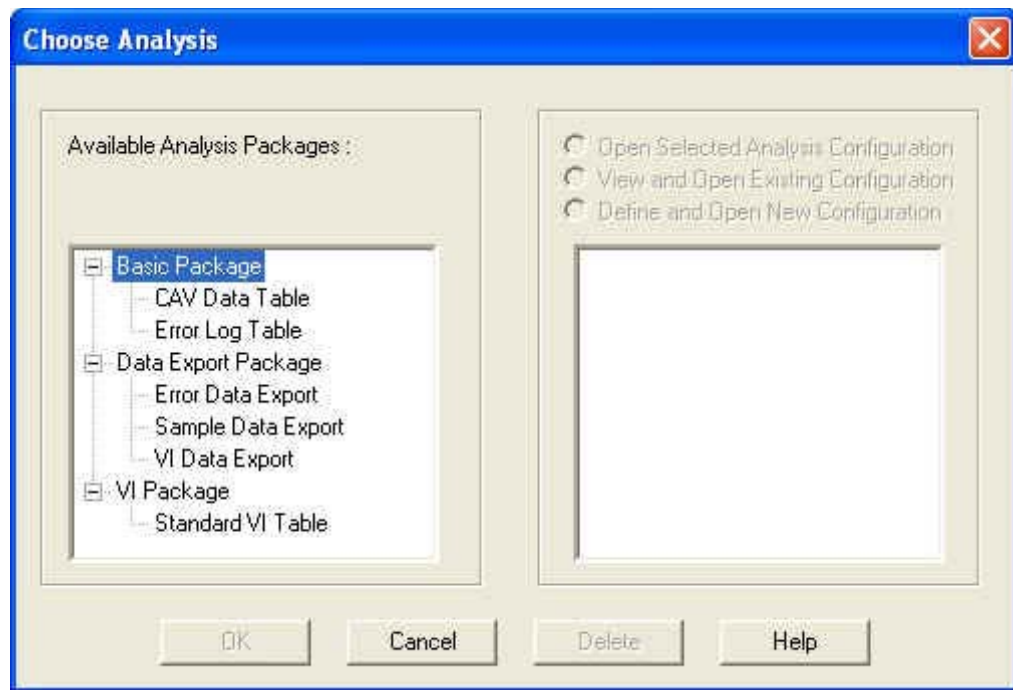
The Choose Analysis window

5. Click on the Define and Open New Configuration radio button ⬤ (or verify that the option is selected).

NOTE   *If you have already configured and saved an analysis, its name will appear in the list box on the right side of the window. If you click on an existing configuration and click* OK*, the analysis will be performed using the selected configuration settings. It will not be necessary to complete the remaining steps in this procedure.*

6. Click OK. The Sample Analysis Configuration window will appear.
    The Sample Analysis Configuration window consists of three tabbed pages:

    Date Filter | Sample Filter | SR Report
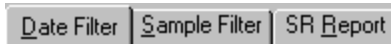
- ◼ **Date Filter**—allows you to select date/time parameters for the analysis
- ◼ **Sample Filter**—allows you to select which tubes/technicians/tests will be included in the analysis.
- ◼ **Report**—allows you to select what sample data will appear in the AV Data Table and how the data will be displayed

7. Click on the tab corresponding to the filter you wish to set and complete configuration options per the instructions below:

Date/Sample filters   Complete selection of Date/Sample filter options per the instructions in Chapter 6.

Report filter   To select data for inclusion in the Analysis, click the Report tab. Then select which fields to include in the report by clicking the "Click here..." box and selecting the desired data from the drop-down list. After individual options have been selected, review the default settings for Precision, Format and Units [of measure]. You may change the default values by double-clicking the box with the default value. A drop-down menu will appear, providing other optional values. Select the desired replacement value by clicking on it (or type an acceptable value and then press the Enter⏎ key).
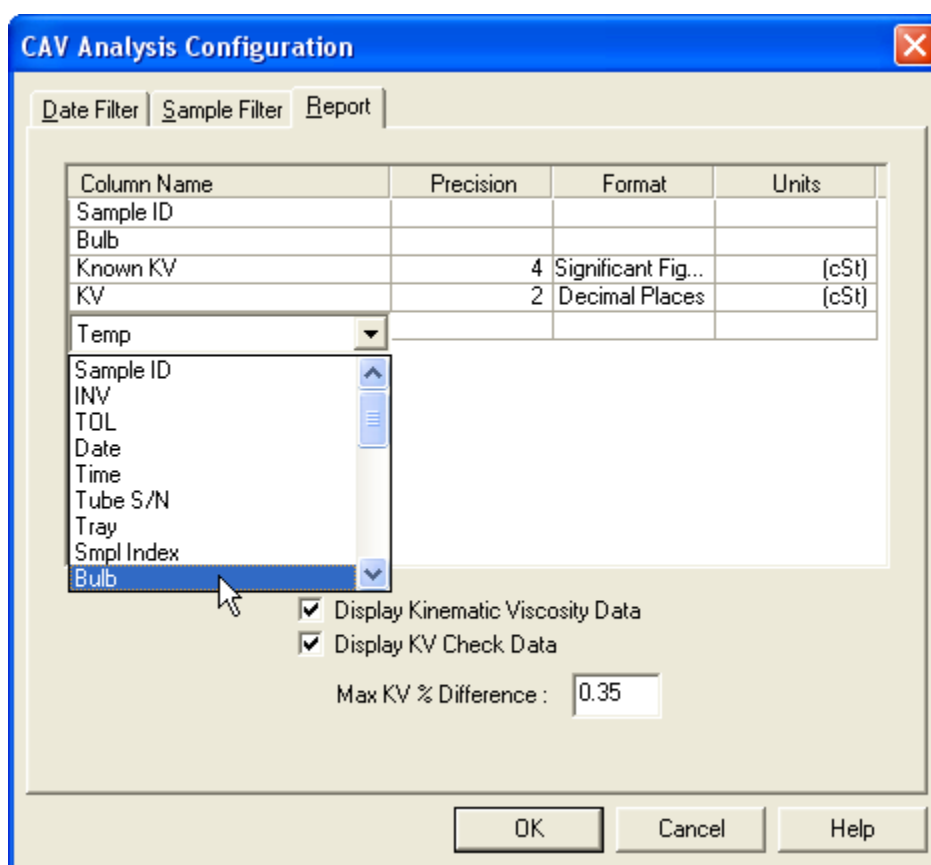
Selecting Report *data filter options*

Modifying data presentation   To delete an item from the report, right-click the column name for the data and then select the Delete option from the popup menu. To insert an item into the report in a particular position, right-click the column name at the desired position and select the Insert New option. Then click on the desired item to insert it in the report at the selected position.

8. When you have completed the configuration, click OK. The program will prompt you to save the configuration.
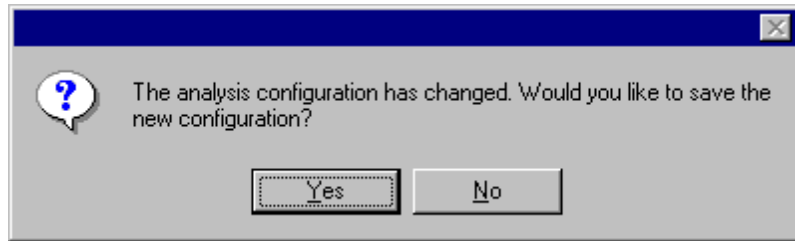
9. Click Yes to save the configuration. The Save Configuration window will appear.
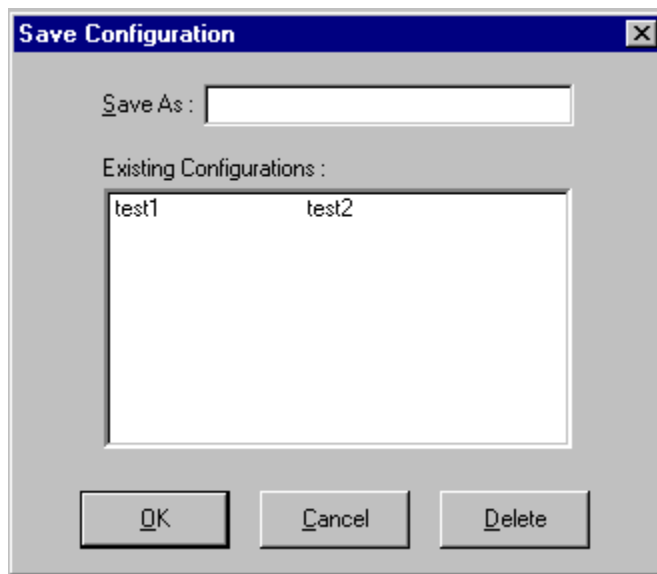
The Save Configuration window

10. Type the name of the new configuration in the Save As: field. Or double-click the name of a preexisting configuration in the Existing Configurations list box to replace the existing configuration with the new configuration settings.

11. Click OK. The analysis will be performed and displayed using the selected configuration settings.

NOTES   *You may click* Cancel *from the* Save Configuration window *to exit without saving configuration changes.*

You may display several analyses simultaneously by repeating the instructions above. Use the tiling options available from the Window *menu to display multiple analyses in the desired window format (horizontal, vertical or cascade view options are available).*

This page intentionally left blank.

STANDARD VI TABLE ANALYSIS

The Viscosity Index (VI) matching sample analysis displays VI data from samples which have been tested using the Measure Sample Viscosity sample action option and matched according to user-defined criteria. The VI analysis displays sample data in a tabular format. In addition to Sample identification (ID), the following data may be included:

- VI—VI value (always included—precision is determined using the VI Report tab)
- INV—Invalid test indication (always included—flow time(s) are out of tolerance and samples will need to be tested again)
- Avg KV—Average kinematic viscosity as calculated at the test temperatures
- KV40C/KV100C and/or KV100F/KV210F—Average kinematic viscosity calculated for bath temperatures of 40° and 100°C and/or 100°F and 210°F
- Temp1/Temp2—Actual average bath temperatures
- Time—Time the sample was measured
- Date—Date the sample was measured
- Tube S/N—Tube serial number (from *Instrument Settings*)

- Technician—Technician name (the individual logged in at the time the sample run was completed)

Reporting options

The VI analysis presents data for samples residing in the database. Several powerful filters may be used to create useful reports. These filters may be used by making selections from the tabbed property sheets found in the VI Configuration window. Once the appropriate filters have been designated, the resulting report configuration can be saved for future use.

Configuring the standard VI table

For general information on using analyses, see Chapter 6. To access and configure the Standard VI Table, follow the procedure below:

1. Select Analyses from the VISCPRO® primary menu options.

2. Select View Analysis ... from the Analyses menu. The Choose Analysis window (see figure, next page) will appear.

3. Double-click VI Package from the list of Available Analysis Packages.
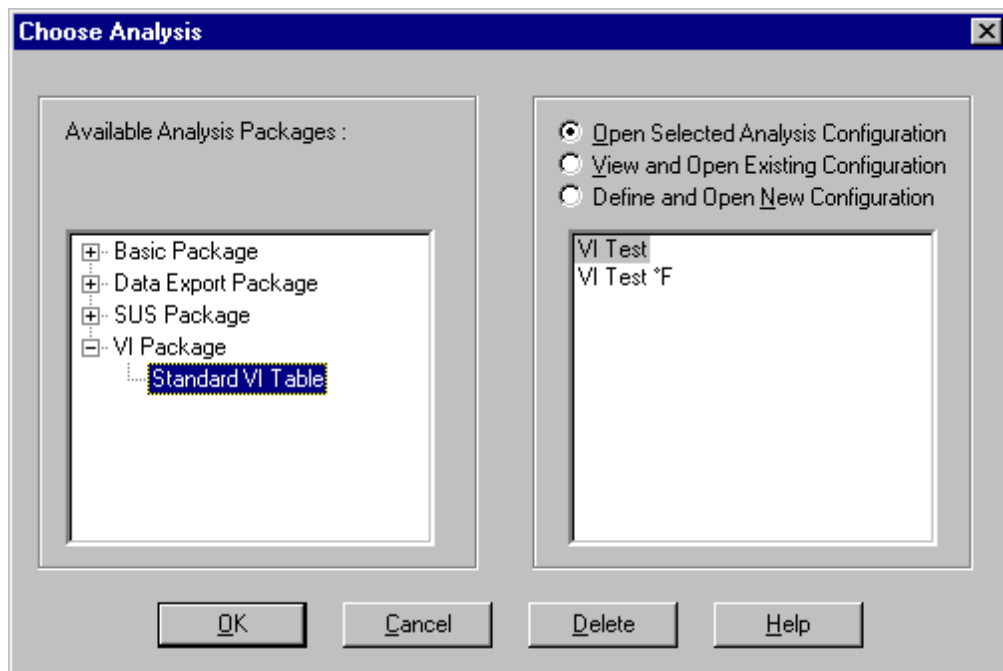
The Choose Analysis window

4. Select Standard VI Table from the VI Package report options.

5. Click on the Define and Open New Configuration radio button ⊙ (or verify that the option is selected).

NOTE   *If you have already configured and saved an analysis, its name will appear in the list box on the right side of the window. If you click on an existing configuration and click* OK*, the analysis will be performed using the selected configuration settings. It will not be necessary to complete the remaining steps in this procedure.*

6. Click OK. The VI Configuration window will appear.

The VI Configuration window consists of three tabbed pages:
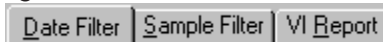
Date Filter | Sample Filter | VI Report

- **Date Filter**—allows you to select date/time parameters for the analysis
- **Sample Filter**—allows you to select which tubes/technicians/tests will be included in the analysis.
- **VI Report**—allows you to select what sample data will appear in the VI Report and how the data will be displayed

7. Click on the tab corresponding to the filter you wish to set and complete configuration options per the following instructions:

Date/Sample filters Complete selection of Date/Sample filter options per the instructions in Chapter 6.

NOTE *The VI Matcher does not match invalid samples UNLESS the* Allow Matching ... *box from the Sample Filter tab options is checked. The VI Matcher never matches unsuccessful samples (samples with no flow time and a displayed kinematic viscosity of "0"). If one of the samples ran successfully at one temperature but not at the other, the good sample can still be used for VI matching if the failed sample is rerun within 8 hours.*

VI Analysis filter To adjust other VI analysis options, click the VI Report tab.

VI Report data filter options

Then use the check boxes to select which fields to include in the report. After individual options have been selected, use the related spin controls and radio buttons to determine the appearance of data for kinematic viscosity, temperature and drop times.

8. When you have completed the configuration, click OK. The program will prompt you to save the configuration.

The analysis configuration has changed. Would you like to save the new configuration?

| Yes | No |

9. Click Yes to save the configuration. The Save Configuration window will appear. Type the name of the new configuration in the Save As: field. Or double-click the name of a preexisting configuration in the Existing Configurations list box to replace the existing configuration with the new configuration settings.

10. Click OK. The analysis will be performed and displayed using the selected configuration settings.

NOTES

You may click Cancel *from the* Save Configuration window *to exit without saving configuration changes.*

You may display several analyses simultaneously by repeating the instructions above. Use the tiling options available from the Window *menu to display multiple analyses in the desired window format (horizontal, vertical or cascade view options are available).*

SAMPLE DATA EXPORT ANALYSIS

The VISCPRO® Sample Data Export analysis provides a convenient operator interface for configuring sample information from the sample database for serial output and exporting it in ASCII text format. The port output filters (Date, Sample and Port Output Format) permit the user to select and output desired data to a file, LPT port or serial port in whatever format is desired.

NOTE

Once the analysis has been exported, it cannot be reconfigured like other VISCPRO® analyses. This prevents duplicate data from being resent to network collection systems your lab may have in place. To resend data, close the analysis window (you may save the configured analysis if you desire) and then recreate the analysis .

Available data for analysis

In addition to exporting the selected data, the analysis displays it on the computer screen in a tabular format. The analysis may include:

- Smpl ID—Sample ID
- Instr ID—Instrument ID (from general configuration settings)
- Instr Type—Instrument Type (from general configuration settings)
- Technician—Technician name (the individual logged in at the time the sample run was completed)
- Avg KV—Average measured kinematic viscosity (KV) expressed in mm^2/s
- Known KV—Known kinematic viscosity of check standards (from standard bottle)
- Temp °C—Average bath temperature
- Temp °F—Average bath temperature
- Date—Date when the test was completed
- Time—Time when the test was completed
- Tube—Tube serial number (S/N)
- Bulb—Bulb number (the bulb in which the sample was run—#1 is the bottom bulb)
- SUS—Kinematic viscosity expressed in Saybolt Universal Seconds
- Flowtime 1—Flow time of the first sample drop (T1)
- Flowtime 2—Flow time of the second sample drop (T2)
- %Diff Flow—% difference in flow times (between drops)
- Formatting Options (Space, Carriage Return, Line Feed) and ASCII Codes—Permits additional user-controlled data formatting

Configuring the Sample Data Export analysis

1. Select Analyses from the VISCPRO® menu options.

2. Select View Analysis from the Analyses menu options

3. Double-click Data Export Package from the list of available analysis types.

4. Select the Sample Data Export analysis option.

5. Click the Define and Open New Configuration radio button ◉ to define a new analysis configuration.

NOTE   *If you have already configured and saved an analysis, its name will appear in the list box on the right side of the window. If you click on an existing configuration and click* OK*, the analysis will be performed using the selected configuration settings. It will not be necessary to complete the remaining steps in this procedure.*

6. Click OK. The ASCII Ports Output Configuration window will appear.

   The ASCII Ports Output Configuration window consists of three tabbed pages:

   Date Filter | Sample Filter | Port Output Format

   ■ **Date Filter**—allows you to select date/time parameters for the analysis.

   ■ **Sample Filter**—allows you to select which tubes/technicians/tests will be included in the analysis.

   ■ **Port Output Format**—allows you to select the output port(s), what sample data will appear in the output analyses, and how the data will be displayed/sent.

7. Click on the tab corresponding to the filter you wish to set and complete configuration options per the following instructions:

Date/Sample filters   a. Complete selection of Date and Sample filter options per the instructions in Chapter 6.

Port Output Format filter   b. To select other analysis configuration options, click the Port Output Format tab.

Adding ports   c. Click Add Port from the Port Output Format button options to open the Select Port window. Select the desired serial port(s) and/ or files for output and verify the configuration settings for each. Then Click OK. Added ports will be displayed in the port list box.
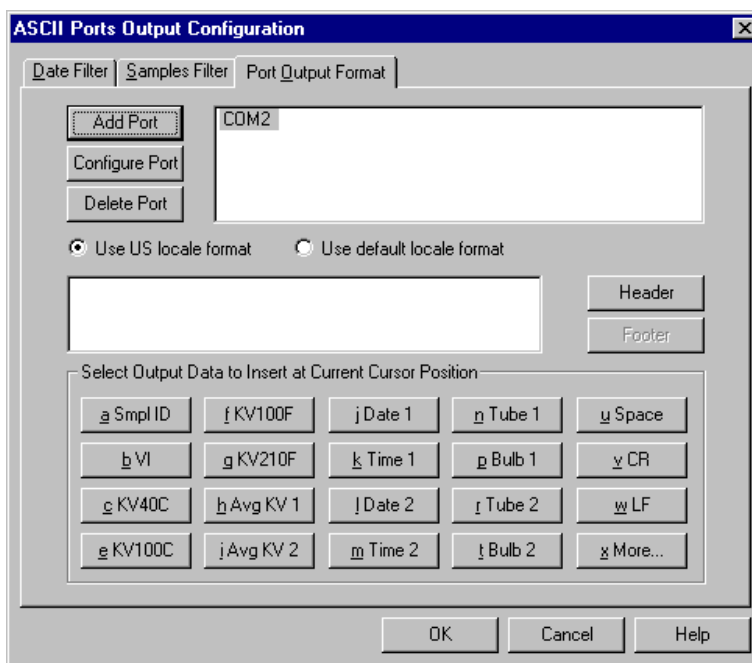
The Port Output Format window

NOTE

If you select NEW FILE *for output, click the* [...] *button to open the Windows* Save As: *box. Select the desired directory and type the desired file name in the* File Name: *text box. If you select an existing file, ASCII port analysis data will be appended to the file.*

Make certain that you have selected the desired port for configuration by clicking on the port name in the Add Port *list box* **prior** *to selecting output data and formatting options for that port. OUTPUT FOR EACH ADDED PORT MUST BE CONFIGURED SEPARATELY (see note below).*

Configuring output

d. Select the desired port/file for configuration by clicking the name of the port/file in the port list box. Then click the radio button ⊙ corresponding to the desired locale format (U.S. or local). Your choice will determine the formatting of numeric data, dates and choice of decimals or commas as placeholders.

Delaying serial output

e. You may delay data transmission of serial output for a time parameter you specify by clicking the Delay button to insert the delay code into the Configure list box, Header or Footer. The Delay Configuration window will appear. To set the time of the Delay, type a numeric value in the appropriate field, and click on one of the radio buttons to select the correct unit of time. Then click OK.

Selecting output data

f. Click the buttons corresponding to the data types you wish to output on the report. As you do so, the appropriate coding for the output analysis will be inserted in the text box.

NOTE	*For some data output options, you will need to select the desired output field length using the spin controls* ⬍ *provided in the* Format Data Output *window. Experienced users may type code directly into the text box by placing the cursor at the appropriate point. The text box information may also be manipulated using the mouse click-and-drag technique to highlight data and then using standard Windows® cut (*Ctrl*-X), copy (*Ctrl*-C), and paste (*Ctrl*-V) keyboard combinations. In this way, formatting data can easily be copied from one port configuration to another.*

Adding a header

g. If you would like to include a header at the beginning of the analysis, click the Header button and add the desired text string via the keyboard. Format the entry as desired using the Carriage Return (CR) and Line Feed (LF) options as necessary to indicate line breaks. Then click OK.

Adding a footer

h. If you would like to include a footer at the end of the analysis, click the Footer button and add the desired text string via the keyboard. Format the entry as desired using the Space, Carriage Return (CR) and Line Feed (LF) options. Then click OK. (Space—Inserts a blank space, CR—Inserts a carriage return code, and LF—Inserts a line feed code)

NOTE *If you have selected the* Dynamic Update *option using the* Date *tab options, the footer will not be sent until the analysis window is closed.*

8. When you have completed the configuration, click OK. Serial data will be routed to the appropriate ports/files and you will be prompted to save the configuration.

9. If you do not wish to save the configuration, click No. The analysis will be displayed and the data will be sent to the selected ports. If you wish to save the configuration, click Yes. The Save Configuration window will appear. Type the name of the new configuration in the Save As: field. Or double-click the name of a preexisting configuration in the Existing Configurations list box to replace the existing configuration with the new configuration settings. Then click OK. The saved analysis will be displayed using the selected configuration settings, and the data will be sent to the selected ports.

NOTES *You may click* Cancel *from the* Save Configuration window *to exit without saving configuration changes.*

The Port Output Analysis cannot be reconfigured. This avoids duplication of output data for collection devices your facility may have in place. You may still view configuration options for a displayed analysis by selecting Configure Analysis from the Analyses menu and choosing the correct analysis.

Re-sending export data

To re-send Port Output Analysis data for a displayed analysis, first save the analysis by clicking Analyses/Save Configuration*, selecting the desired analysis, typing the analysis name in the* Save As: *list box and clicking* OK*. Then close the* Port Output Analysis *window and re-select* Port Output Analysis *by clicking* Analyses/View Analysis *from the primary menu options. Then click on the desired configuration from the list of saved configurations and click OK.*

Exporting specific sample data

To re-send data from specific samples, use Sample Filter options, including wildcard characters if desired, to reconfigure the analysis to send only the necessary data.

Port selection

Make certain that you have selected the desired port for configuration by clicking on the port name in the Add Port *list box **prior** to selecting output data and formatting options for that port. OUTPUT FOR EACH ADDED PORT MUST BE CONFIGURED SEPARATELY.*

This page intentionally left blank.

VI DATA EXPORT ANALYSIS

The VISCPRO® VI Data Export Analysis provides a convenient operator interface for configuring Viscosity Index (VI) sample information from the sample database for serial output and exporting it in ASCII text format. The port output filters (Date, Sample and Port Output Format) permit the user permit the user to select and output desired data to a file, LPT port or serial port in whatever format is desired.

NOTE

Once the port output analysis has been generated, it cannot be reconfigured like other VISCPRO® analyses. This prevents duplicate data from being resent to network collection systems your lab may have in place. To re-send data to the serial port, close the analysis window (you may save the configured analysis if you desire) and then recreate the analysis .

Available data for analysis

In addition to the serial transmission, the analysis displays requested sample data on the computer screen in a tabular format and may include the following data:

- Smpl ID—Sample ID for sample pair
- VI—Viscosity Index for sample pair
- KV40C—Kinematic viscosity at 40°C for low-temperature sample
- KV100C—Kinematic viscosity at 100°C for high-temperature sample
- KV100F—Kinematic viscosity at 100°F for low-temperature sample
- KV210F—Kinematic viscosity at 210°F for high-temperature sample
- Avg KV 1/Avg KV 2—Average measured kinematic viscosity (KV) for the low/high temperature sample
- Date 1/Date 2—Date when the test was completed for the low/high temperature sample
- Time 1/Time 2—Time when the test was completed for the low/high temperature sample
- Tube 1/Tube 2—Tube serial number (S/N) for the low/high temperature sample
- Bulb 1/Bulb 2—Bulb number (the bulb in which the sample was run—#1 is the bottom bulb) for the low/high temperature sample
- SUS 100F/SUS 210F—Kinematic viscosity expressed in Saybolt Universal Seconds (SUS) for the low/high temperature sample
- TempC 1/TempC 2—Bath temperature
- TempF 1/TempF 2—Bath temperature
- Instr 1/Instr 2—Instrument ID (from general configuration settings) for the low/high temperature sample
- InstrType 1/InstrType 2—Instrument Type (from general configuration settings) for the low/high temperature sample

- Tech 1/Tech 2—Technician name (the individual logged in at the time the sample run was completed) for the low/high temperature sample
- ASCII Codes—Permits addition of user-selected ASCII codes to analysis
- Space—Inserts a blank space (formatting option)
- CR—Inserts a carriage return code (formatting option)
- LF—Inserts a line feed code (formatting option)
- Next/Previous—Displays more button options

Configuring the VI Data Export Analysis

1. Select Analyses from the VISCPRO® menu options.

2. Select View Analysis from the Analyses menu options

3. Double-click Data Export Package from the list of available analysis types.

4. Select the VI Data Export Analysis option.

5. Click the Define and Open New Configuration radio button ⦿ to define a new analysis configuration.

NOTE

If you have already configured and saved an analysis, its name will appear in the list box on the right side of the window. If you click on an existing configuration and click OK*, the analysis will be performed using the selected configuration settings. It will not be necessary to complete the remaining steps in this procedure.*

6. Click OK. The Port Output Configuration window will appear.

   The Port Output Configuration window consists of three tabbed pages:

   Date Filter | Sample Filter | Port Output Format

- **Date Filter**—allows you to select date/time parameters for the analysis.
- **Sample Filter**—allows you to select which tubes/technicians/tests will be included in the analysis.
- **Port Output Format**—allows you to select the output port(s), what sample data will appear in the output analyses, and how the data will be displayed/sent.

7. Click on the tab corresponding to the filter you wish to set and complete configuration options per the following instructions:

Date/Sample filters

a. Complete selection of Date and Sample filter options per the instructions in Chapter 6.

Port Output Format filter

b. To adjust other analysis configuration options, click the Port Output Format tab:

Date Filter | Sample Filter | Port Output Format

Add Port	LPT1
Configure Port	
Delete Port	

⦿ Use US locale format   ○ Use default locale format

[ID,%-10.10s][KV100F,%7.0g][KV210F,%7.0g]\r\n[LKV,%10.0g]
[HKV,%10.0g]

| Header |
| Footer |

Select Output Data to Insert at Current Cursor Position

a Smpl ID	f KV100F	j Tube S/N 1	n Tube S/N 2	u ASCII Code
b VI	g KV210F	k Tray Indx 1	p Tray Indx 2	v CR
c KV40C	h Avg KV 1	l Smpl Indx 1	r Smpl Indx 2	w LF
e KV100C	i Avg KV 2	m Bulb 1	t Bulb 2	x More...

| OK | Cancel | Help |

VI Port Output Format options

Adding ports

    c. Click Add Port from the Port Output Format button options to open the Select Port window. Select the desired serial port(s) and/or files for output and verify the configuration settings for each. Then Click OK. Added ports will be displayed in the port list box.

NOTE

If you select NEW FILE *for output, click the* [...] *button to open the Windows* Save As: *box. Select the desired directory and type the desired file name in the* File Name: *text box. If you select an existing file, ASCII port analysis data will be appended to the file.*

Make certain that you have selected the desired port for configuration by clicking on the port name in the Add Port *list box **prior** to selecting output data and formatting options for that port. OUTPUT FOR EACH ADDED PORT MUST BE CONFIGURED SEPARATELY (see following note).*

Configuring output

    d. Select the desired port/file for configuration by clicking the name of the port/file in the port list box. Then click the radio button corresponding to the desired locale format (U.S. or local). Your choice will determine the formatting of numeric data and dates.

Delaying serial output

   e. You may delay data transmission of serial output for a time parameter you specify by clicking the Delay button to insert the delay code into the Configuration list box, Header or Footer. The Delay Configuration window will appear. To set the time of the Delay, type a numeric value in the appropriate field, and click on one of the radio buttons to select the correct unit of time. Then click OK.

Selecting output data

   f. Click the buttons corresponding to the data types you wish to output on the report. As you do so, the appropriate coding for the output analysis will be inserted in the text box.

NOTE

For some data output options, you will need to select the desired output field length using the spin controls ⬍ *provided in the* Format Data Output *window. Experienced users may type code directly into the text box by placing the cursor at the appropriate point. The text box information may also be manipulated using the mouse click-and-drag technique to highlight data and then using standard Windows® cut (Ctrl-X), copy (Ctrl-C), and paste (Ctrl-V) keyboard combinations. In this way, formatting data can easily be copied from one port configuration to another.*

Adding a header

   g. If you would like to include a header at the beginning of the analysis, click the Header button and add the desired text string via the keyboard. Format the entry as desired using the Carriage Return (CR) and Line Feed (LF) options as necessary to indicate line breaks. Then click OK.

Adding a footer

   h. If you would like to include a footer at the end of the analysis, click the Footer button and add the desired text string via the keyboard. Format the entry as desired using the Carriage Return (CR) and Line Feed (LF) options. Then click OK.

NOTE

If you have selected the Dynamic Update *option using the* Date *tab options, you will not be able to enter* Footer *information for the analysis.*

   8. When you have completed the configuration, click OK. Serial data will be routed to the appropriate ports/files and you will be prompted to save the configuration.

The analysis configuration has changed. Would you like to save the new configuration?

   Yes   No

9. If you do not wish to save the configuration, click No. The analysis will be displayed and the data will be sent to the selected ports. If you wish to save the configuration, click Yes. The Save Configuration window will appear. Type the name of the new configuration in the Save As: field. Or double-click the name of a preexisting configuration in the Existing Configurations list box to replace the existing configuration with the new configuration settings. Then click OK. The saved analysis will be displayed using the selected configuration settings, and the data will be sent to the selected ports.

NOTES

You may click Cancel *from the* Save Configuration window *to exit without saving configuration changes.*

The Port Output Analysis cannot be reconfigured. This avoids duplication of output data for data collection devices your facility may have in place. You may still view configuration options for a displayed analysis by selecting Configure Analysis from the Analyses menu and choosing the correct analysis.

Re-sending export data

To re-send Port Output Analysis data for a displayed analysis, first save the analysis by clicking Analyses/Save Configuration*, selecting the desired analysis, typing the analysis name in the* Save As: *list box and clicking* OK*. Then close the* Port Output Analysis *window and re-select* Port Output Analysis *by clicking* Analyses/View Analysis *from the primary menu options. Then click on the desired configuration from the list of saved configurations and click OK.*

Exporting specific sample data

To re-send data from specific samples, use Sample Filter options, including wildcard characters if desired, to reconfigure the analysis to send only the necessary data.

Port selection

Make certain that you have selected the desired port for configuration by clicking on the port name in the Add Port *list box* **prior** *to selecting output data and formatting options for that port. OUTPUT FOR EACH ADDED PORT MUST BE CONFIGURED SEPARATELY.*

This page intentionally left blank.

CHAPTER 11
ERROR DATA EXPORT ANALYSIS

The VISCPRO® Error Data Export analysis compiles error information from the sample database for serial output and exports it in ASCII text format. The port output filters (Date, Error and Error Report) permit the user to select and output desired data to a file, LPT port or serial port in whatever format is desired.

NOTE   *Once the port output analysis has been generated, it cannot be reconfigured like other VISCPRO® analyses. This prevents duplicate data from being resent to network collection systems your lab may have in place. To re-send data to the serial port, close the analysis window (you may save the configured analysis if you desire) and then recreate the analysis .*

Available data for analysis   In addition to the serial transmission, the analysis is displayed on the computer screen in a tabular format and may include the following data:

- Error—Error description
- Date—Date when the test was completed
- Time—Time when the test was completed
- Error Source—Source for the error message (instrument or other)
- Instr ID—Identification of the instrument associated with the error (if applicable)
- Sample ID—Identification of the sample associated with the error (if applicable)
- Bulb No.—Bulb number associated with the error
- Tray Index—Position of the sample tray associated with the error (trays are numbered sequentially from left to right)
- Sample Index—Position of the sample associated with the error (samples are numbered sequentially beginning at the rear of the tray)
- Technician—The name of the technician who was logged on at the time the error occurred (if applicable)
- Formatting Options (Space, Carriage Return, Line Feed) and ASCII Codes—Permits additional user-controlled data formatting

Configuring the Error Data Export analysis

1. Select Analyses from the VISCPRO® menu options.

2. Select View Analysis from the Analyses menu options

3. Double-click Data Export Package from the list of available analysis types.

4. Select the Error Data Export analysis option.

5. Click the Define and Open New Configuration radio button ⦿ to define a new analysis configuration.

NOTE   *If you have already configured and saved an analysis, its name will appear in the list box on the right side of the window. If you click on an existing configuration and click* OK*, the analysis will be performed using the selected configuration settings. It will not be necessary to complete the remaining steps in this procedure.*

6. Click OK. The Port Output Configuration window will appear.

The Port Output Configuration window consists of three tabbed pages:

Date Filter | Error Page | Port Output Format

■ **Date Filter**—allows you to select date/time parameters for the analysis (see Chapter 6 for more information)

■ **Error Page**—allows you to filter errors by source and by technician.

■ **Port Output Format**—allows you to select the output port(s), what sample data will appear in the output analyses, and how the data will be displayed/sent.

7. Click on the tab corresponding to the filter you wish to set and complete configuration options per the following instructions:

Date filter

a. Use the Date Filter to select the appropriate date/time parameters for the analysis. See Chapter 6 for more information on using the Date Filter.

Error Page filter

b. Use the Error Page tab to limit the analysis to errors which have been associated with certain instruments or analyses, or which are associated with certain technician names.

To filter errors by source or technician name, click the Error Page tab from the analysis configuration window (see figure, next page).

Then select the desired error sources/technicians from their respective list boxes. To select a range of sources/technicians, click on the first desired item and then hold down the ⇧ Shift key while clicking on the last desired item in the sequence. To individually select sources/technicians from the list boxes and add them to the analysis, hold down the Ctrl key while clicking on each desired tube/instrument.

You may also type filter information directly into the Selected . . . list boxes. Position the cursor in the desired field and use the keyboard to input entries. You may use wildcards (%,_) to select a range of samples. For example, S% would include data from all samples starting with S. %S% would include data from all samples containing S. The underscore (_) is a single-character wildcard.
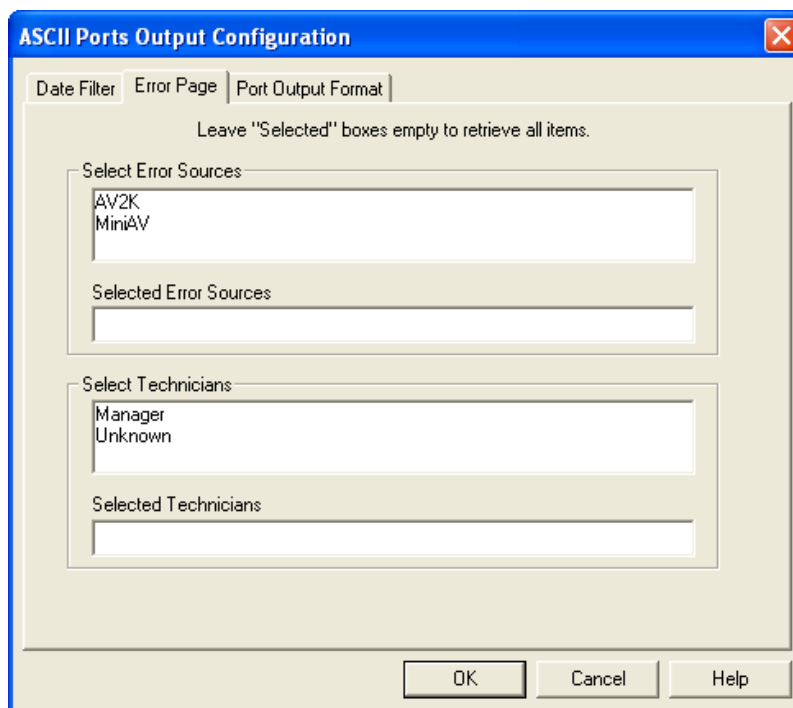
The Error Page tab

You may use multiple IDs separated by a comma. For example, AV%,40C% would display all samples beginning with AV or 40C.

NOTE   *If no error sources/technicians are selected, the analysis will display data for ALL error sources/technicians.*

Port Output Format filter   c. To adjust other analysis configuration options, click the Port Output Format tab (see Figure, next page):

Adding ports   Click Add Port from the Port Output Format button options to open the Select Port window. Select the desired serial port(s) and/or files for output and verify the configuration settings for each. Then Click OK. Added ports will be displayed in the port list box.

Configuring output   d. Select the desired port/file for configuration by clicking the name of the port/file in the port list box. Then click the radio button corresponding to the desired locale format (U.S. or local). Your choice will determine the formatting of numeric data and dates.
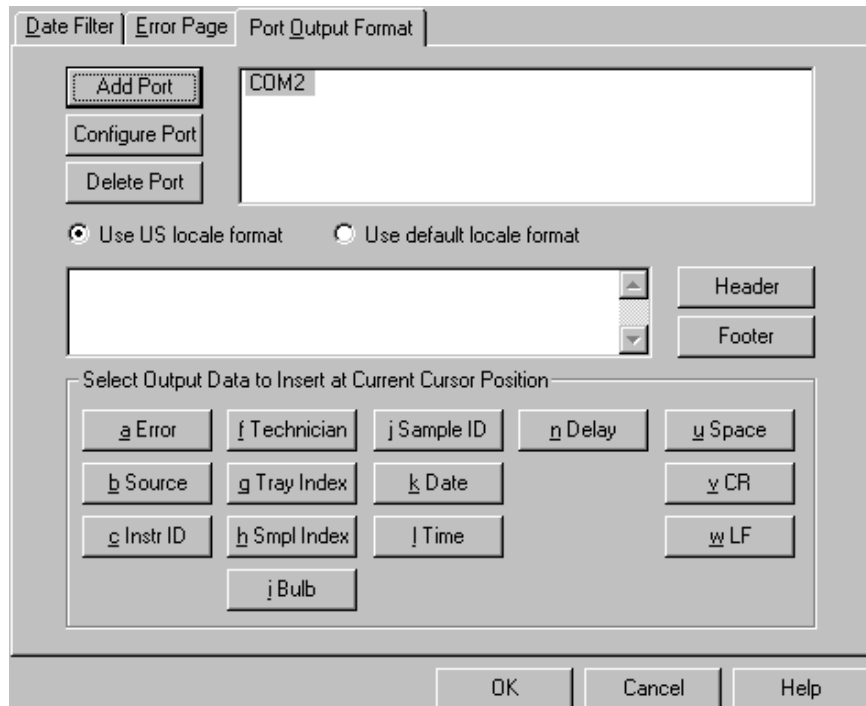
Error Ports Ouput Configuration options

Delaying serial output

e. You may delay data transmission of serial output for a time parameter you specify by clicking the Delay button to insert the delay code into the Configuration list box, Header or Footer. The Delay Configuration window will appear. To set the time of the Delay, type a numeric value in the appropriate field, and click on one of the radio buttons to select the correct unit of time. Then click OK.

Selecting output data

f. Click the buttons corresponding to the data types you wish to output on the report. As you do so, the appropriate coding for the output analysis will be inserted in the text box.

NOTE

For some data output options, you will need to select the desired output field length using the spin controls ⊟ *provided in the* Format Data Output *window. Experienced users may type code directly into the text box by placing the cursor at the appropriate point. The text box information may also be manipulated using the mouse click-and-drag technique to highlight data and then using standard Windows® cut (Ctrl-**X**), copy (Ctrl-**C**), and paste (Ctrl-**V**) keyboard combinations. In this way, formatting data can easily be copied from one port configuration to another.*

Adding a header

g. If you would like to include a header at the beginning of the analysis, click the Header button and add the desired text string via the keyboard. Format the entry as desired using the Carriage Return (CR) and Line Feed (LF) options as necessary to indicate line breaks. Then click OK.

Adding a footer

h. If you would like to include a footer at the end of the analysis, click the Footer button and add the desired text string via the keyboard. Format the entry as desired using the Carriage Return (CR) and Line Feed (LF) options. Then click OK.

NOTE

If you have selected the Dynamic Update *option using the* Date *tab options, you will not be able to enter* Footer *information for the analysis.*

8. When you have completed the configuration, click OK. Serial data will be routed to the appropriate ports/files and you will be prompted to save the configuration.

The analysis configuration has changed. Would you like to save the new configuration?

Yes   No

9. If you do not wish to save the configuration, click No. The analysis will be displayed and the data will be sent to the selected ports. If you wish to save the configuration, click Yes. The Save Configuration window will appear. Type the name of the new configuration in the Save As: field. Or double-click the name of a preexisting configuration in the Existing Configurations list box to replace the existing configuration with the new configuration settings. Then click OK. The saved analysis will be displayed using the selected configuration settings, and the data will be sent to the selected ports.

NOTES

You may click Cancel *from the* Save Configuration window *to exit without saving configuration changes.*

The Port Output Analysis cannot be reconfigured. This avoids duplication of output data for collection devices your facility may have in place. You may still view configuration options for a displayed analysis by selecting Configure Analysis from the Analyses menu and choosing the correct analysis.

Re-sending export data   *To re-send Port Output Analysis data for a displayed analysis, first save the analysis by clicking* Analyses/Save Configuration, *selecting the desired analysis, typing the analysis name in the* Save As: *list box and clicking* OK. *Then close the* Port Output Analysis *window and re-select* Port Output Analysis *by clicking* Analyses/View Analysis *from the primary menu options. Then click on the desired configuration from the list of saved configurations and click OK.*

Exporting specific sample data   *To re-send data from specific samples, use Sample Filter options, including wildcard characters if desired, to reconfigure the analysis to send only the necessary data.*

If you select NEW FILE *for output, click the* [...   ] *button to open the Windows* Save As: *box. Select the desired directory and type the desired file name in the* File Name: *text box. If you select an existing file, ASCII port analysis data will be appended to the file.*

Make certain that you have selected the desired port for configuration by clicking on the port name in the Add Port *list box **prior** to selecting output data and formatting options for that port. OUTPUT FOR EACH ADDED PORT MUST BE CONFIGURED SEPARATELY.*

ERROR LOG TABLE ANALYSIS

The Error Log Table is designed as a troubleshooting tool to display error messages generated by the software during automatic processing of sample data.

The Error Log Table displays data in a tabular format. In addition to an error description, the following data may be included:

■ Time at which the error occurred

■ Severity of error

■ Instrument source (if applicable)
■ Source identification (ID) (if applicable)

■ Tray associated with the error (if applicable)

■ Sample placement in the tray (if applicable)

Reporting options

The Error Log analysis can present data for any errors encountered during sample runs for which data resides in the database. Several powerful filters may be used to create useful Error Log reports. These filters may be used by making selections from the tabbed property sheets found in the Error Log Configuration window. Once the appropriate filters have been designated, the resulting report configuration can be saved for future use.

Configuring the Error Log analysis

For general information on using analyses, see Chapter 6. To access and configure the Error Log Table, follow the procedure below:

1. Select Analyses from the VISCPRO® primary menu options.

2. Select View Analysis ... from the Analyses menu. The Choose Analysis window will appear.

3. Select the Error Log Table from the list of analyses included in the Basic Package.
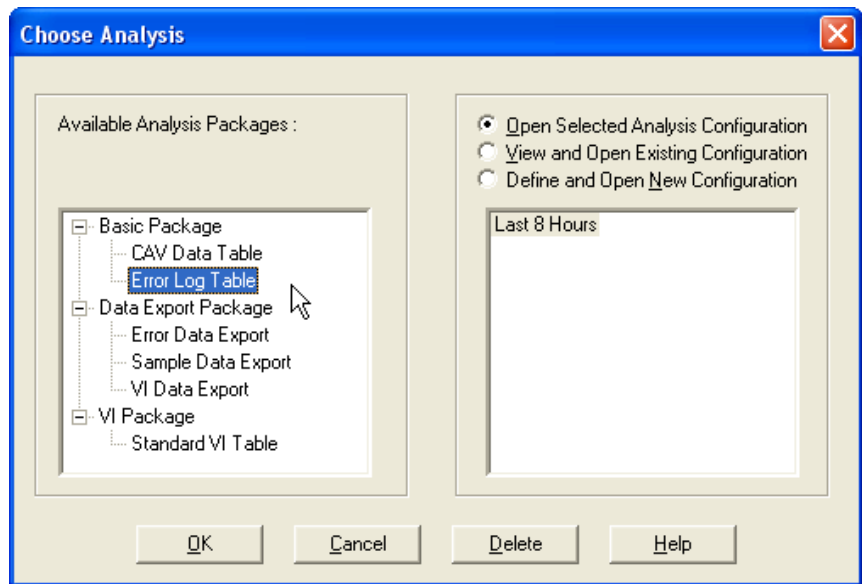
Choosing the Error Log analysis

4.   Click on the Define and Open New Configuration radio button ⊙ (or verify that the option is selected).

NOTE   *If you have already configured and saved an analysis, its name will appear in the list box on the right side of the window. If you click on an existing configuration and click* OK*, the analysis will be performed using the selected configuration settings. It will not be necessary to complete the remaining steps in this procedure.*

5.   Click OK. The Error Log Configuration window will appear.

The Error Log Configuration window consists of tabbed pages with filter options.

■   **Date Filter**—allows you to select date/time parameters for the analysis

■   **Sample Filter**—allows you to select which tubes/technicians/tests will be included in the analysis.

■   **Error Filter**—allows you to select what sample data will appear in the Error Log Table and how the data will be displayed

6.   Click on the tab corresponding to the filter you wish to set and complete configuration options. Use the check boxes to select which fields to include in the report. After individual options have been selected, use the related spin controls and radio buttons to determine the appearance of data.

7.   When you have completed the configuration, click OK. The program will prompt you to save the configuration.
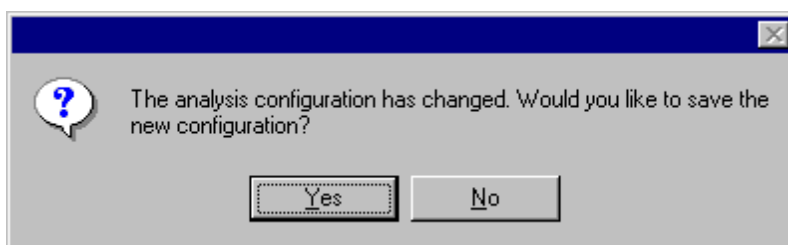
8. Click Yes to save the configuration. The Save Configuration window will appear.
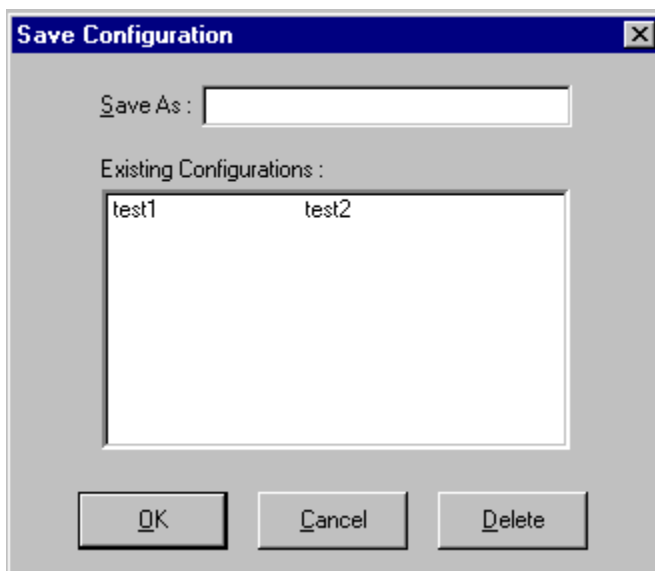
The Save Configuration window

9. Type the name of the new configuration in the Save As: field. Or double-click the name of a preexisting configuration in the Existing Configurations list box to replace the existing configuration with the new configuration settings.

10. Click OK. The analysis will be performed and displayed using the selected configuration settings.

NOTES   *You may click* Cancel *from the* Save Configuration window *to exit without saving configuration changes.*

You may display several analyses simultaneously by repeating the instructions above. Use the tiling options available from the Window *menu to display multiple analyses in the desired window format (horizontal, vertical or cascade view options are available).*

This page intentionally left blank.

USING THE DATABASE MANAGER

The Database Manager is a separate software program which is automatically installed in the same directory as your VISCPRO® software. The Database Manager provides options for managing the VISCPRO® database, including functions for:

- archiving old data

- importing archived data to the working database

- changing the database directory

- repairing/compacting the database
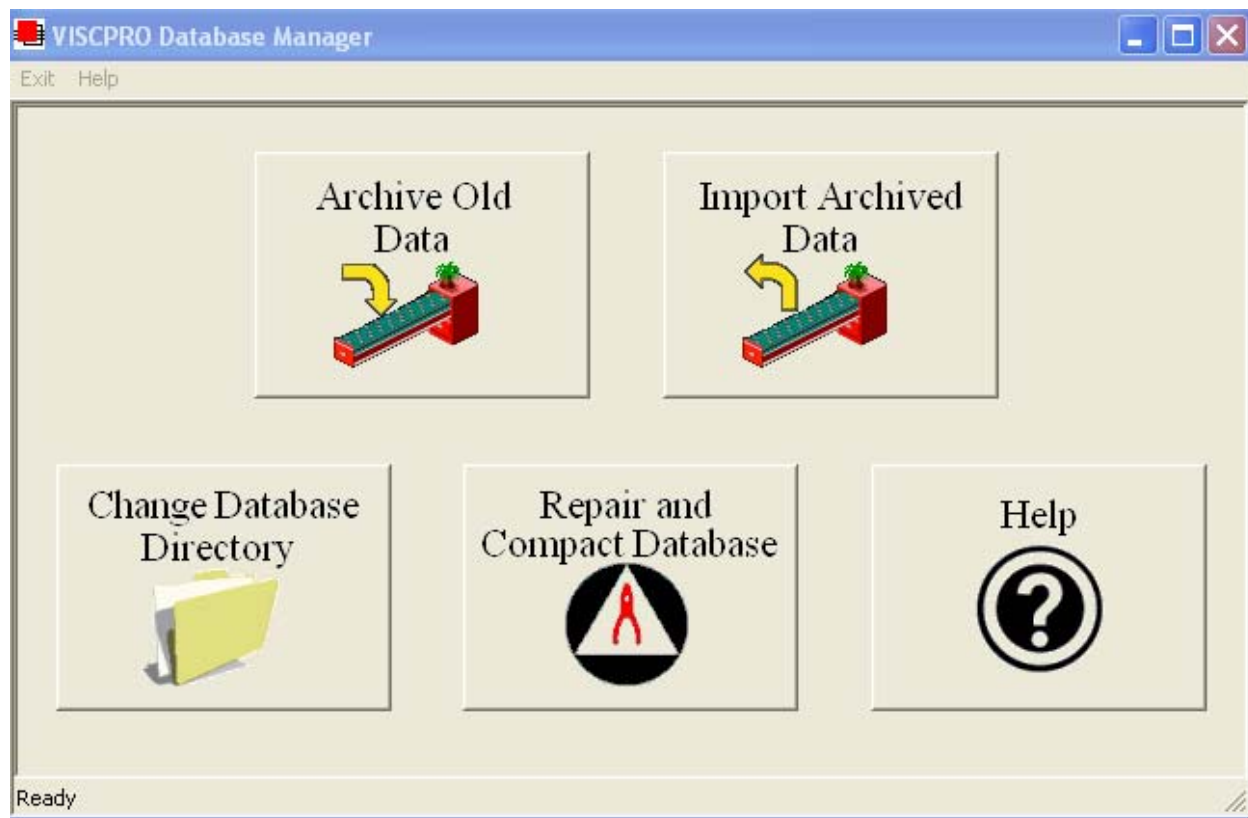
The Database Manager interface

Starting the program	To start the Database Manager software:

1. Exit the VISCPRO® application. Then click on the Windows® Start bar.

2. Select Programs/VISCPRO 2.0/VISCPRO Database Manager from the list of options.

Archiving old data

When to archive

Data from the VISCPRO® database should be regularly archived in order to maintain the size and utility of the database file and to provide an additional level of security for your test data. The archive program allows you to back up existing data and/or remove it from the working database.

One recommended archive strategy would be to archive data older than 60 days at the end of each month, removing it from the working database. This will result in a working database of manageable size and a series of archive files, each containing a month of data. If necessary, archive materials could be temporarily imported into the working database for historical reporting.

Archive procedure

1. Select Archive Old Data from the button options. A Windows® Save As … window will appear.

2. Use the Windows® controls to select the drive and directory (folder) you wish to use for the archive file.

3. Enter the name of the archive file into the File name text box.

4. Use the spin controls ⬦ to select the desired date. Data from sample runs completed prior to that date will be copied to the archive file.

NOTE *If you would like to remove archive data from the working database, click the* Remove Archived Data *check box.*

5. Click Save to copy archive information to the selected archive file. Or click Cancel to exit the Save As archive window without saving data to the archive file.

Changing the database directory

Changing the database location can facilitate its use by multiple networked computers. As the database grows, it may be desirable to relocate it to a different directory or hard drive. The Change Database Directory option does not physically transfer the database files from one location to another. Rather, it allows the user to select the location for the working database. The database must first be archived (see previous page) or copied to the desired location BEFORE using Change Database Directory.

Change . . . procedure

1. Select Change Database Directory from the button options. A Browse … window will permit you to select the correct location for the database (SAMPLES.mdb) file.

NOTE   *The current database directory is indicated at the top of the window.*

2. Select the correct drive and use the Windows® controls to select the directory (folder) you wish to identify as the database location.

3. Click on OK to confirm database directory selection. Or click Cancel to close the window without selecting a directory.

NOTES   *You may only select a directory which contains a valid working database (SAMPLES.mdb) file.*

Click Network to access network map options. See your Windows® documentation for additional information.

Importing archived data

1. Select Import Archived Data from the button options. An import window will appear.

2. Use the Windows® controls to select the directory (folder) of the archive file to be restored to the working database.

3. Enter the name of the archive file into the File name text box.

4. Click Open to copy information from the selected file to the working database. Or click Cancel to exit the import window without importing archive data.

Repairing/compacting the database

Select Repair and Compact Database from the button options. The database will be automatically updated.

NOTE   *CANNON® recommends that the Repair and Compact Database utility be run at least once a week if possible to provide additional stability for the database.*

Exit

When you have completed database management procedures, click Exit to exit from the Database Manager program. Or just close the Database Manager window ☒ .

This page intentionally left blank.

CHAPTER 14

REPLACEMENT PARTS LIST

Following is a list of miniAV replacement parts available from **CAN-NON**® Instrument Company.

Replacement fuses are initially provided with your AV-2100 instrument. It may be desirable for some users to maintain additional components in inventory.

PART #	DESCRIPTION
P25.4030	POWER SUPPLY, +5 ±15
P65.0149	VACUUM PUMP
P65.3013	VACUUM REGULATOR
P65.3245	FUSE, 8A
P65.3247	FUSE, 4A
P81.2100	MANIFOLD VALVE MINIAV UPPER
P81.2102	6MM TUBING
P81.2108	PRESSURE REGULATOR
P81.2109	SOLENOID VALVE, VAC/SEL
P81.2111	MANIFOLD VALVE MINIAV LOWER
P81.2113	VALVE CONTROLL UNIT
P81.2150	ELECTRONIC CONTROL UNIT
P81.2156	TUBE, BEARING W/SHAFT SEAL
P81.2162	POWER SUPPLY, 24V FOR TE
P81.2164	POWER SUPPLY, 48V
P81.2185	1/8" TUBING
P81.2194	SOLENOID VALVE, MANIFOLD
P81.2196	BELT
P81.2198	CONTROL PROBE
P81.2217	BOTTLE UP SWITCH ASSEMBLY
P81.2227	FLOAT
P81.2219	SOLENOID VALVE, WASTE
P81.2236	BOTTLE
P81.2238	FILL CAP
P81.2262	THERMAL FUSE

This page intentionally left blank.

APPENDIX A–MULTIPLE UNIT CONFIGURATION

Introduction

The miniAV instrument is capable of being networked with the controlling computer via available RS-485 connections. As many as four miniAV instruments may be connected to a single computer. Follow the instructions in this appendix to complete assembly of the multi-unit networking kit, available from ***CANNON***®.

Kit components

The multi-unit interface kit contains an RS-232-to-RS-485 converter and RJ-45 cables capable of networking up to four AV Bath Units to a single computer.

Procedure

Using the interface kit components, complete the multi-unit configuration as follows:

Connecting components

NOTE   *The interface kit was designed for Bath Units placed in an adjacent configuration. Custom configuration with longer RJ-45 cables is possible.*

Make certain to install the VISCPRO® software on the controlling computer. Complete all component assembly before proceeding with RS-485 networking.

Completing RS-485 connections

⚠️ **CAUTION**   1. Make sure the power is removed from the computer and all instruments to be configured.

2. Locate the RS-485 converter and required RJ-45 connecting cable(s).

3. Attach the RS-485 converter directly to the computer via the standard 9-pin RS-232 connector. Then attach the longer RJ-45 cable from the converter to the RS-232 connector on the serial communications interface on the ear panel of the first miniAV instrument.

4. Attach a shorter RJ-45 cable to one of the twin RS-485 connectors on the ear panel of the first miniAV bath. Then attach the other end of the cable to one of the twin RS-485 connectors on the ear panel of the adjacent Bath Unit.

5. Continue the procedure from the previous step for each bath consecutively until you have completed RS-485 connections between each Bath Unit and the previous unit in the sequence (see diagram).

6. For each networked instrument, extend the left ear panel and locate the Instrument Address access on the interior side of the panel. The adjust pot is inside the aperture. Select the desired instrument address (1-9) using a small flat-bladed screwdriver. Make certain to select a DIFFERENT address for each miniAV instrument.

7. Restore power to each miniAV.

INDEX

CANNON INSTRUMENT COMPANY®

2139 High Tech Road | State College, PA 16803 | USA
800-676-6232 | 814-343-8000 | Fax: 814-353-8007
sales@cannoninstrument.com | **www.cannoninstrument.com**