



MiniAV-LT Quick Start Guide

Introduction:

Thank you for purchasing the miniAV-LT low temperature automated viscometer – part of the popular CANNON minAV family which includes the miniAV, the miniAV-HT and the miniAV-X. This quick reference is intended to provide the operator with key information on setting up and operating the miniAV-LT instrument.

- Function
- Specifications/Installation
- Calibrating
- Running a Sample



Function

miniAV-LT Function

The miniAV-LT is a fully automated kinematic viscometer specially designed to handle the unique needs of low temperature (sub-zero) kinematic viscosity determination of jet fuels, turbine lubricants, and hydraulic fluids. The miniAV-LT offers ASTM D445 and D2532 precision. At the core of the instrument resides the miniAV instrument – providing a familiar system and software user interface.

miniAV-LT Apparatus

The miniAV-LT test apparatus consists of the same three major units as the miniAV; the Bath Unit, the Power Supply, and the Waste Receiver. The Air-Water Heat Exchanger is unique to the miniAV-LT. Refer to Figure 1 for a miniAV assembled.

Air/Water Heat Exchanger

The Air/Water Heat Exchanger contains a radiator, fan(s), and water pump to circulate and cool a mixture of water and ethylene glycol flowing through the hot side heat sinks surrounding the bath in the Control Unit. Circulation of the mixture helps remove heat from the Control Unit bath.

Filling the Air/Water Heat Exchanger

Obtain a supply of quality automotive antifreeze (ethylene glycol) and mix it with water in a ratio of 30 percent antifreeze to 70 percent water. Do not mix antifreeze types in the Air/Water Heat Exchanger. After the Exchanger tubing connections are secured, pour this antifreeze/water mixture into the reservoir opening on the top of the Air/Water Heat Exchanger until it is full (< 2 liters).



Warning: Ethylene glycol is a toxic substance. Use proper safety precautions when handling and follow appropriate (M)SDS instructions.

Depending on the amount of fluid displacement in the coolant lines, it may be necessary to add additional antifreeze/water mixture to the Exchanger when the unit commences operation. You are able to observe the liquid circulating inside the reservoir from the opening at the top of the Exchanger during normal operation. If air bubbles are consistently visible in the coolant lines, add additional mixture until the Exchanger is full.



Caution: The water/antifreeze mixture should be replaced annually for reliable performance and to prevent corrosion of internal components.

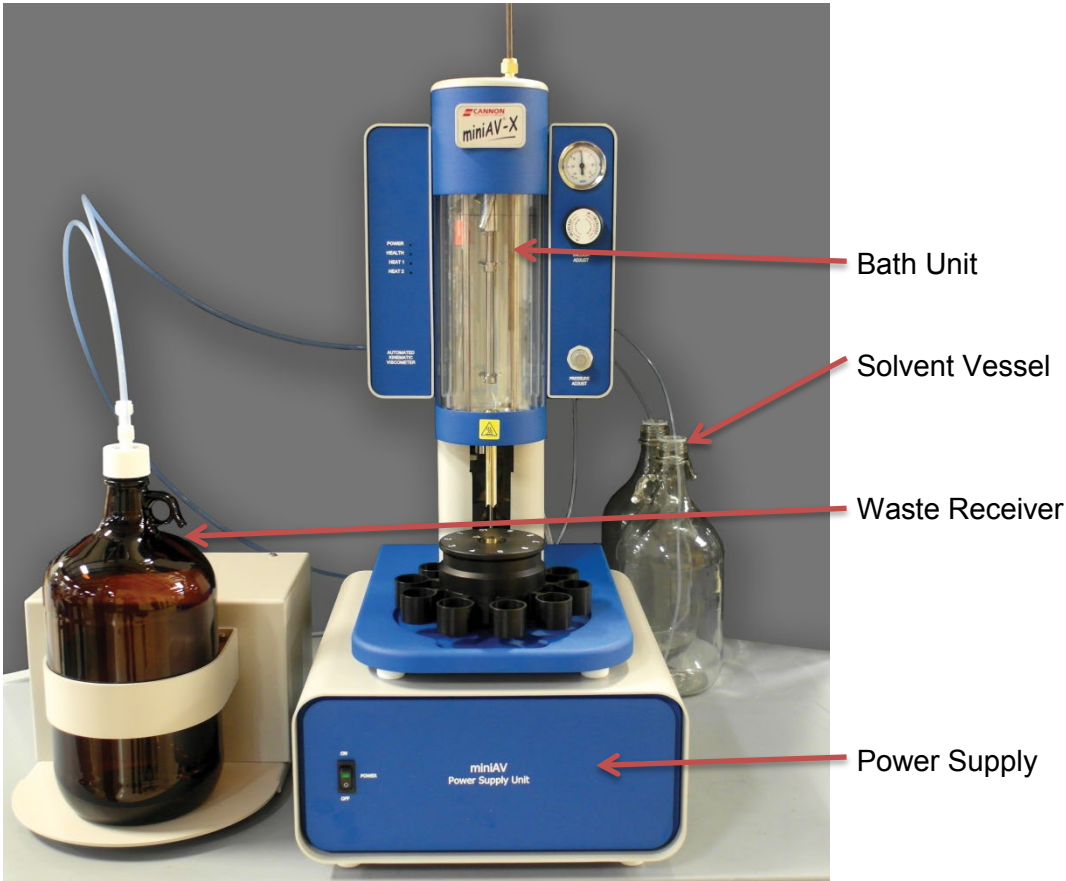


Figure 1: miniAV Series Components, assembled

miniAV-LT Specifications:

Instrument Specifications	
Dimensions (W x D x H)	Unit: 25.4 cm x 30.5 x 59.8 cm (10 in x 12.0 in x 23.5 in) Power Supply: 33 cm x 39.6 cm x 17.2 cm (13 in x 15.6 in x 6.8 in) Waste Receiver: 33 cm x 39.6 cm x 17.2 cm (13 in x 15.6 in x 6.8 in) Air/Water Heat Exchanger: 38.6 cm x 51.1 cm x 34.9 cm (15.2 in x 20.1 in x 13.7 in)
Weight	Unit: 12.5 kg (27.5 lb) Power Supply: 11 kg (24 lb) Waste Receiver: 6 kg (13 lb) Air/Water Heat Exchanger: 14 kg (30 lb)
Shipping Weight	98.9 kg (218 lb)
Data Output	RS-232 and RS-485
Temperature Range and Accuracy	-20 °C to 30 °C ± 0.02 °C*
Viscosity Range	Up to 20,000 mm ² /s (cSt) in 100-fold increments (depends on viscometer selection)

Instrument Specifications	
Maximum Throughput	1 test per hour
Automated sample capacity	1
Minimum Sample/solvent volume	5 mL sample*/15 mL solvent per test <i>*as little as 3 mL with fast run tubes</i>
Operating Conditions	15 °C to 30 °C, 10% to 75% relative humidity (non-condensing), Installation Category II, Pollution Degree 2
Electrical Specifications	100 VAC; 50/60 Hz; 115 VAC, 50/60 Hz; 230 VAC, 50/60 Hz; 1,000 watt power consumption
Compliance	CE Mark; EMC Directive 2004/108/EC; Low voltage directive (2006/95/EC); HI-POT (1900 VDC, 60 sec.); ROHS

Installation

The miniAV-LT setup can be accomplished in just a few minutes by following the instructions in the installation guide provided with the instrument. Please refer to your instrument instruction manual.



Note: Once the instrument and VISCPRO II are successfully installed, a calibration must be performed at the wash temperature and each temperature at which the user wishes to run samples.

Preparing the miniAV-LT for Testing

Calibrate the miniAV Instrument

Temperature calibration is essential for the proper operation of the miniAV-LT after installation. The calibration process consists of sending a temperature and its offset to the instrument, then waiting for the temperature to equilibrate. Equilibration is complete when the instrument stays within 0.02 °C for 150 seconds. To calibrate temperature on the miniAV-LT, follow the instructions below.



Note: It is necessary to log in as a manager to complete the calibration.

1. Click **Configure** from the primary display and select **Instrument Settings** from the **Configure** options for the desired instrument.
2. Click **Tray Settings: Tube and Bath** option.
3. Enter the temperature you wish to calibrate in the **Bath Temp** input box and then press **OK** to save new target temperature.
4. Click **Service** from the primary display and select your desired instrument.
5. Click **Temperature Calibration** option. The **Temperature Calibration Data** window will open.



Note: The value in the Calibration Temperature box should display the temperature the user selected in the tray settings.

6. Click **Go to Calibration Temperature** button to set the target temperature of the instrument to the desired temperature to calibrate (if not the wash temperature).
7. Place your reference thermometer inside the bath.
8. Wait for the machine to equilibrate at the desired temperature.
9. Enter the current temperature reading to the nearest 0.01 °C from the reference thermometer into the **Reference Temperature** display window as shown in Figure 2.

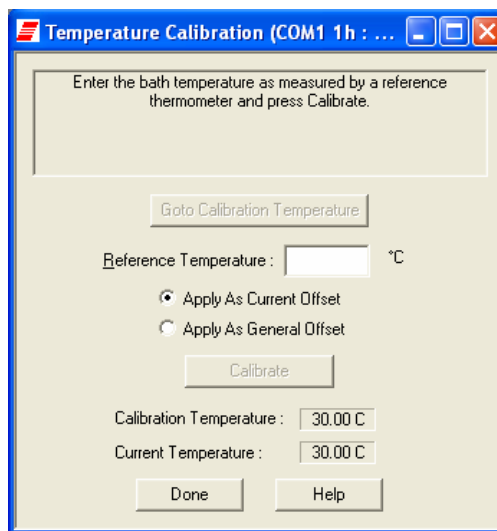


Figure 2: Reference Temperature Window

10. Click the **Apply as Current Offset** option button (always click the radio button for the **Apply as Current Offset** unless directed otherwise by a CANNON service engineer).
 11. Click the **Calibrate** button and wait for the machine equilibrate using the offset.
 12. Repeat this entire process for each temperature at which the user wishes to run samples.
- Occasionally a temperature may require several calibrations in order to get an accurate calibration. The **General Bath Offset** is a factory-preset value affecting temperature control at all temperatures and should not be changed. Once all desired running temperatures have been calibrated, the user must train the tube sensors at each of these temperatures.

Train the Tube Sensors

The miniAV-LT tube sensors must be trained in order for the instrument to properly perform test functions. To train the miniAV-LT series sensors, follow the instructions below.



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

1. To train tube sensors, click **Service** from the primary display and select the **Train Tube Sensors** option for the desired instrument. This opens the **Train Tube Sensors** window as shown in Figure 3.

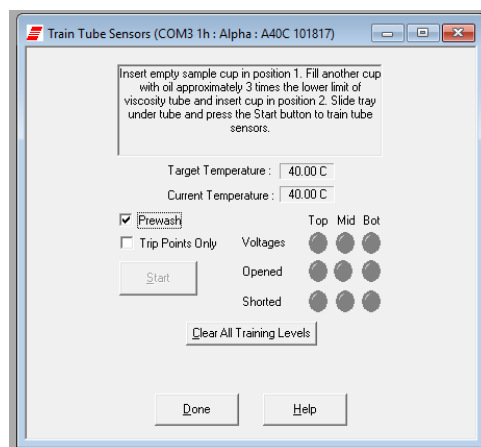


Figure 3: Train Tube Sensors Window

2. Wait for the machine to equilibrate at the desired temperature.
 3. Click the **Train at Wash Temperature** checkbox if wash temperature training is desired.
- Select the desired training parameters as follows:

- **Prewash:** 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.
- **Temperature to Train:** Input all desired temperatures to be trained in the **Temperatures To Train** list
- **Thermal Soak Time:** Set our desired **Thermal Soak Time** using the scroll box



Note: The instruction panel will instruct you to insert an empty vial in order to perform the prewash.

4. Raise the empty vial to enable the **Start** button.
5. Click the **Start** button.

After the prewash is complete, the instrument will then obtain the voltages for each sensor at each of the specified temperatures.

The instruction panel will then instruct you to insert a vial containing an oil with a viscosity three times the lower limit of the tube and raise it into the ready position for determining trip points.

Once all voltages and trip points have been obtained for all desired temperatures, the tube sensors have been trained.

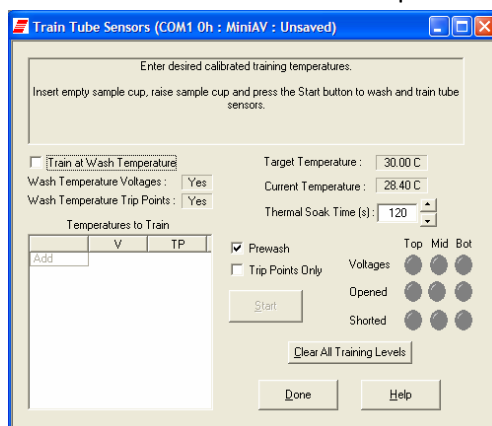


Figure 4: Train Tube Sensors Window

Bath Fluid Safety Features:

If the bath fluid drops to an unacceptable level, the light in the bath unit will go out, alerting the user that the level may be too low. Bath operations should be aborted until the level is checked and if needed, restored to an acceptable bath fluid level.

Checking the Bath Fluid Level

1. Open the left side panel (left ear) to view the LED light and to check the bath fluid level, as shown in Figure 5.

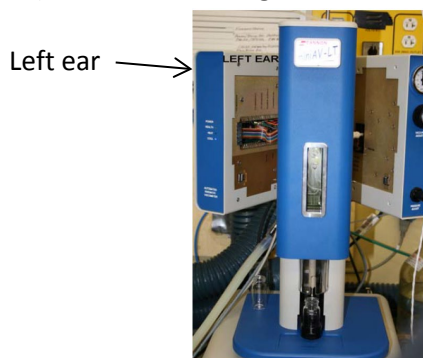


Figure 5: Open miniAV-LT Panels

2. If the LED light is off as shown in Figure 6, more bath fluid needs to be added. Follow the instructions the *miniAV-LT Instruction & Operation* manual for filling the bath.

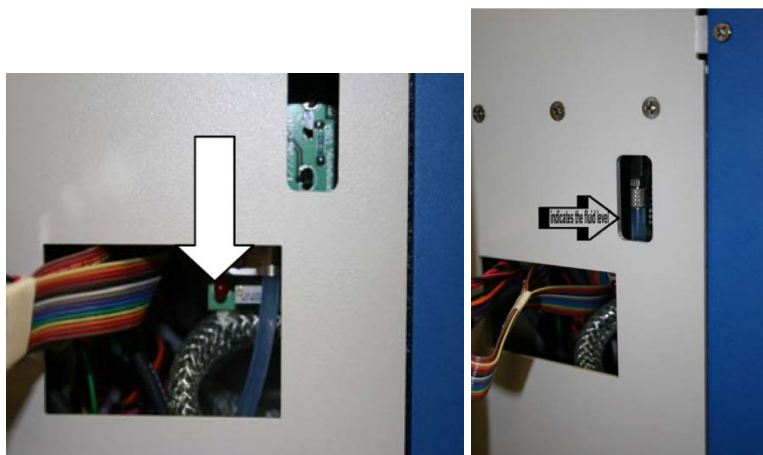


Figure 6: LED Light and Bath Fluid Level

Running a Sample

1. If the miniAV instrument is powered off, ensure MAINS power cable is plugged in and turn the instrument on by switching the power switch on the front of the power supply to the ON position.
2. Turn on the computer and load the VISCPRO software by clicking the desktop icon.
 - a. If the software is already open, click **Main** from the menu bar and click **Poll for Instruments** from the **Main Menu** bar. This establishes connection between the computer and instrument.
 - b. Permit the bath to stabilize at test temperature before testing samples.
3. 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.



Caution: Do not overfill the sample vials as sample overflow may create problems for the tube cleaning cycle.

4. Place the sample vial in the holder underneath the viscometer tube.
5. Raise the holder until the magnetic coupling engages. The viscometer tube tip will be touching the bottom of the sample vial. Refer to Figure 7.



Figure 7: Raised Sample Vial

6. 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 of the Operator's Manual.
7. 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. Refer to Figure 8.

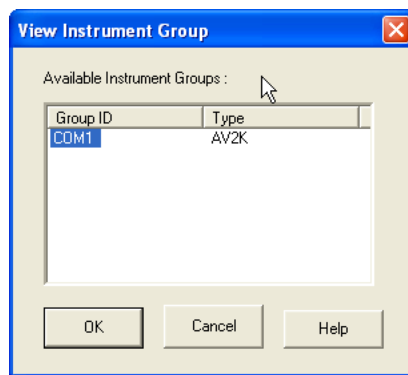


Figure 8: View Instrument Group Window

8. Select the desired **Group Id** and Click **OK** to display the **Sample Input View** as shown in Figure 9. Then click the tray corresponding to the desired miniAV.

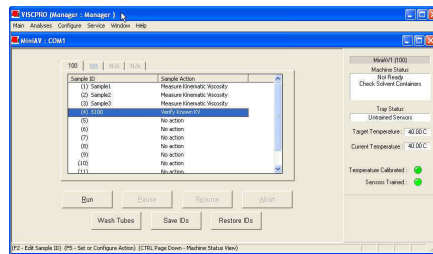


Figure 9: Sample Input Window

9. Double-click on **Sample ID (1)** with the left mouse button to access the sample ID data entry field (or press **2**).
10. 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.

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 as shown in Figure 10.

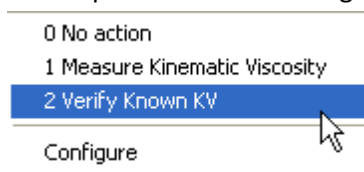


Figure 10: Sample Actions

Select the desired action by highlighting it with the mouse and clicking the left mouse button.

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.

11. Continue entering sample information for all desired trays. When sample ID data entry is complete, check the **Tray Status** window to verify all trays are ready for testing.
12. 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.
13. 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).

Pause 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.

Resume 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.

Abort 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.

Conclude a Test

After the automatic testing has completed, make certain that:

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



Warning: Use appropriate caution when handling warm sample vials to avoid the possibility of injuries and burns.

2. The Machine Status (as indicated in the VISCPRO **Sample Input Machine Status** window), is **Ready**.
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.
4. Press **Resume** to clear data and begin testing the next sample as shown in Figure 11.

100	T01	N/A	N/A
Sample ID		Sample Action	
(1) Sample1		KV = 0.6000 cSt	
(2) Sample2		Measure Kinematic Viscosity	

Figure 11: Next Sample