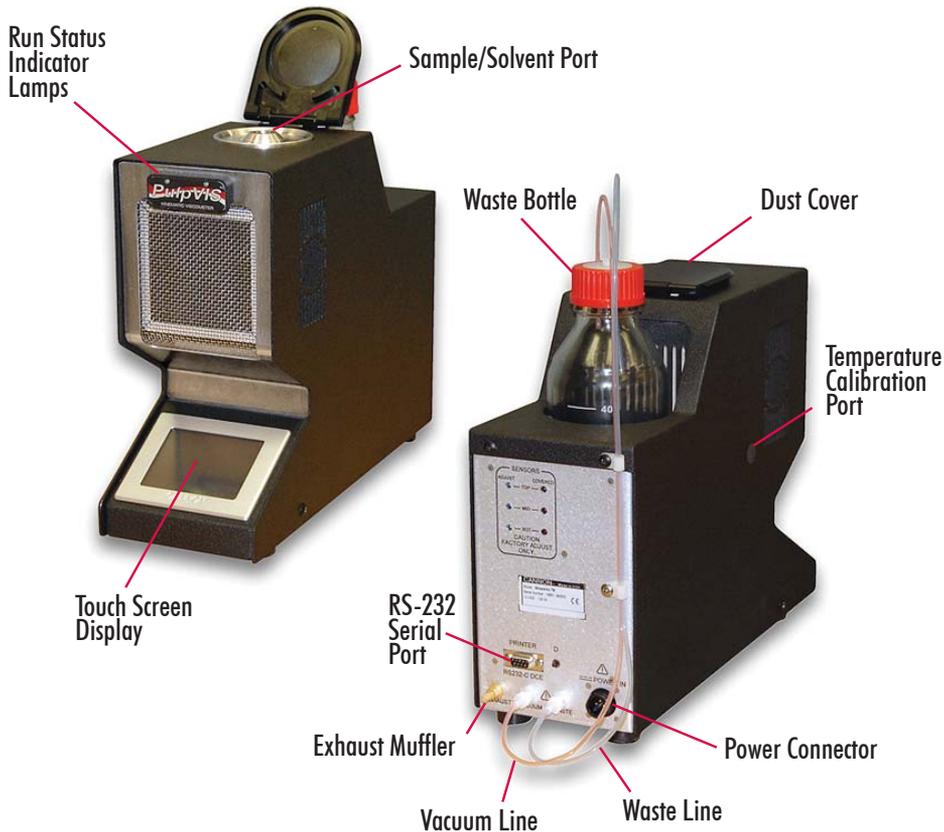




# PulpVIS<sup>®</sup> Viscometer Reference Guide

82.1034





**SAFETY CAUTIONS** Please observe the following safety procedures and notices for proper operation of the PulpVIS<sup>®</sup> viscometer.

- 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<sup>®</sup>** Instrument Company.
- Do not deviate from the installation, operation and maintenance procedures described in this guide. Improper use of the PulpVIS<sup>®</sup> viscometer 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.
- Do not place the PulpVIS<sup>®</sup> viscometer on an unstable cart or stand. The PulpVIS<sup>®</sup> viscometer should be placed on a level table or bench.
- Never operate damaged or leaking equipment.
- 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 **CANNON<sup>®</sup>** authorized service personnel.



### **CAUTION**

In addition to the cautionary statements listed above, additional cautions may be posted in the manual. These cautions, identified by the symbol on the left indicate important operational procedures. Read and follow these important instructions.



### **Protector 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. The main plug for the power cord should only be inserted in a socket outlet (receptacle) provided with a protective ground (earth) contact. Do not use an extension cord (power cable) without a protective conductor (grounding).

**~MAINS** 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 AC/DC power adapter for the instrument. The supplied AC Mains power cord must be attached to the connector labeled ~MAINS. This connection serves as a means of disconnect and should be readily accessible.

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

**Hazardous materials** Routine PulpVIS<sup>®</sup> viscometer operation may require the use and handling of hazardous chemicals and solutions. **CANNON<sup>®</sup>** Instrument Company strongly urges the operators and technicians working with the PulpVIS<sup>®</sup> viscometer 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.

PulpVIS <sup>®</sup> Viscometer Specifications/Compliance	
Product Info.	Model: <b>PulpVIS<sup>®</sup></b> viscometer (Cat. No. <b>9725-S15</b> )
Applications	<b>Pulp Viscosity, Tappi T230, PAPTAC G.24P</b>
Test Temperatures	<b>20 or 25 °C</b> - user selectable
Viscosity Range	<b>1 – 70 mm<sup>2</sup>/s (cSt) 10 – 700 mm<sup>2</sup>/s (cSt)</b>
Accuracy	<b>&lt; 3%</b> of measured value, calibrated
Repeatability	<b>&lt; 1 – 2%</b> of measured value, typical
Sample Material Type	<b>Pulp, CED Solution, Paper</b>
Solvent Compatibility	<b>Internal wetted components compatible with acetone</b>
Volume Requirements	Sample: <b>450 μL (1 – 70 cSt) 500 μL (10 – 700 cSt)</b> Solvent: <b>3 – 5 mL</b> per test
Dimensions	<b>130 mm wide x 370 mm deep x 310 mm high (5x14x12")</b>
Weight	PulpVIS <sup>®</sup> viscometer unit: <b>5.6 kg (12.3 lbs)</b>
Shipping Weight	<b>13.3 kg (29 lbs)</b> with all accessories
Input Power	PulpVIS <sup>®</sup> viscometer Operation Voltage: <b>11 – 13 VDC @ 11A peak</b>
AC/DC Adapter Power Requirements	<b>100~230 Volts, 50/60 Hz, 120 Watts</b>
Operating Conditions	<b>15°-30°C, 10%-90% R.H. non-condensing, Installation Category II, Pollution degree 2</b>
Compliance	CE Mark: EMC Directive (2004/108/EC); Low Voltage Directive (2006/95/EC); HI-POT (1900 VDC, 60 sec.); ROHS

# Running a Test

## GETTING STARTED

Press the **on** switch on the AC/DC adapter. The **Warm up Screen** will display a **“PLEASE WAIT”** message. During this time, the instrument will seek the preset target temperature (20 or 25°C) and, when reached, the instrument will enter an equilibration period. The equilibration period is 180 seconds.

**Note:** Refer to the **Select Target Temperature Section** on page 14 under **Basic information for instructions on how to select the target temperature.**

Once the temperature has equilibrated and the instrument is ready for measurement, the run status indicator lamps on front of instrument will illuminate and the user will be prompted to inject the sample on the **Ready to Test Screen**.



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



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

**Failure to empty waste bottle prior to the 400 mL line marked on the bottle will result in pump damage and void warranty. Refer to the Basic Maintenance portion of this guide for more information.**

**PLEASE WAIT**  
Seeking Target Temperature:  
25.00 °C  
Actual Temperature  
**23.00 °C**  
Previous Result  
N/A mm<sup>2</sup>/s    N/A °C  
Version : 01.00    2012-06-12 08:35

### Warm up Screen

**Ready to Test**  
Please Inject Sample  
Actual Temperature  
**25.00 °C**  
**Start**  
Previous Result  
N/A mm<sup>2</sup>/s    N/A °C  
Version : 01.00    2012-06-12 08:35

### Ready to Test Screen

# Running a Test

## Injecting a sample

1. Using the supplied piston operated pipettor, insert the tip into a vial of test sample and pull the measured amount into the pipettor. Be sure no bubbles exist in the oil or results may be erratic. Refer to pipettor instruction guide for more information. The pipettor volume setting should be set to  $450\ \mu\text{L}$  (0.45 mL) for 1 - 70 cSt range tube or  $500\ \mu\text{L}$  (0.5 mL) for 10 - 700 cSt range tube.
2. Place the pipettor at a  $45^\circ$  angle into the sample/ solvent injection port, located on top of the instrument, and gently release the fluid in one easy operation so that the entire sample is smoothly dispensed into the tube without introducing bubbles.



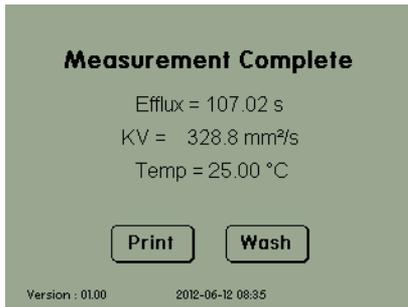
The **Ready to Test Screen** contains a **START** button. Pressing the button is optional as the injected sample will automatically be detected. The button is useful for higher viscosity fluids that may take a while to trip the top sensor.

The run status indicator lamp will turn off during testing. When the viscosity measurement is complete, the run status indicator lamp will blink and the viscosity result will be displayed.

# Running a Test

## Print the results (only if optional printer is installed)

1. Press the Print button on the display screen to printout the test results to an attached serial printer (optional accessory).
2. You may skip the print option and go directly to the wash cycle. See the next section.



### Result Screen

## Wash Cycle

1. Place the tip of the solvent bottle along the opening of the glass capillary in the sample/solvent port and gently squeeze until the cup is filled with solvent to clean any sample residue that might be left over from injecting the previous sample.

*Be careful to consider bath temperature(s) and potential solvent hazards when selecting solvents for use with the PulpVIS® viscometer*



*Observe appropriate safety precautions when handling solvents.*



**Note: Acetone (technical grade) is compatible with the PulpVIS® viscometer.**

2. Press the **Wash** button on the display screen to start the wash cycle.
3. Wait for the solvent in the cup to be drawn down the tube.
4. Place the tip of the solvent bottle directly into the glass capillary for approximately one second (no need to squeeze the bottle, the pump will pull the solvent in) and then remove for several seconds to allow the solvent to be drawn through the viscometer tube to the waste bottle. The display screen will prompt the user when to inject and remove the solvent bottle. Repeat this step until the display screen alerts the user to press the **Dry** button to start the dry run cycle.

# Running a Test

## Dry Cycle

Press the **Dry** button on the display wash screen to start the dry run cycle. The display will show the time remaining in the dry cycle.

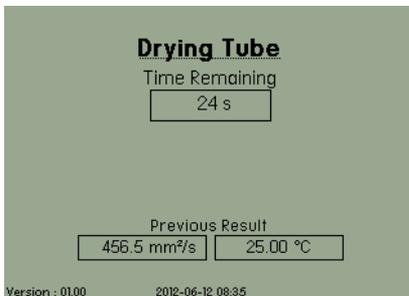
When the dry cycle time ends, the pump will turn off and the instrument will return to the **Warm up Screen** for a period of 60 seconds. The instrument will then be ready to run a new sample measurement at the leisure of the operator.

## Run Status Indicator

Run Status Indicator lamps on front of the instrument allow users to see from a distance whether the instrument is ready to accept a sample. When the instrument is ready to accept a sample, the lamps will be lit. During the viscosity measurement, the indicator lamps will be off. The indicator lamps will blink at the conclusion of a new test or if an instrument error occurs.



**Wash Screen**



**Dry Screen**

# Maintenance & Calibration

The PulpVIS<sup>®</sup> viscometer was designed to require minimal maintenance through simplicity of design and built-in electronic diagnostics. All new instruments are shipped with factory calibrations. However, like most metrological equipment, periodic maintenance and calibration is critical to maintaining accurate long-term measurements. CANNON<sup>®</sup> Instrument Company recommends the following intervals for maintaining the proper and accurate operation of the PulpVIS<sup>®</sup> viscometer.

## Basic Maintenance

The main chassis of the PulpVIS<sup>®</sup> viscometer does not contain any user-serviceable parts and should be returned to the manufacturer (or an authorized dealer service center) for repair when required. Basic instrument maintenance should be carried out weekly or each time the effluent waste bottle is emptied.

### **Cleaning the Air Filter/Replacing the Air Filter**

#### **Cleaning the Viscometer Tube**

To clean the viscometer tube simply start a wash cycle by tapping the “Ready to Test” caption field in the Ready to Test Screen three times within two seconds. This will cause the display to switch to the Wash Screen and start a normal wash. See discretionary washing on page 12.

#### **Changing the Tip on the Pipettor**

Refer to the pipette manual for detailed information on using the device. The tips can be wiped off after each test and reused. Use a clean dry paper towel to wipe the tip off.

#### **Cleaning the Display Screen**

Turn off the PulpVIS<sup>®</sup> viscometer. Wet a soft, lint-free or micro fiber cloth with clean or distilled water. Wring out as much water as possible to ensure the cloth is damp but not wet. Wipe the screen in a gentle motion to remove dust, oil, or fingerprint smudges. Finish cleaning the touch screen with a dry lint-free cloth to wipe any excess moisture, and then turn the instrument back on.

# Maintenance & Calibration

## Emptying the Waste Bottle

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

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



***Use appropriate precautions when handling the waste lines. Avoid spilling or splashing waste material collected in the lines. Check for kinks or wear in the lines. Always follow appropriate MSDS procedures when handling samples/solvents.***

Pour the collected solvent/sample mixture out of the Waste Bottle into a proper hazardous liquid waste storage container. Securely reconnect the cap with drain tubes to the Waste Receiver ensuring the lines are properly inserted. (Refer to the Basic Information section of this guide for more information on tubing connection)



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

## Cleaning the Tray that Houses the Waste Receiver

Use a clean dry paper towel to wipe the tray to remove any spillage of solvent/sample. Dispose of the paper towel appropriately.

## Calibration

The frequency of instrument calibration is dependent on the usage of the instrument (number of samples tested monthly), the environment in which the instrument is located, the type and cleanliness of the samples, and whether basic maintenance has been properly carried out. **CANNON**<sup>®</sup> recommends either of the two following calibration intervals.

# Maintenance & Calibration

## Performance Based Method

Determine need to calibrate by performing weekly check-runs of certified viscosity reference standards. It is recommended the results of these runs be recorded and compared against the certified viscosity value printed on the standard bottle. When these check-runs consistently exceed the required precision (typically  $> 2$  or  $3\%$ ), then the instrument should be calibrated. This method requires more user interaction, but affords the least amount of risk that the instrument could be used when out-of-calibration.

## Periodic Interval Method

On a 12-month basis, the instrument is returned to **CANNON**<sup>®</sup> Instrument Company for calibration and certification regardless of the prior usage and performance. This method requires the least amount of user interaction with the instrument, but does afford some risk as errant calibrations (if present) will only be corrected once every 12 months.

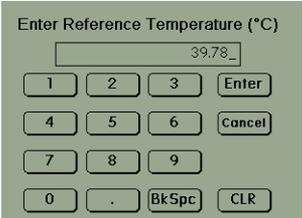
## Verifying Temperature

Periodically, the temperature should be verified with a digital reference thermometer. The temperature should be recalibrated if the displayed temperature does not agree with the reference thermometer.

**Note:** Please contact **CANNON**<sup>®</sup> Instrument Company for details on suitable reference thermometers.

The user may access **Temperature Calibration Screen** from the **Ready to Test Screen**

by tapping the temperature field 3 times within 2 seconds. The **Temperature Calibration Screen** will appear in which the user may enter the temperature as read from the reference thermometer to the nearest  $0.01^{\circ}\text{C}$ . This may need to be repeated if the temperature still does not agree with the reference with the desired tolerance.



Enter Reference Temperature ( $^{\circ}\text{C}$ )

39.78

1 2 3 Enter

4 5 6 Cancel

7 8 9

0 . BkSpc CLR

## Temperature Calibration Screen

## Maintenance & Calibration

*Changing the temperature calibration by more than 0.05°C will affect the instrument viscosity calibration by 2% or more. Please consult CANNON before proceeding.*

It is recommended that the instrument temperature be at target for at least 30 minutes before recalibrating if the instrument has been powered down for more than a couple of hours. This will ensure proper calibration as it may take some time for the entire instrument to come to proper thermal equilibration from a cold start.

### Changing Date and Time

End users may need to change the date and time displayed on the instrument. This may be accomplished by just tapping once on the Date/Time field at the bottom of the **Warm up Screen** or the **Ready to Test Screen**. These fields are soft buttons which will access the **Date And Time Screen**. This screen provides list boxes to set the Year, Month, Day of Month, Hour and Minute.

### Discretionary Washing

Tube washing is normally performed after a test is completed, but there may be other times when the tube needs washing. For example, if the user injects oil into the tube and the sensors do not detect it for some reason. In cases such as this, the wash cycle may be started by tapping the "Please Wait" caption field in the **Warm up Screen** or the "Ready to Test" caption field in the **Ready to Test Screen** or the "Timing Started" caption field in the **Timing Screen** three times within 2 seconds. This will cause the display to switch to the **Wash Screen** and start a normal wash cycle.

**Date and Time Settings**

Year	Month	Day	Hour	Minute
05 ↑	February ↑	10 ↑	14 ↑	11 ↑
06	March	11	15	12
07	April	12	16	13
08	May	13	17	14
09 ↓	June ↓	14 ↓	18 ↓	15 ↓

### **Date and Time Screen**

**Timing Started**

Elapsed Time

Actual Temperature

Previous Result

Version : 0100      2012-06-12 08:35

### **Timing Screen**

## Basic Information

### Unpack your PulpVIS® viscometer

Remove all packing materials from the components. The PulpVIS® viscometer should be placed on a stable laboratory table or bench.

1. Verify that you have received all components for the PulpVIS® viscometer. Report missing items to **CANNON®** Instrument Company immediately.
2. Inspect each component for signs of damage. Report damages to the shipper and **CANNON®** Instrument Company immediately.
3. Retain all packing materials until the instrument is connected and functioning properly. If any component(s) must be returned to **CANNON®** Instrument Company, the damaged item(s) should be packaged in the included shipping case.

### Setting up your PulpVIS® viscometer

**Complete the following rear panel electrical connections:**

1. Plug the AC/DC power adapter into the power connector on the rear panel of the instrument. The connector will only go in one way correctly. Make sure the power switch on the AC/DC adapter is off.
2. Plug the power cord into the AC/DC adapter.
3. Plug the other end of the power cord into an appropriate AC Mains outlet matching the voltage requirements indicated on the AC/DC adapter.
4. **Do not** turn on the AC/DC adapter switch at this time.

(Optional printer: Plug the 9 pin serial printer cable into the RS232-C port on the rear panel of the instrument. Then plug the other end into the printer.)

**Complete the following tubing connections:**

1. Locate the glass waste bottle and securely (but not overly) tighten the bottle cap to ensure an air-tight seal. Place the bottle in the holder on the top rear of the PulpVIS® viscometer.
2. Connect both pieces of 1/8" transparent tubing into the bottle cap.
3. Make sure that the waste line extends into the cap further than the vacuum line by approximately 2 inches. (Refer to application note)

## Basic Information

4. Connect the other ends of both pieces of tubing as indicated in the photo image on page 2.

### Select Target Temperature:

1. Turn the power to the instrument off.
2. Press the **on** switch on the AC/DC adapter. The **Warm up Screen** will display a **“PLEASE WAIT”** message
3. Select the temperature by tapping the temperature directly under the “Seeking Target Temperature” caption field in the **Warm Up Screen** three times within two seconds. This will cause the display to switch to the **Set Temperature Screen**.
4. Select the desired temperature then press the save button.



## Returning your Instrument to Cannon Instrument Co.

1. Please contact **CANNON**<sup>®</sup> Instrument Company to receive a Return Authorization (RA) number from our Technical Service Department.
2. Download our Instrument Repair/Calibration Return Form and fill in all required information on the form
3. Carefully package and ship your instrument with all required information in the case supplied with the instrument. The RA number needs to be clearly marked on the package label. Ship to the following address:

Cannon Instrument Company

ATTN: Return Authorization Number: \_\_\_\_\_

2139 High Tech Road

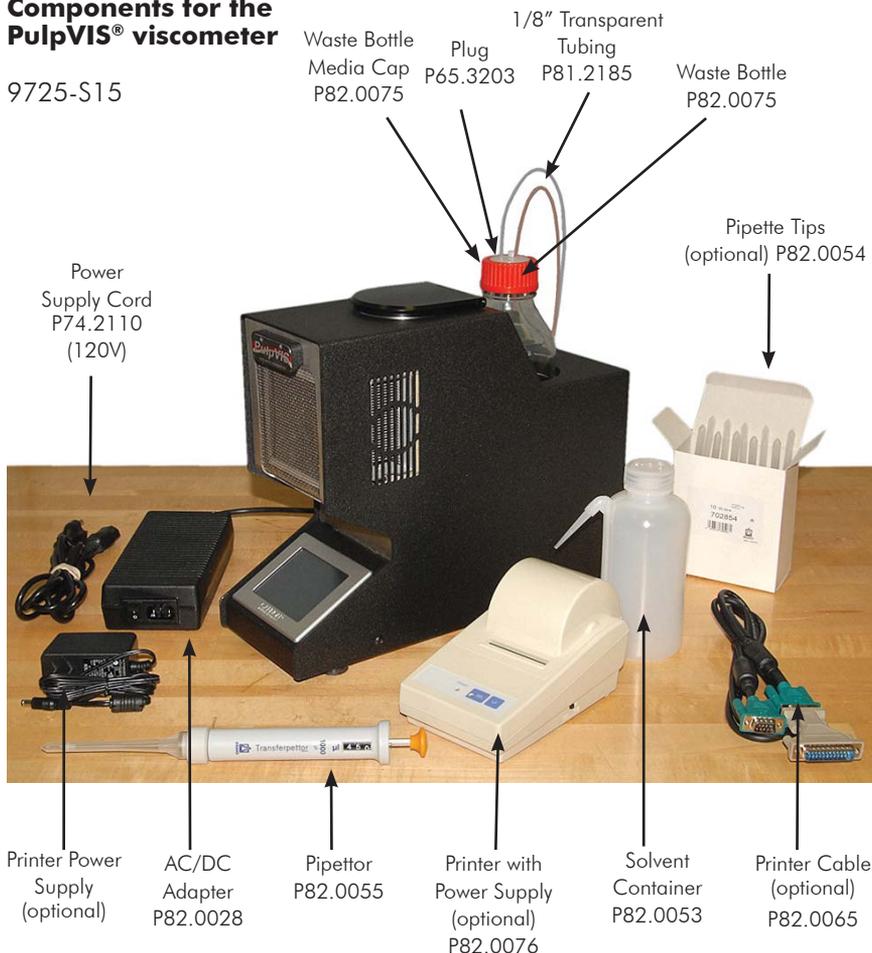
State College, PA 16803 USA

*When returning your instrument please include the following information:*

The name and telephone number of the person in your company to contact regarding the instrument.

# Components for the PulpVIS® viscometer

9725-S15





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814-353-8000 • 800-676-6232 • Fax 814-353-8007  
[cannon@cannoninstrument.com](mailto:cannon@cannoninstrument.com) • [www.cannoninstrument.com](http://www.cannoninstrument.com)