
**ARTEL© PCS™ PIPETTE CALIBRATION SYSTEM
PROCEDURE**

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Principle

The volumetric pipettes located in the Coagulation/Hematology department will be calibrated twice per year using the PCS 2™ Pipette Calibration System and the Artel Pipette Tracker software. The instrument uses a traceable colorimetric method and a high performance photometer to measure the actual volume dispensed by any pipette with volumes from 0.1 µL to 5000 µL. After each sampling, the PCS™ will calculate and display the volume of liquid delivered. Results are then analyzed using the Artel Pipette Tracker software.

Equipment

PCS™ Instrument and Pipette Tracker software
PCS™ Reagent Kit
PCS™ Instrument Calibrator Kit
Pipettes
Pipette Tips

Maintenance

1. A complete instrument calibration is performed monthly. This verifies that all responses pass for Noise, Accuracy, Inaccuracy Due to Noise and Overall System Inaccuracy. See Operator's Manual (PCS2 Procedure Guide) for procedure on performing instrument calibration.
2. The instrument housing is wiped clean and the vial holders are cleaned with cotton swabs dipped in alcohol, then dried with gauze as needed.

Procedure

1. Check the monthly maintenance sheet and determine if calibration is needed. If calibration is needed, refer to Maintenance above. If not needed, proceed.
2. Locate the Standard Reagent Kit. The kit contains blank reagent vials, sample solutions, a calibration "A" standard, and kit inserts with lot code information.
3. There are four routine sample solutions. Use the correct solution for the size pipette to be calibrated as follows:
 - A. Range 1: For pipette volumes 200 – 5000 mcL
 - B. Range 2: For pipette volumes 50 – 199 mcL
 - C. Range 3: For pipette volumes 10 – 49 mcL
 - D. Range 4: For pipette volumes 2 – 9 mcL

NOTE: For new lot reagent kit, enter the new lot code and calibration codes into the PCS2:

1. Main menu
 2. Pipette calibration? "Yes"
 3. Follow prompts
 4. Enter reagent lot codes
 5. Enter calibration codes
-
4. Verify that all vials (blank reagent and calibration) are clean and free of fingerprints. If dirty, hold the vial by the cap and immerse the lower portion (approx 1 in) into clean isopropyl alcohol. Then, gently wipe by rotating the vial against a lint-free wipe. **Place up to 4 blank vials in the Vial Block for at least 15 minutes prior to use.**
 5. Double click the Artel Pipette Tracker icon on the Windows computer screen. A split screen appears with Worklist and Inventory. Double click on Worklist.
 6. Turn on the PCS instrument (Right side). The instrument will perform a system test.
 7. Answer the prompts on the instrument. Pipette calibration? –NO. Instrument calibration? –NO. (If a calibration has been done in the last 30 days and the kit lot # is the same). Link to Computer? –YES. The instrument will now say Computer Link ready for command.
 8. Return to the computer monitor. Double click the pipette that is to be calibrated from the Worklist.
 9. Wait for the new screen to appear and click "Start Run".
 10. The instrument will now state, "Self Calibration, Please Wait" and then "Insert CAL A". Place the sealed CAL A standard vial from the kit into the vial holder. Be sure the CAL A label faces front. Be careful not to touch the vial except by the cap. The instrument will prompt, "Please Close the Cover". Close the cover.
 11. The instrument then prompts, "Please Remove Vial". Replace CAL A back into the kit. The display will then prompt, "Mix Blank, Remove Cap and Insert". Select a blank vial from the vial block, mix, open cap and insert into the instrument. This vial must not be removed or turned during calibration. Plan to use the entire number of available calibrations on each vial if possible.
 12. The instrument will then prompt, "Please Close the Cover". Close the cover and the instrument will take a blank reading.
 13. Based on the pipette chosen on the computer screen, the instrument will give the range to be used and say "Pipette Sample #1". Locate a bottle of the correct solution from the kit, mix gently and transfer an aliquot into a pour over vial. Recap the bottle immediately and return it to the kit (away from light).
 14. Using the correct tip and the correct pipetting technique (refer to "10 tips to improve your pipetting technique" document from Artel), open the cover and pipette the amount indicated on the computer screen into the vial in the instrument. Close the cover. The instrument will mix the sample and take a reading. The reading is transferred into "Sample 1" box on computer screen and displayed on the instrument.
 15. Continue pipetting samples as instructed on computer screen and instrument (a total of 5 for each volume). Observe the Status box in the upper right corner of the computer screen for "pass" or "failed". If Status changes to "failed", you may click the "redo sample" box and try that sample again, or in most cases, click the "abort run" box, then click "X" in upper right corner to completely exit this calibration. Double click the pipette from the Worklist again to start over.

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16. If a “passed” status is unable to be obtained, adjust the pipette according to manufacturer’s instructions (found in Pipette Calibration Notebook). Adjustment tools are located in orange toolbox. Consult supervisor or experienced user if assistance is required.
17. When pipetting is complete and “passed” status is obtained, click on the “close” box. The pipette is removed from the Worklist and remains in Inventory in “passed” status until calibration is due again (within 180 days of calibration date). It will then appear as “Due” on the Worklist again.
18. Click on “view inventory” at the top of the screen. Find the pipette that was just calibrated and double click on it. On the screen that appears, highlight today’s date and click “print”.
19. Click on “print” in the upper left hand corner of the screen. Make sure correct printer is selected and click “print” on this screen.
20. Retrieve printout from the printer, sign it and place in supervisor’s mailbox for review. “X” out of the screens on the computer to the Inventory screen and click Worklist at the top to choose and calibrate another pipette.
21. If no more pipettes are to be calibrated, clean up the area and turn off the instrument (remember to remove and discard the vial in the instrument). “X” off of the screens and log off the computer.
22. Fill out a new tag for the pipette, which includes volume, date calibrated, pipette # and initials. ALWAYS remove the existing label. Attach new one with scotch tape.

INSTRUMENT TROUBLESHOOTING:

Refer to the PCS2 Procedure Guide.

Expected Values

Verify that the CV% and INACC% are within the acceptable range for the pipette. These are calculated by the Artel Pipette Tracker software. They are reported on the printout and are stored in the computer files. The acceptable ranges are programmed into the computer.

ACCEPTABLE LIMITS: These limits (or more strict in some cases) are set into the Artel Pipette Tracker software.

Pipette (mCL)	Inaccuracy (%)	CV (%)
5	±5	±5
10	±5	±5
20	±5	±5
40	±5	±5
50	±2	±2
100	±1	±1
200	±1	±1
300	±1	±1
450	±1	±1
500	±1	±1
830	±1	±1
1000	±1	±1

NOTE:

The 8 channel Brinkman 50-200µL pipette is calibrated for 100uL only using the PCS2 instrument, and Artel software. The results are recorded in the Artel software.

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References

1. PCS2™ Pipette Calibration System Procedure Guide, Artel©, Inc., Westbrook, ME, April 2002.
 2. Pipette Tracker User Manual, Artel©, Inc., Westbrook ME, July 2004.
 3. 10 Tips to Improve Your Pipetting Technique, Artel©, Inc., 2002.
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Authorized Reviewers

Medical Director, Coagulation

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ARTEL© PCS™ PIPETTE CALIBRATION SYSTEM PROCEDURE

Document Control

Location of Master: Coagulation Procedure

Master electronic file stored on the Beaumont Laboratory server:

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Document History

Signature	Date	Revision #		Related Documents Reviewed/ Updated
Prepared by: Brad Goller MT(ASCP)	11/01/2001			
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Reviewed by: (Signature)	Date	Revision #	Modification	Related Documents Reviewed/ Updated
Joan C. Mattson, MD	11/30/2001		New procedure	
Noelle Procopio, MT(ASCP)SH	12/30/2002		No change	
Noelle Procopio, MT(ASCP)SH	12/29/2003		No change	
Joan C. Mattson, MD	01/02/2004		No change	
Noelle Procopio, MT(ASCP)SH	01/04/2005		No change	
Joan C. Mattson, MD	02/08/2005	00	Standardized procedure format	
Noelle Procopio, MT(ASCP)SH	12/22/2006		No change	
Marc Smith, MD	05/21/2007		No change	
Marc Smith, MD	08/07/2007	01	Pg.1 deleted Jan, Apr, Jul, Oct. pg.3 added Results are automatically recorded on the Artel pipette v3.2 program. The 8 channel pipette for the CAG is recorded on the Quarterly pipette calibration form.	
Marc Smith, MD	06/30/2008		No change	
Marc Smith, MD	09/22/2008	02	Revised to include instructions for using Artel Pipette Tracker software in tandem with PCS2 instrument. Updated references.	
Marc Smith, MD	05/28/2009		No change	
Marc Smith, MD	05/05/2010		No change	
Marc Smith, MD	06/07/2011		RC.HM added to SOP#; new format.	
Marc Smith, MD	12/19/2012	03	Updated frequency of calibration testing.	NA

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