
Updating Calibration Coefficients in PADS 3.X

DMT Technical Note Rev B



2545 Central Avenue
Boulder, CO 80301-5727 USA

CONTENTS

1.0	Problem	3
2.0	Affected Instruments	3
3.0	Resolution	3
3.1	Updating Pressure Coefficients	3
3.2	Updating Other Coefficients	5
4.0	Rationale for Change	7
4.1	For the CIP, CIP-GS and PIP	7
4.2	For the FM-100	8
4.3	For the PCASP-X2	8
Appendix A: Updates to This Document		8

Figures

Figure 1: Inserting New Pitot Calibration Coefficients in PADS 3.X	4
Figure 2: PADS 2.X Coefficients	6
Figure 3: Entering New Coefficients in PADS 3.X	7

1.0 Problem

If you have updated from PADS 2.X to PADS 3.X but have not sent your instrument in for calibration, you will need to update certain calibration coefficients in PADS.

2.0 Affected Instruments

Affected instruments include the CIP, CIP-GS, PIP, CAS, FM-100, and PCASP-X2.

3.0 Resolution

3.1 Updating Pressure Coefficients

[This section is old, I just put a new heading on it]

- 1.) Locate your instrument's Calibration Data Sheet.
- 2.) Open PADS 3.X.
- 3.) Navigate to the PADS tab for your instrument. Click on **Configure > Configure Instrument** to bring up the instrument's configuration editor. On the right-hand side of the window, you will see the Channels table.
- 4.) On the calibration spreadsheet, locate the "Slope" coefficient at the bottom of the **Static Summary** coefficients. Enter this coefficient in the **Static Pressure** row in the PADS Channels table, in the **x¹ Slope** cell. Also, if the intercept coefficient is not the same as that listed in the **x⁰ Offset** cell, update this cell. See Figure 1.

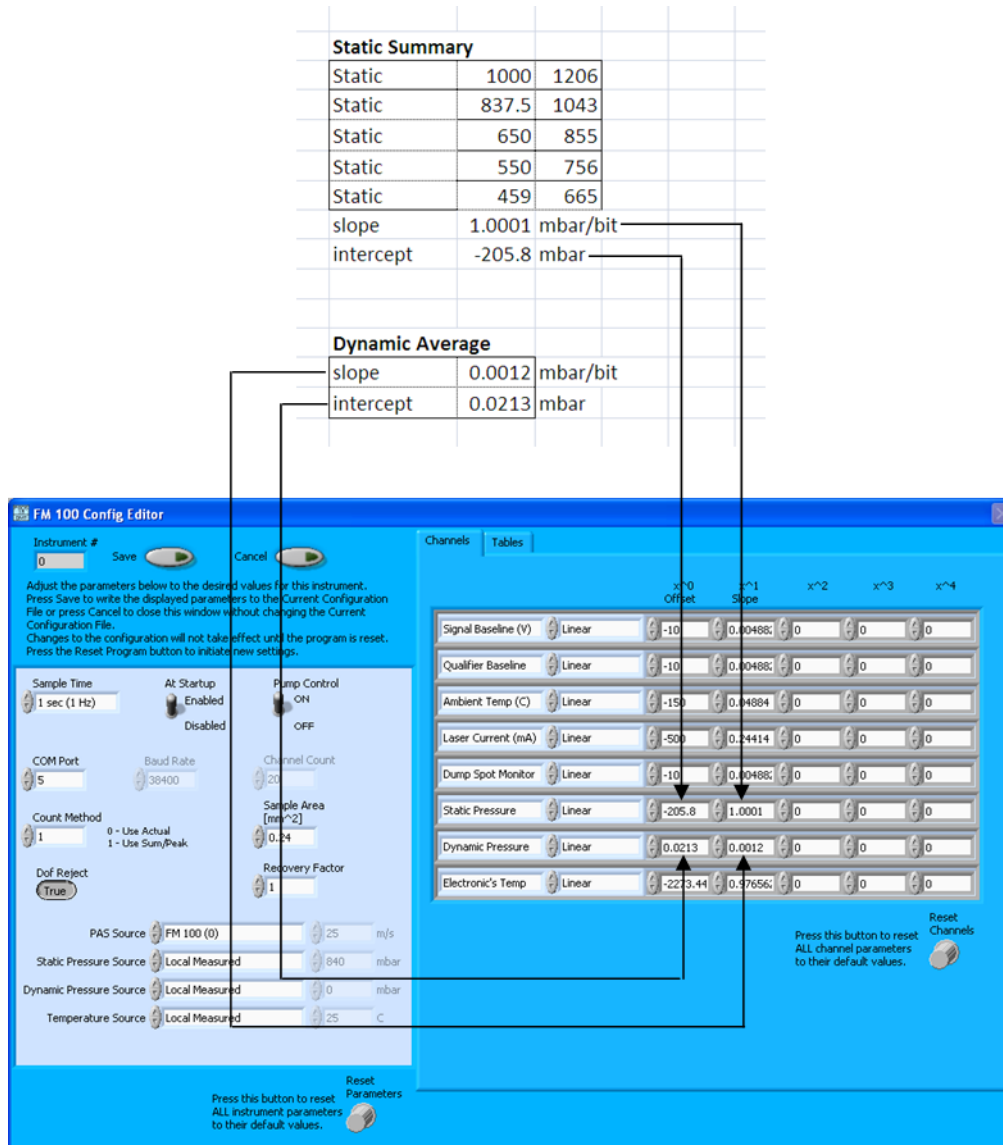


Figure 1: Inserting New Pitot Calibration Coefficients in PADS 3.X

- 5.) On the calibration spreadsheet, locate the “Slope” coefficient in the **Dynamic Average** coefficients. Enter this coefficient in the **Dynamic Pressure** row in the PADS Channels table, in the **x¹ Slope** cell. Also, if the Dynamic Average intercept coefficient is not the same as that listed in the **x⁰ Offset** cell, update this cell.
- 6.) Click the **Save** button at the top of the Configuration Editor.
- 7.) Click the green **Reset Program** button.

- 8.) Repeat the above steps for as many instruments as you have that measure static and dynamic pressure.

3.2 Updating Other Coefficients

[This whole section is new]

- 1.) Open PADS 2.X.
- 2.) Navigate to the PADS tab for your instrument. Click on **Configure > Configure Instrument** to bring up the instrument's configuration editor.
- 3.) Write down all the coefficients for the parameter in question (e.g., sample flow).
- 4.) Convert PADS 2.X coefficients to PADS 3.X coefficients using the formulas provided in this document.
- 5.) Open PADS 3.X.
- 6.) In PADS 3.X, navigate to the PADS tab for your instrument. Click on **Configure > Configure Instrument** to bring up the instrument's configuration editor. On the right-hand side of the window, you will see the Channels table.
- 7.) Enter the new coefficients in the PADS 3.X Channels table.
- 8.) Repeat steps 3 - 7 for all coefficients to be changed.
- 9.) Click the **Save** button at the top of the Configuration Editor.
- 10.) Click the green **Reset Program** button.

Example: Updating PCASP-X2 Sample Flow

- 1.) Open the PCASP-X2 module in PADS 2.X. Click on the **Configure** menu and select **Configure instrument**.
- 2.) Note the values for A, B, and C coefficients for the sample flow:

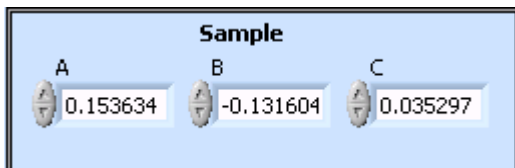


Figure 2: PADS 2.X Coefficients

3.) Adjust these values according to the formulas given for the PCASP-X2 (section 4.3):

$$\begin{aligned}
 A[\text{PADS 3.X}] &= A[\text{PADS 2.X}] * (5/4095)^2 = \\
 &= 0.153634 * (1.49084 \times 10^{-6}) \\
 &= 2.29044 \times 10^{-7}
 \end{aligned}$$

$$\begin{aligned}
 B[\text{PADS 3.X}] &= B[\text{PADS 2.X}] * (5/4095) = \\
 &= -0.131604 * 0.001221 \\
 &= -0.000160689
 \end{aligned}$$

$$C[\text{PADS 3.X}] = C[\text{PADS 2.X}] = 0.035297$$

- 4.) In PADS 3.X, navigate to the PADS tab for the PCASP-X2. Click on **Configure > Configure Instrument** to bring up the PCASP-X2 configuration editor. On the right-hand side of the window, you will see the Channels table.
- 5.) Enter the new values in the appropriate fields (Figure 3).

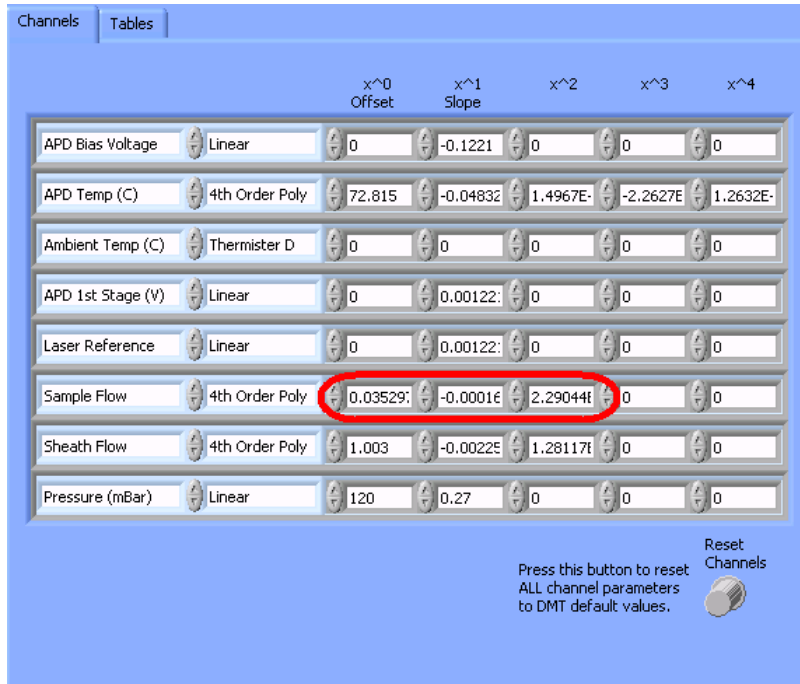


Figure 3: Entering New Coefficients in PADS 3.X

4.0 Rationale for Change

PADS receives housekeeping channel readings in A/D counts. In PADS 2.X, the program converted these A/D readings to a voltage equivalent, and then used the calibration coefficients to convert the voltages to mBar. In PADS 3.X, the program uses the calibration coefficients to convert the readings directly from A/D counts to engineering units. The coefficients used in the two versions of PADS will thus differ considerably for the same instrument. In particular, PADS 3.X includes an extra multiplication factor to convert A/D counts to voltages. This factor is equal to the voltage range of the channels divided by the output range of the A/D converter. For instance, in the FM-100, the multiplication factor for pressure coefficients is 20/4095, because the pressure channels have a 0 - 20 Volt range measured by a 12-bit A/D converter that gives integer values from 0 to 4095.

4.1 For the CIP, CIP-GS and PIP

The relationship between PADS 2.X and PADS 3.X coefficients is described by the equations below.

$$\text{PADS 3.X Slope Coefficient} = \text{PADS 2.X Slope Coefficient} * (5/4095)$$

Intercept coefficients are the same for PADS 2.X and PADS 3.X.

4.2 For the FM-100

The relationship between PADS 2.X and PADS 3.X coefficients is described by the equations below.

$$\text{PADS 3.X Slope Coefficient} = \text{PADS 2.X Slope Coefficient} * (20/4095)$$

Intercept coefficients are the same for PADS 2.X and PADS 3.X.

4.3 For the PCASP-X2

The PCASP-X2 pressure coefficients are the same for PADS 2.X and PADS 3.X. However, 2.8 users will need to update their sample and sheath coefficients.

Both PADS 2.X and PADS 3.X use the formula $A * x^2 + B * x + C$ to derive sample and sheath flows. However, in PADS 2.X, $x = [\text{ADC} * (5/4095)]$, whereas in PADS 3.X, $x = \text{ADC}$. The coefficients thus should be updated as follows:

$$A[\text{PADS 3.X}] = A[\text{PADS 2.X}] * (5/4095)^2$$

$$B[\text{PADS 3.X}] = B[\text{PADS 2.X}] * (5/4095)$$

$$C[\text{PADS 3.X}] = C[\text{PADS 2.X}]$$

Appendix A: Updates to This Document

Rev. Date	Rev No.	Summary	Section
8-2-11	B	Added calibration coefficients for PCASP-X2.	3.2, 4.3