VARIABLE CORRECTION FACTOR (“VCF”) IN-SITU CALIBRATION PROCEDURE

By:
Dr. Jerry Kurz and Tom Setliff

Introduction

The purpose of this procedure is to provide the User with the method to adjust the output of the Series 155 ADAM Mass Flow Computer to correct for possible calibration error. ADAM software allows the User to enter a Correction Factor (C.F.) for one or more reference test data sets. The ADAM software interpolates to provide a C.F. for intermediate flow rates. The basic idea is to record the Kurz output data at the same time that the reference flow measurements are made for each in-situ flow test and use this information to correct the Kurz data to agree with the reference method data.

Thus:

Corrected SCFM = (C.F.) x V_{KAVG} x A

C.F. = Correction Factor

V_{RMAVG} = Reference Method Average Velocity during test

V_{KAVG} = Kurz Average Velocity during test

A = Duct/Stack Area defined in Square Feet (FT^2)

SCF = Standard Cubic Feet

ET = Elapsed Time in minutes

Detailed Procedure

A) For each Reference Test:

1) At the start of the test, record the Kurz totalized flow (1), and elapsed time (1). This is most easily accomplished by using the Demand Print Feature (L) of the ADAM Mass Flow Computer. and a laptop computer with the Upload/Download/Record Program. This method averages the signals automatically and saves time.

2) At the end of the test, record the Kurz totalized flow (2), and elapsed time (2) as in Step 1.

3) Calculate the Reference Method Average Velocity measured with the Pitot Tube Velocity Measurement System using EPA Method 2 procedures, equivalent acceptable reference method, or Kurz Tracer Gas Dilution Method. Correct this data to Standard Conditions of 25°C and 760mm Hg.

4) Calculate the Kurz Average Velocity by using the data collected in Step 1 and 2:

   a) V_{KAVG} = SCF/[ET x A], or $V_{KAVG} = \frac{\text{Totalized Flow (2) - Totalized Flow (1)}}{\text{[Elapsed Time (2) - Elapsed Time (1)] x A}}$

b) Calculate the Correction Factor: C.F. = V_{RMAVG} / V_{KAVG}

5) Repeat this method for as many Reference Tests as conducted.

6) Tabulate C.F. data in order of **increasing average velocity** according to the following example data:

Test Number	1	2	3	4
C.F.	.950	.960	.980	1.020
V_{KAVG}	1000	2000	3000	4000

B) Enter C.F. Data into The Series 155 Mass Flow Computer by following Model 155 State Diagram:

1) Press P, Enter 6 digit Technical Access Code, Press Enter:

2) Press P until display indicates:

PRESS ENTER TO SET METER DATA

3) Press Enter.

4) The Display will then read:

PRESS ENTER TO SET METER #1

Use **Yes (∧)** or **No (∨)** keys to advance meter number to the appropriate "meter", and press enter.

5) Sequentially Press P until the display reads:

C F TYPE VCF ∧ = CCF ∨ VCF

Press No (∨) to select "VCF", then press Enter. (Note: "CCF" is an automatic correction factor normally used with multi-point systems).

The display reads:

ENTER # C.F. DATA POINTS XX

Enter number of sets of Reference Test Data, press Enter. (Note: Up to seven sets maximum.)

6) The display then reads:

C.F.#1= 0.950

Put in calculated Correction Factor, then press Enter (E).

The display then reads:

C.F.#1 -0.950 AT XXXX SFPM

Put in the V_{KAVG} Value for C.F. #1, and press Enter (E).

The display reads:

C.F #1 = 0.950 AT 1000 SFPM

7) Repeat Step 6 until all C.F. Values and corresponding Velocity Values are programmed, in order of increasing Kurz Average Velocity.

For this example, you will display the following displays in sequence:

C.F. #1 = .950 AT 1000 SFPM

C.F. #2 = .960 AT 2000 SFPM

C.F. #3 = .980 AT 3000 SFPM

C.F. #4 = 1.020 AT 4000 SFPM

7) When finished programming meter data, Press "C" until ADAM Display goes out of the Program Mode. The system is now in it's Normal Operation Mode. The value of the instantaneous C.F. is displayed along with all other data for each METER, when the "D" Display is used.

Please reference Model 155 State Diagram for more details.