# Fine Tuning Flow Sensor

Sometimes the electronic flow sensor's readings do not exactly match a flow manometer or some other calibration standard, like in the table below. You will see the readings match at the high end and match at zero, but are slightly low in the middle. So you may want to "fine tune" the flow readings to more closely match at all readings. This can be done in the more advanced Head Porter version for Port Flow Analyzer.

| Black Box Flow Reading | Manometer |
|---|---|
| 0% | 0% |
| 48% | 50% |
| 72.5% | 75% |
| 90% | 90% |
| 100% | 100% |

First, you must turn on the "Fine Tuning" option by going into Preferences, then the "Gen Operation, cont" tab, then set "Allow Fine Tuning for Flow Sensor" to Yes, then clicking OK at upper right to save this setting. See picture to right.
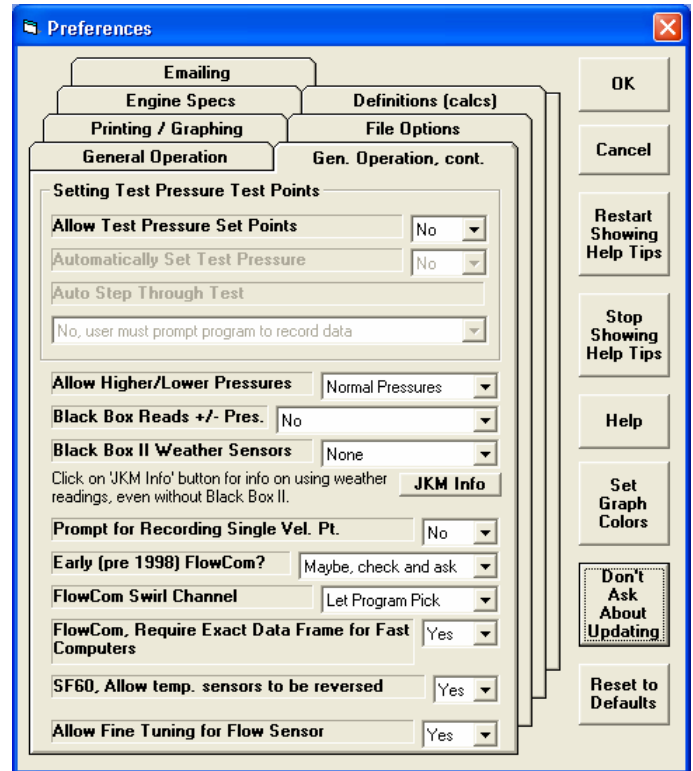
Now go into Flow Bench specs, then click "See Details (calibrations) button at lower left for the Calibrations screen shown to the right. Click on More Details, then Fine Tune Inclined Manometer.
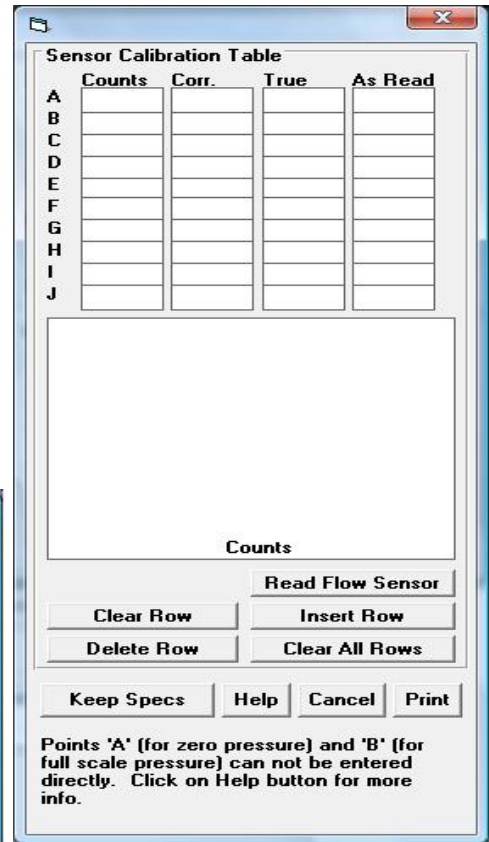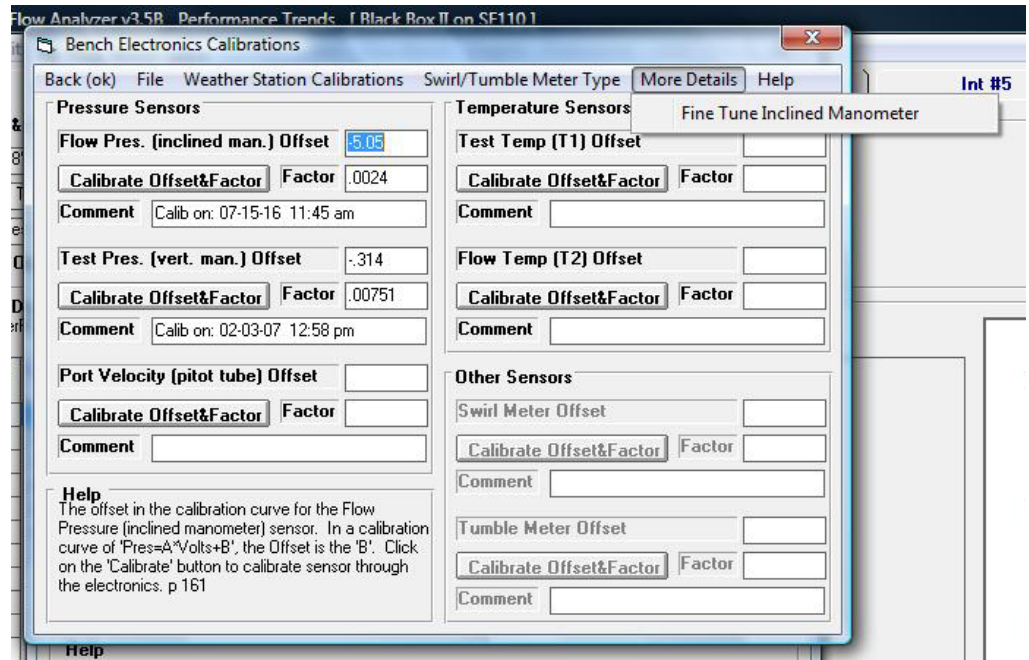
You are first given some instructions about using this feature.
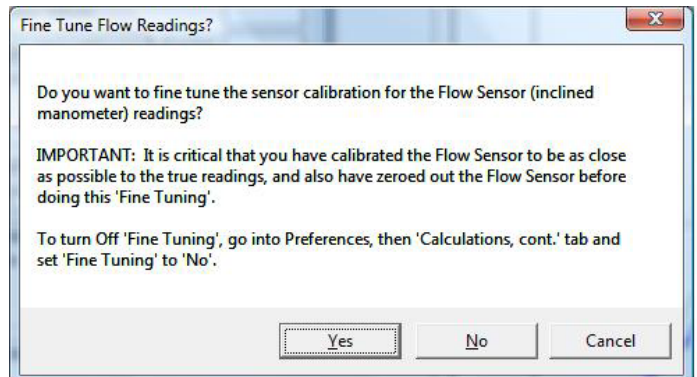
You are next presented the Sensor Calibration Table shown to right. Here you will let the program read the sensor "Counts" in the first column by clicking on the Read Flow Sensor button. Then you will tell the program how different the computer's reading is from the "True" reading, which could be the actual manometer reading.

The first point you should read is the zero flow reading. It will be filled into the first row. You can not manually enter readings directly into the first or second row, as these are saved for the zero flow reading and full scale reading. The program assumes that both zero and full scale are reading correctly, and the fine tuning is needed in the middle of the calibration curve.

If there is nothing in the first row, the program will likely warn you as shown below.

**Are You Setting Zero Pressure?**

You need a zero reading (readings in the top row of this table) to continue 'Fine Tuning'. Are you setting Zero Pressure, with the flow bench motors turned Off?

Yes    No

**Sensor Calibration Table**

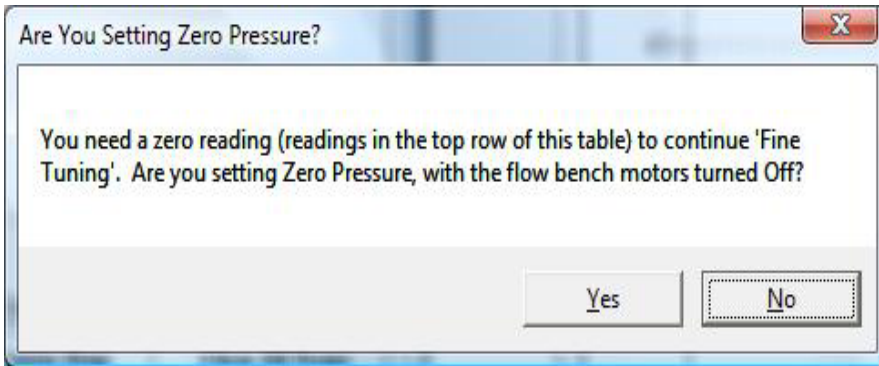| | Counts | Corr. | True | As Read |
|---|---|---|---|---|
| A | | | | |
| B | | | | |
| C | | | | |
| D | | | | |
| E | | | | |
| F | | | | |
| G | | | | |
| H | | | | |
| I | | | | |
| J | | | | |

Counts

Read Flow Sensor

Clear Row    Insert Row

Delete Row    Clear All Rows

Keep Specs    Help    Cancel    Print

Points 'A' (for zero pressure) and 'B' (for full scale pressure) can not be entered directly. Click on Help button for more info.
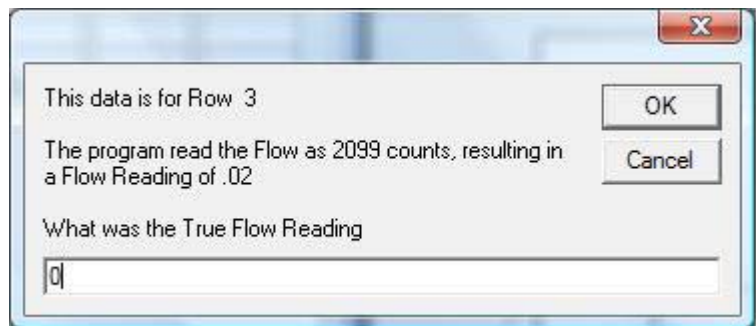
So, with the blower motors OFF, click the Read Flow Sensor button and it will come back with a message like to the right. Enter 0 for the True Reading. This lets the program know this data should be filled into the first row.
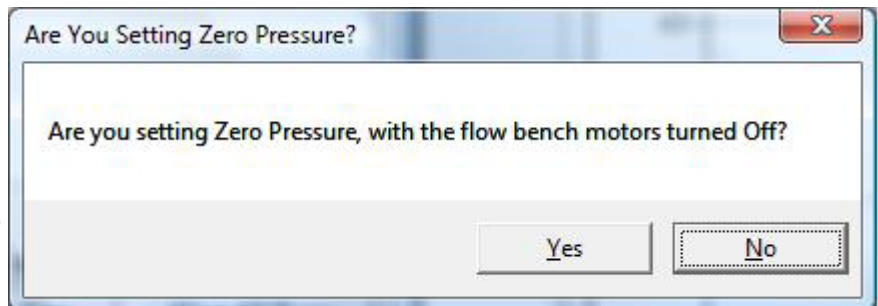
This data is for Row 3    OK

The program read the Flow as 2099 counts, resulting in a Flow Reading of .02    Cancel

What was the True Flow Reading

0

The program will ask you to confirm this is your zero flow reading, so answer Yes. The program will fill in the first row of the table with the zero reading, and then also the second row with the Full Scale counts. In both cases, the program will assign the "Corr." (sensor correction) a value of 1, which means there is no correction to be done at these counts. For example, 45% flow times 1 remains 45% flow (45 x 1 = 45).
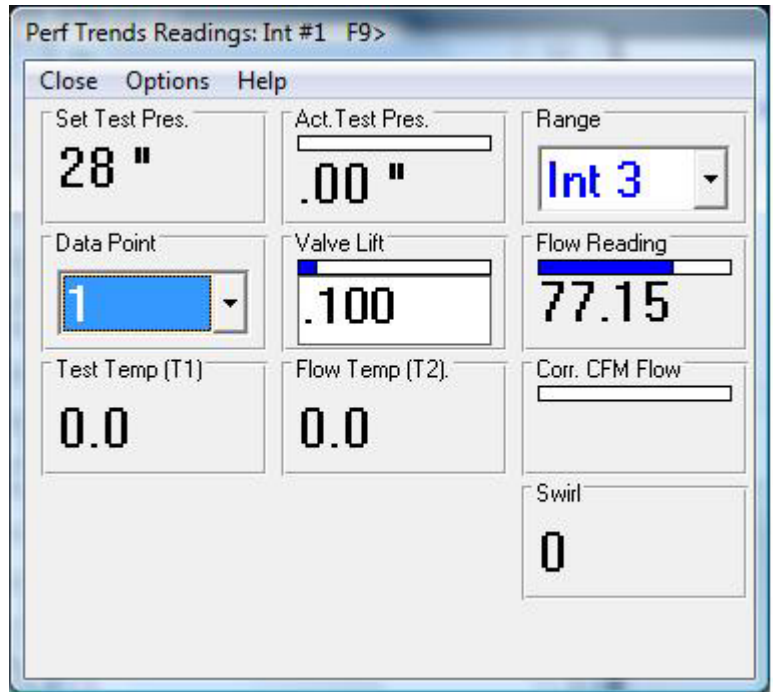
**Are You Setting Zero Pressure?**

Are you setting Zero Pressure, with the flow bench motors turned Off?
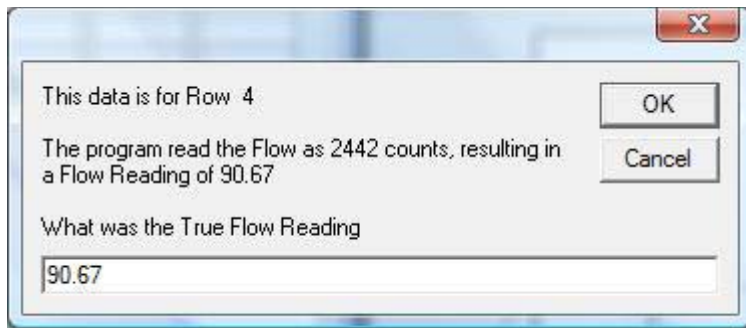
Yes    No

Next, take a reading in an area where the flow readings do not match, like about 75% flow. Set up a 75% flow reading with the bench on and click the Read Flow Sensor button.

The program will read the "counts" and % Flow from the Black Box II and will ask what the True reading was (similar to picture below). Based on the "As Read" and "True" readings, it will calculate the "Corr." or flow correction. In the table to the lower right, you see the True reading of 78.5 which you read on the manometer is 2.7% higher than what the program read on 75.47. This produces a "Corr." correction factor of 1.027. This means the readings at this point in the calibration curve will be multiplied by 1.027, or increased by 2.7%.

**Perf Trends Readings: Int #1   F9>**

Close   Options   Help

| Set Test Pres. | Act. Test Pres. | Range |
|---|---|---|
| 28 " | .00 " | Int 3 |

| Data Point | Valve Lift | Flow Reading |
|---|---|---|
| 1 | .100 | 77.15 |

| Test Temp (T1) | Flow Temp (T2). | Corr. CFM Flow |
|---|---|---|
| 0.0 | 0.0 | |

Swirl

0

Take another reading, say at 90% flow, as shown below. At 90% flow, the manometer agrees with what the computer reads, which will produce a Corr. of 1, or no correction.

This data is for Row 4

The program read the Flow as 2442 counts, resulting in a Flow Reading of 90.67

What was the True Flow Reading

90.67

OK     Cancel

**Sensor Calibration Table**

|   | Counts | Corr. | True | As Read |
|---|---|---|---|---|
| A | 2099 | 1 | 0 | 0 |
| B | 4095 | 1 | | |
| C | 2343 | 1.027 | 78.5 | 76.47 |
| D | 2442 | 1.000 | 90.67 | 90.67 |
| E | | | | |
| F | | | | |
| G | | | | |
| H | | | | |
| I | | | | |
| J | | | | |

1.027

1.

2099.          Counts          4095.

Read Flow Sensor

Clear Row          Insert Row

Delete Row          Clear All Rows

Keep Specs     Help   Cancel   Print

Points 'A' (for zero pressure) and 'B' (for full scale pressure) can not be entered directly. Click on Help button for more info.

What the Calibration Table and graph to the right are showing is at zero flow (2099 counts), the sensor reads correctly. Between 2099 and 2342 counts, a correction should be multiplied to the "as read" counts. The correction starts at 1 at 2099 counts and slowly increases to a maximum of 1.027 at 2343 counts. Then the correction slowly drops back to 1 (no correction) at 2442 counts and stays at 1 all the way to the maximum counts of 4095.

Done correctly, the readings should now agree through the full range.

| Black Box Flow Reading | Manometer |
|---|---|
| 0% | 0% |
| 50% | 50% |
| 75% | 75% |
| 90% | 90% |
| 100% | 100% |

Fine Tune Flow Sensor.pub  page 3