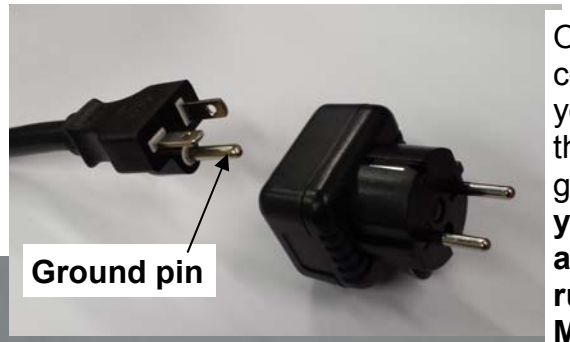
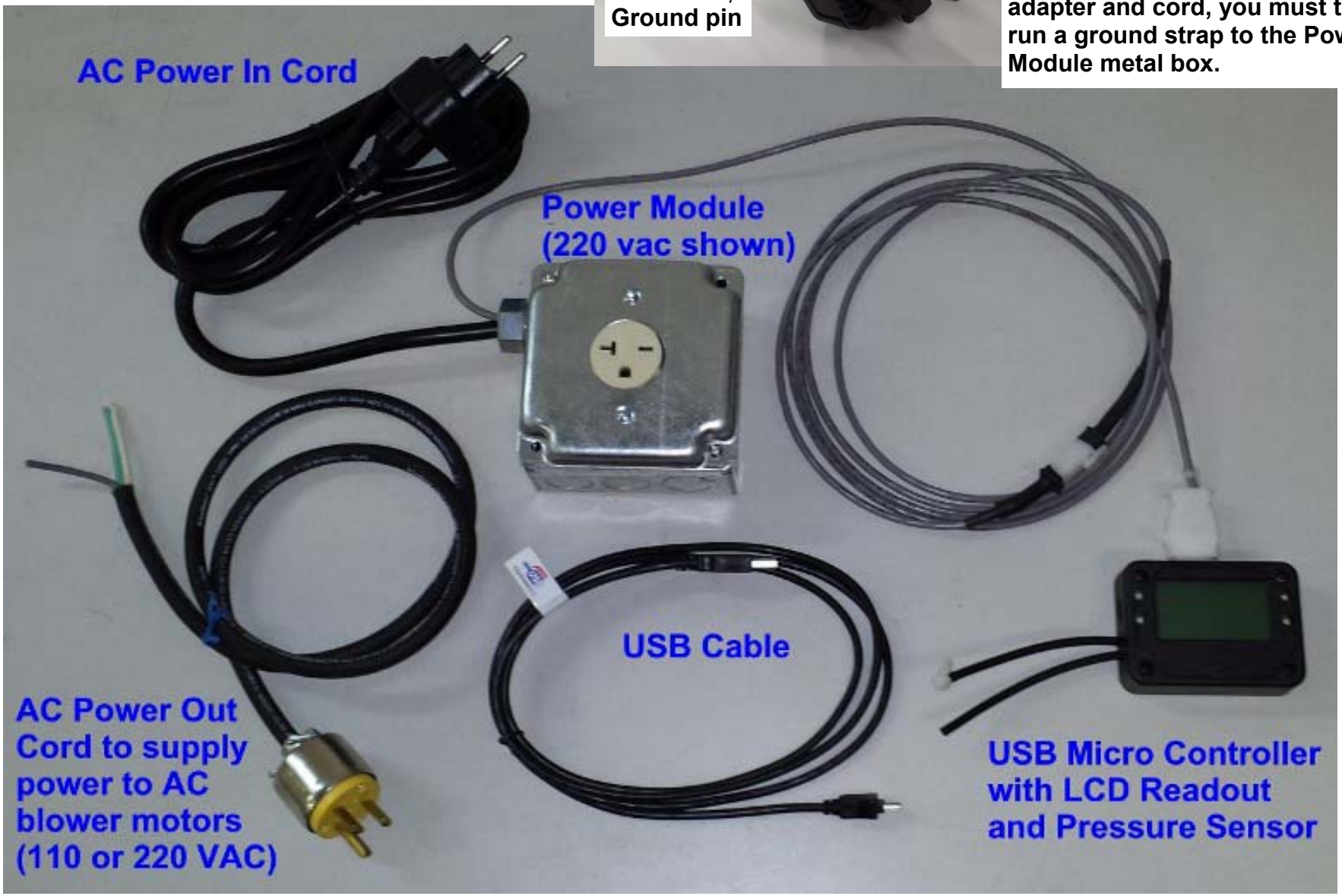
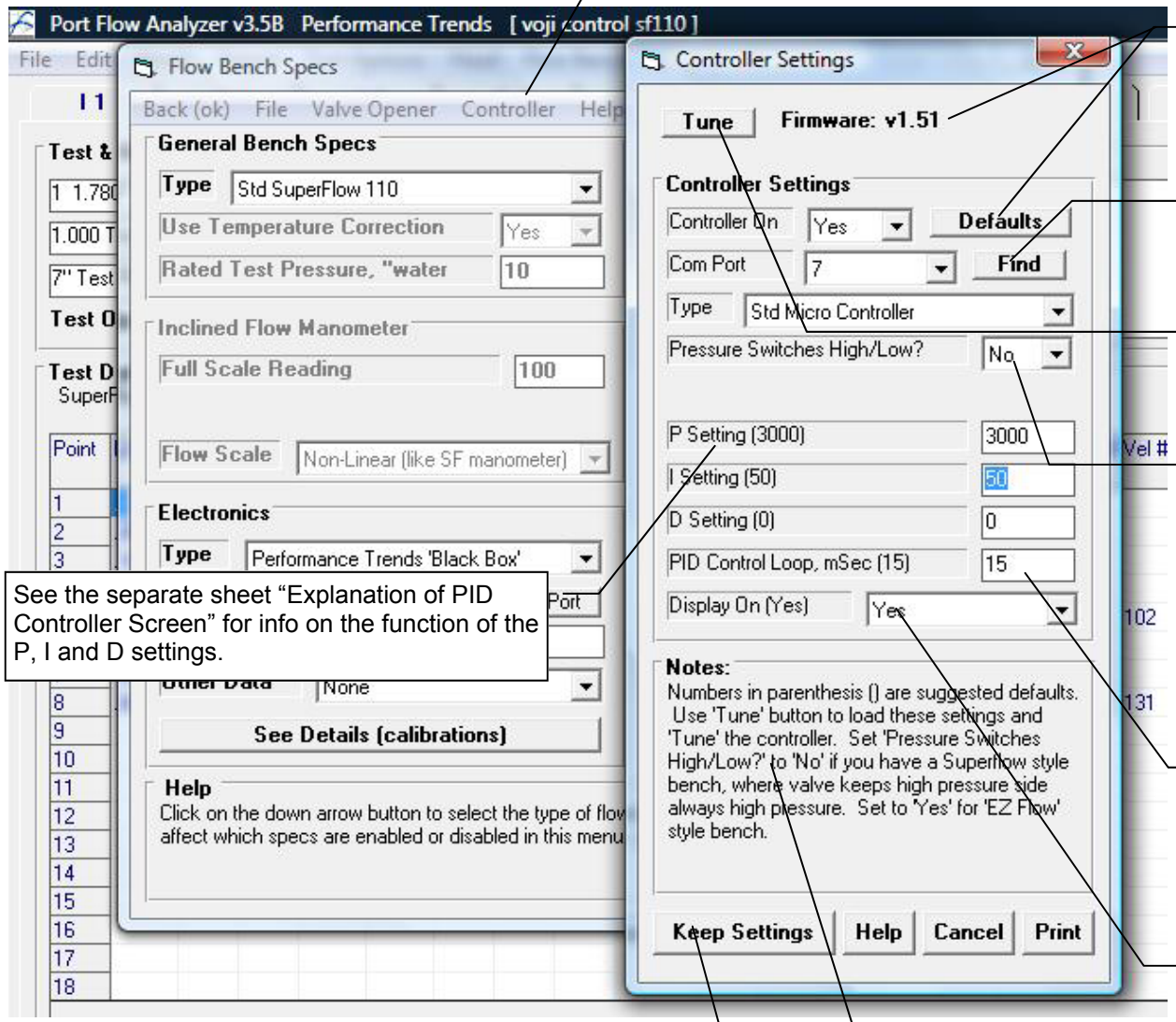
USB Motor Controller



Outside of the USA, your AC power cord may come with an adapter for your country's AC plugs. It is critical that your adapter grounds the round ground pin on the USA style plug. **If you can not ground it through the adapter and cord, you must then run a ground strap to the Power Module metal box.**



USB Motor Controller Setup Screen



Click on Flow Bench at top of Main Screen. Then click on Controller.

Click on Defaults to load default settings. It is unlikely you would want to use settings other than the defaults, unless directed to by Performance Trends. This also reads and displays the Firmware version number.

Click on Find to find possible Com Ports. This will be a different port than what the Black Box II or FlowCom is set to.

Once you have made your settings, click the 'Tune' button to send these parameters to the controller.

This tells the controller whether the pressure to the controller goes from vacuum to pressure when the flow direction switches from Intake to Exhaust directions. For SuperFlow ™ benches, the pressure does not switch, and you will enter No. For other benches without pressure switching valves, you will choose Yes, like a simple EZ Flow system.

See the separate sheet "Explanation of PID Controller Screen" for info on the function of the P, I and D settings.

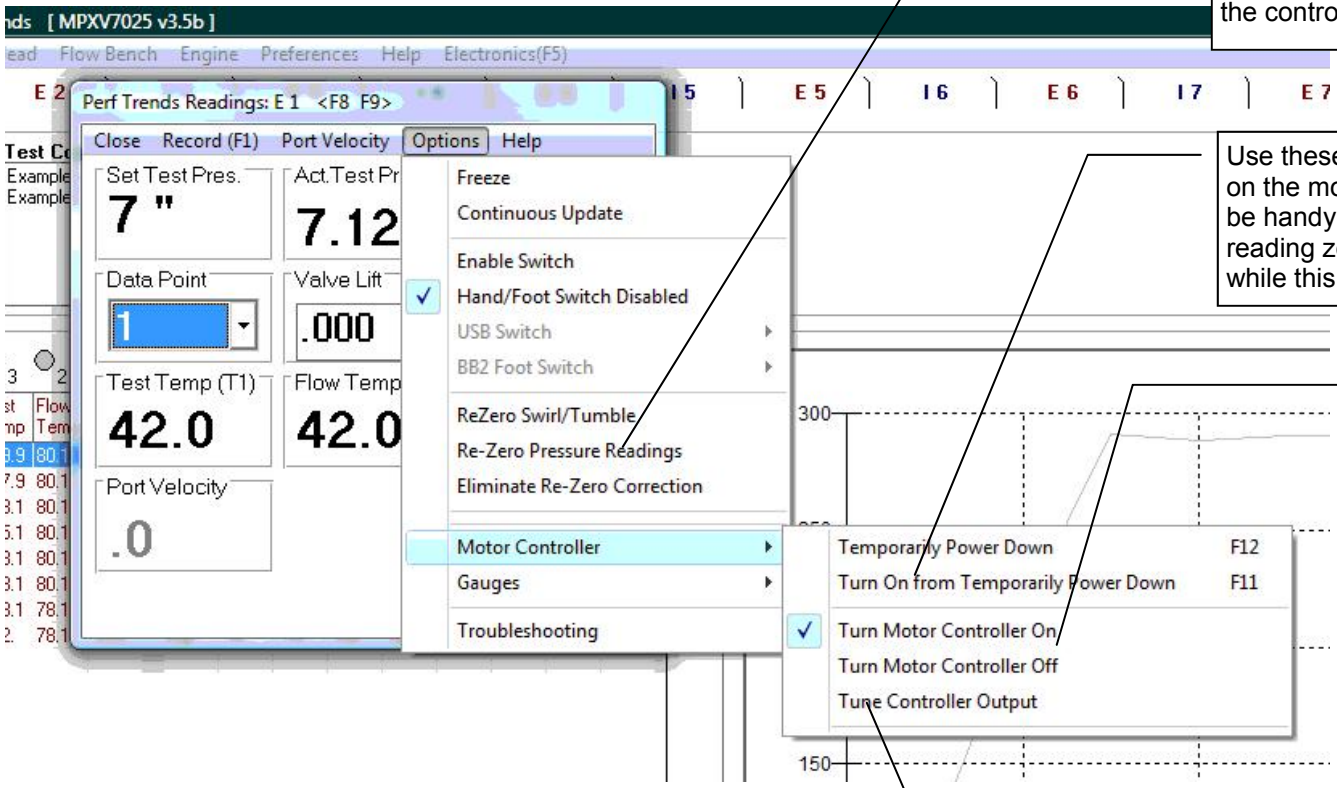
The lower you set this number, the faster responding the PID controller. However, if you set it too fast, the controller may "lock up or stop communicating with the Port Flow software, especially if the display is On.

For Firmware versions of 1.51 or later, you can set this to Yes. Earlier versions would not produce good, fast control with the display On.

These notes explain how you can change these settings to 'Troubleshoot' the controller by directing numbers to the LCD screen of the controller.

Click here to Keep Settings. **Note: This only saves these settings to this screen. You must click the Tune button to have them saved to the Controller.**

USB Motor Controller Options, in Electronics Screen



You should rezero the pressure readings whenever the pressures do not read zero when the motors are off. If the program knows you have a motor controller, it will also ask if you want the controller's pressure sensor to be rezeroed.

Use these options, or press F12 and F11 to turn on the motors in the bench temporarily. This can be handy for checking if the pressure sensors are reading zero correctly, or for working on the head while this screen is open.

Use these options to turn the controller On or Off. Note: Turning the controller On or Off here is the same as turning it On or Off in the Controller Setup screen, which you access in the Flow Bench Specs screen.

Use this "Tune" option to fine tune the controller. The controller will try to set the "Set Test Pres." you have requested in the Test Options screen, which you access from the main Screen. In the screen shown here, it is 7" water, and you can see the "Act. Test Pres" (actual test pressure) is 7.12", which is very close. In this situation, using the Tune option is not necessary. However, if the "Act. Test Pres." was, say, 6" or 8" or farther off, click this Tune option and follow the program's instructions. Once you do this, this new "Tune" is remembered, and you should not have to do this again. IMPORTANT: Before you do this 'Tune' option you should rezero the pressure sensors and also ask to rezero the controller's pressure sensor. See notes above.

Flow Controller, Quick Start

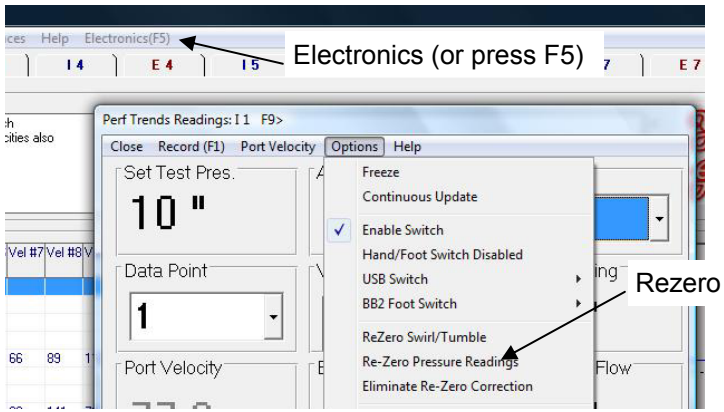
1) Hook up hoses and USB cable. See USB Driver sheet for USB info.

This hose goes to top (suction side) of SuperFlow "well type" manometer, or test pressure point under cylinder head if DIY, custom or EZ Flow bench.

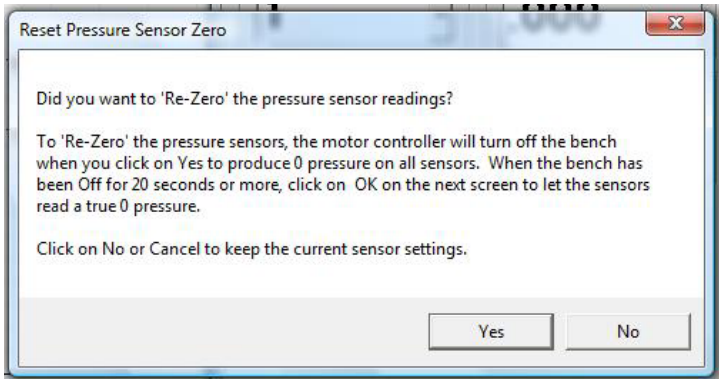
This hose goes to bottom (pressure side) of SuperFlow "well type" manometer, or left open to atmosphere if DIY, custom or EZ Flow bench.

2) Set up Port Flow configuration following the USB Motor Controller Setup Screen instructions.

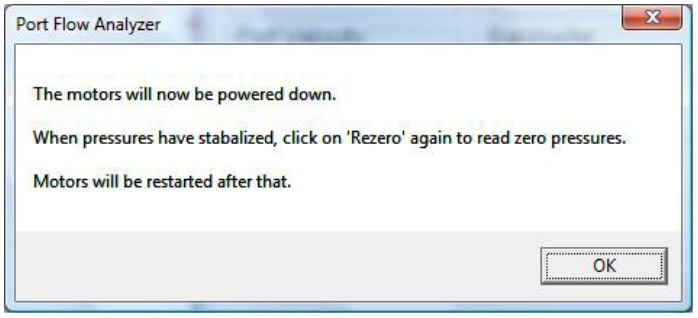
3) Go into Electronics or FlowCom screen and Rezero Pressure Readings to also Rezero the controller's pressure.



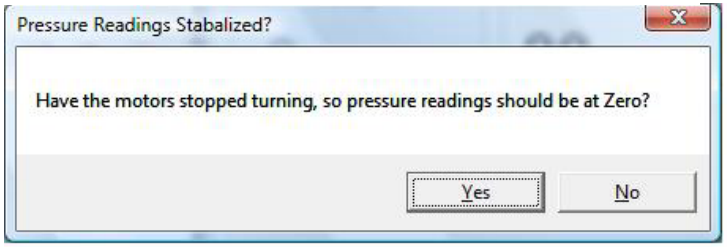
4) Answer Yes to Rezero



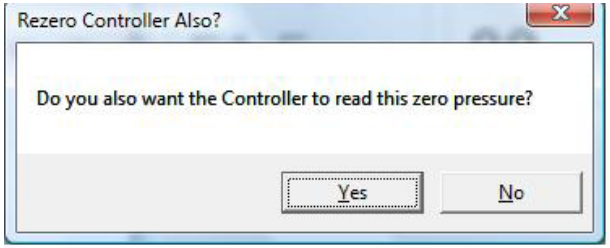
5) If Controller present, program will shut down motors to produce zero pressure. Then you must do Step 3 (click on Options, then Rezero Pressure Sensors) again.



6) Wait until the motors have completely stopped before proceeding with pressing Yes for this message.



7) If this is the first time you have rezero'd the pressure sensors since you have installed the controller, you definitely want to also rezero the controller's pressure sensor, so answer Yes. If your controller is working well already, then you may want to answer No.



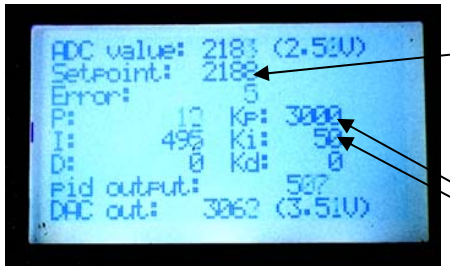
Flow Controller, Quick Start,cont

8) After re-zeroing the pressure sensors and controller, it is best to close (click Close at upper left corner) and then go back into the Electronics/FlowCom screen for the change to take effect.

9) You will notice 2 stages of the control of the Test Pressure (vertical manometer). When you first enter the screen, only partial control is given to get the motors running. Then when communications has been established with the Black Box II or FlowCom, full control is set (P, I and D values are sent to the controller).

10) After things have stabilized, if the Act Test Pres (10.54" in figure) does not match the Set Test Pres (10" in figure), you may want to "fine tune" the controller. Typically you only need to do this when you have first installed the controller, or if you notice a consistent pattern of the Act Test Pres being consistently off by a significant amount (more than 0.5" or so)

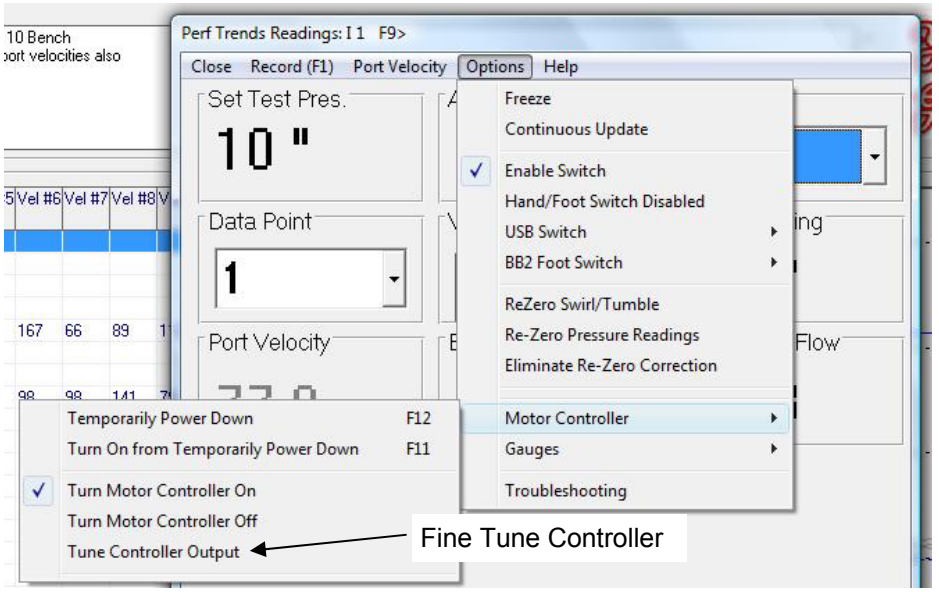
11) To Fine Tune, click on Options, then Motor Controller, then Tune Controller Output as shown in figure at upper right. You want to do this after the system has full control, and you see the proper P, I and D values entered into the LCD display. See below.

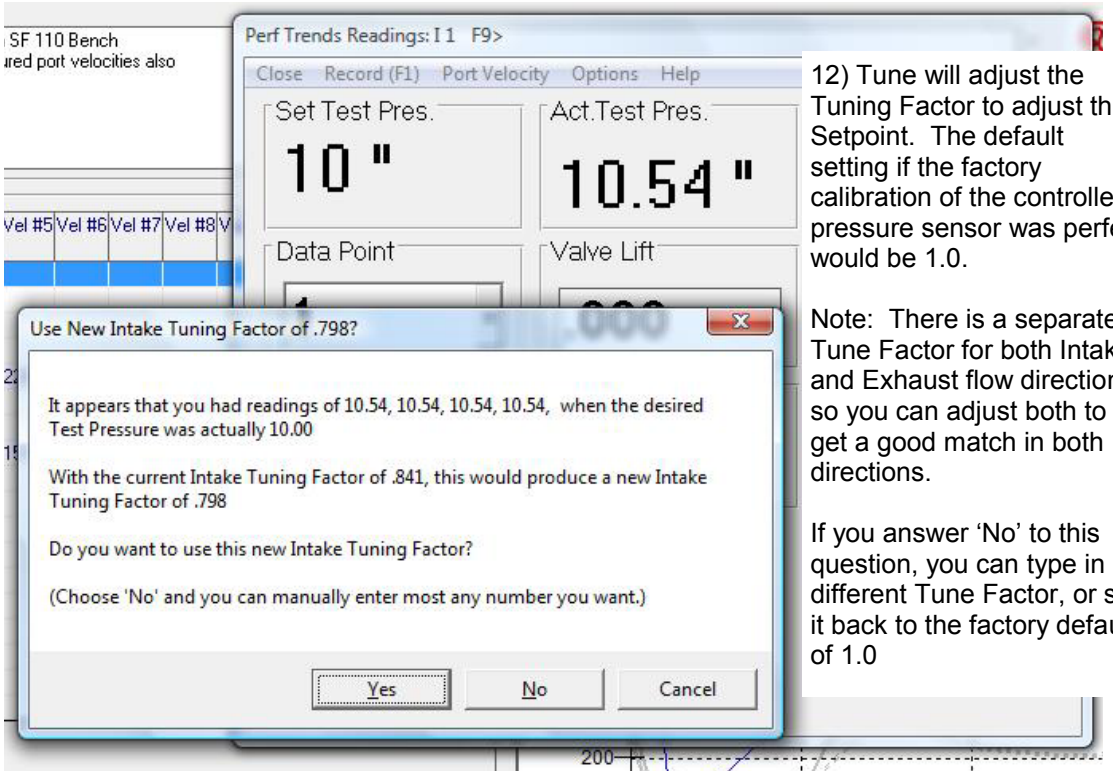


Setpoint is what gets adjusted when you Fine Tune

Full P and I setting. D setting may be 0.

If DAC out is close to 5 volts, it indicates the motors are maxed out, and Tuning will not fix the mismatch in pressures. Actually, trying to Tune when the DAC out is more than approximately 4.2 volts could produce a worse result keeping the existing tune number.



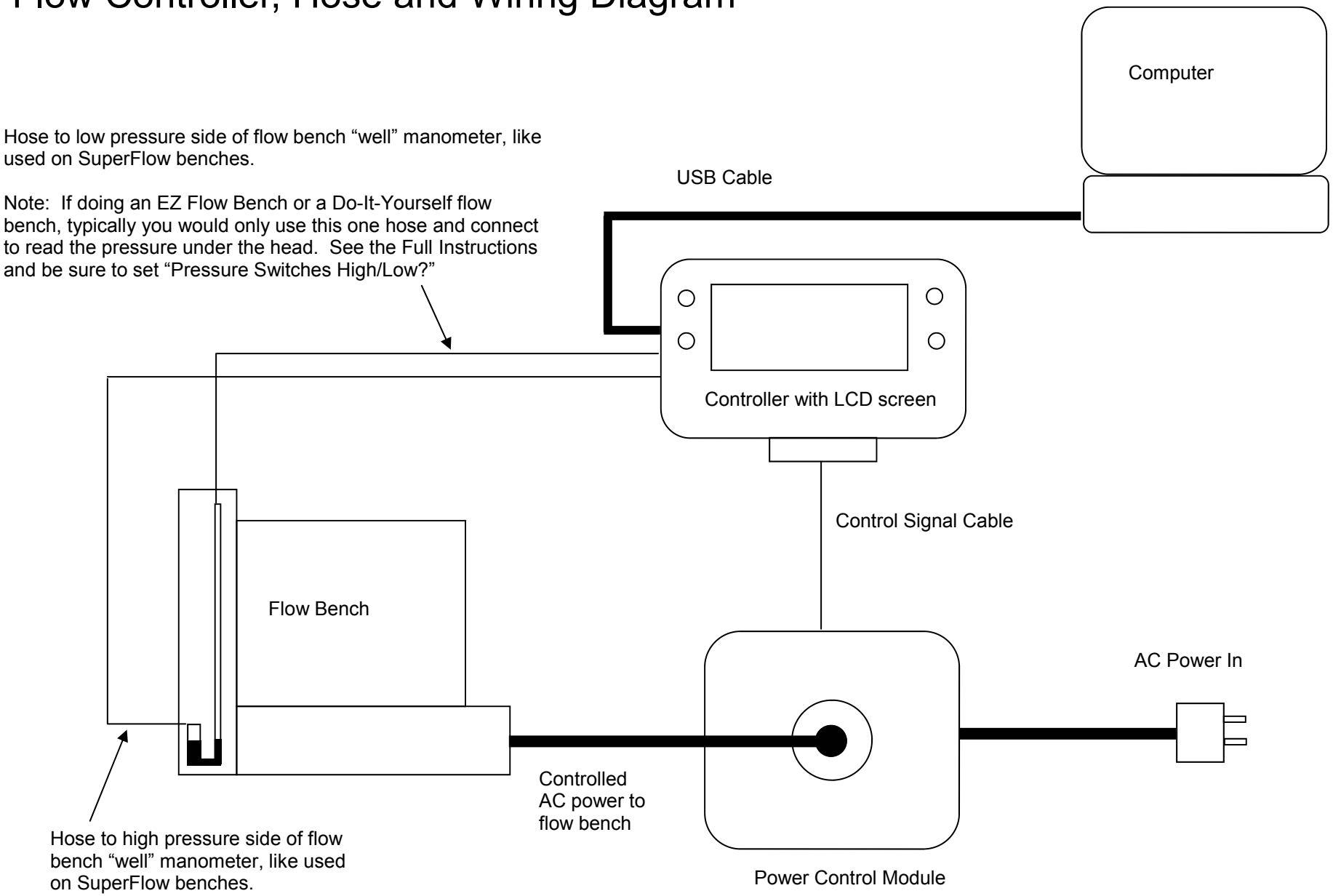


12) Tune will adjust the Tuning Factor to adjust the Setpoint. The default setting if the factory calibration of the controller's pressure sensor was perfect would be 1.0.

Note: There is a separate Tune Factor for both Intake and Exhaust flow directions, so you can adjust both to get a good match in both directions.

If you answer 'No' to this question, you can type in a different Tune Factor, or set it back to the factory default of 1.0

Flow Controller, Hose and Wiring Diagram



Flow Controller, Packing List

Flow Controller w LCD screen with 2 short hoses and adapters from small 3/32 hose from controller up to 1/8” hose

Power control module with AC cord for power in. If outside the USA, probably needs an adapter.

If outside the USA, needs AC power cable for power to bench

Power control cable from Flow Controller to Power Control Module (gray cable w 8 pin and 4 pin connector and likely blue shrink tubing)

Mini USB cable

2 vacuum tees for 1/8” nose

10 ft of 1/8” hose