

Flow Bench Operation

Preparation

- Always wear approved eye protection when operating your flow bench.
- Always keep your bench area clear of any objects or substances that could fall into the receptacle.
- Never look into the receptacle while air pressure is being applied.
- Disable the air source before inspecting the inside of the receptacle.
- Always check the receptacle for objects or substances that may have fallen into the receptacle before applying air pressure.

It is important to check your equipment before doing any flow testing to ensure everything is working correctly. The easiest way to do this is to flow test a calibration orifice for proper flow rates, and to make any minor adjustments to calibration before testing.

The most common reason for errors in flow testing are caused by air leaks. Since the FE series flow elements are not capable of measuring air flow down to zero, no reliable method of leak testing is known at this time. It is up to the operator to ensure that air leaks are not occurring.

When starting the FP1 flow processor, it will take a minute or two for the pressure sensors to settle down before they can be zeroed properly. Sometimes they will lose their zero state after having pressure applied. For this reason, it is always a good idea to flow a calibration orifice and re-zero the FP1 before doing any flow testing.

Flow Element

The flow element connects to the FP1 in the following way:

FP1 PS2+ to flow element +

FP1 PS2- to flow element -

When applying vacuum (negative pressure)

FP1 PS1- to receptacle

When applying positive pressure to receptacle

FP1 PS1+ to receptacle

Test Piece Preparation

The most common way of mounting a test piece to the receptacle is by using C clamps or similar clamping devices. **Do not over tighten the clamps. Just snug them down.** Over-tightening the clamps may distort the surface that the receptacle is mounted to, causing air leaks or damage.

Make sure your test piece is mounted with an even clamping force and not cocked or skewed. Check the receptacle gasket for bits of debris or for bumps or an uneven surface before mounting the test piece.

Make sure the sealing surfaces are clean and smooth. If you need to use grease on the rubber gasket, use only a water based jell. Oil based grease will destroy the rubber gasket.

On cylinder heads, apply grease to both valve stems, the valve seat of the valve that will not be flow tested and to the threads of the spark plug or the plug that will seal the spark plug hole. This will help ensure these areas will not leak air.

Prepare your test piece before mounting the head on your bench. Installing your valve depression device and any clay radiuses onto your test piece is usually much easier before mounting the piece.

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Exhaust Port Testing

Always wear eye protection when operating your flow bench.

Because most air sources heat the air that they supply, it is important to follow some special procedures when testing in the exhaust mode. Heated air causes air flow readings to change for several reasons. Also, the flow element will lose its calibration as it heats up. **It is important to do your exhaust flow testing first, and quickly.**

Connect the receptacle pressure tube to the FP1 PS1+ port.

Install Flow Element for proper flow direction indicated by the arrow on the element label.

By testing your exhaust port before the intake port, your air source motor will not yet be hot and will not heat the air too much.

Don't let the air source run while not testing. The longer your air source runs, the hotter the air will become. Only run the air source while actually testing, then turn it off if more exhaust testing is expected.

Mounting the test piece for exhaust testing must be done very carefully because the air pressure will try to push pieces apart, where vacuum pressure tends to pull them together. Also, as the air heats things, things tend to change.

An extension to the exhaust port will dramatically affect your readings. Any change you make to the extension, diameter, length, position, curvature and direction of any curvature will affect your flow readings. For this reason, we believe it is best not to use any extension for flow rate comparison purposes.

Intake Port Testing

It is important to do exhaust port testing first. This is because most air sources heat the air in exhaust mode and the exhaust should be tested before the air source exhaust air becomes too hot.

Make sure you have installed a radius to the port entrance before mounting your test piece.

Adjust your air source to create a negative air pressure (vacuum).

Connect the receptacle pressure tube to the FP1 PS1- port.

Install Flow Element for proper flow direction indicated by the arrow on the element label.