

**2006 EPA National Air Monitoring Conference  
PM Continuous Training Session**

**TEOM/FDMS Setup, Operation and  
Maintenance**

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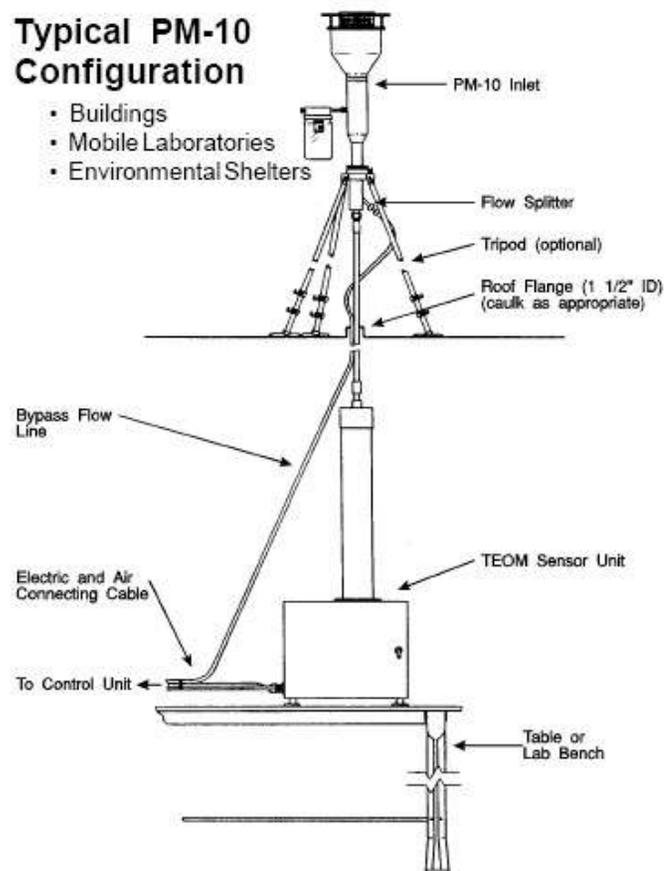
# 1400A TEOM & 8500 FDMS TRAINING



# 1400A TEOM Typical Installation

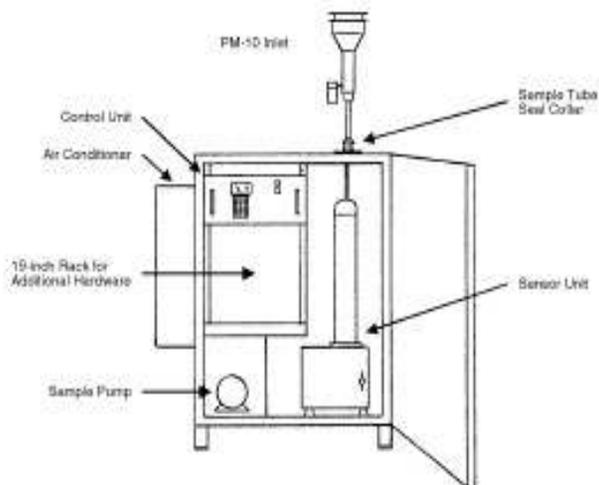
## Typical PM-10 Configuration

- Buildings
- Mobile Laboratories
- Environmental Shelters



# 1400A TEOM Outdoor Enclosure

## Complete Outdoor Enclosure



# 8500 FDMS Typical Installation



# 8500 FDMS Outdoor Enclosure

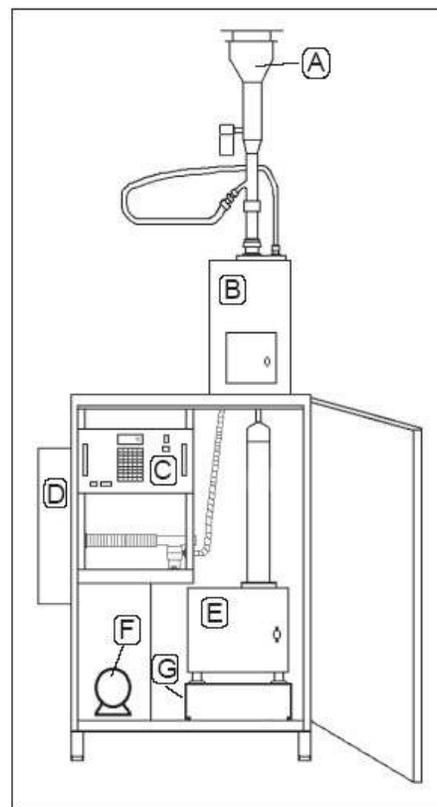
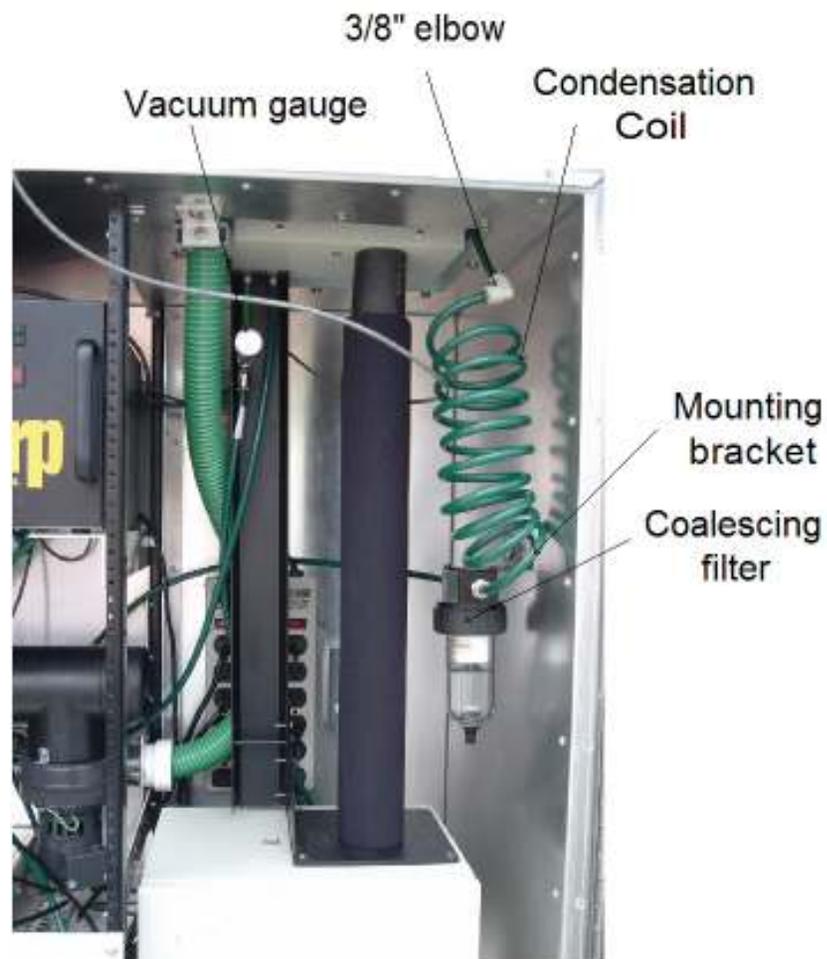
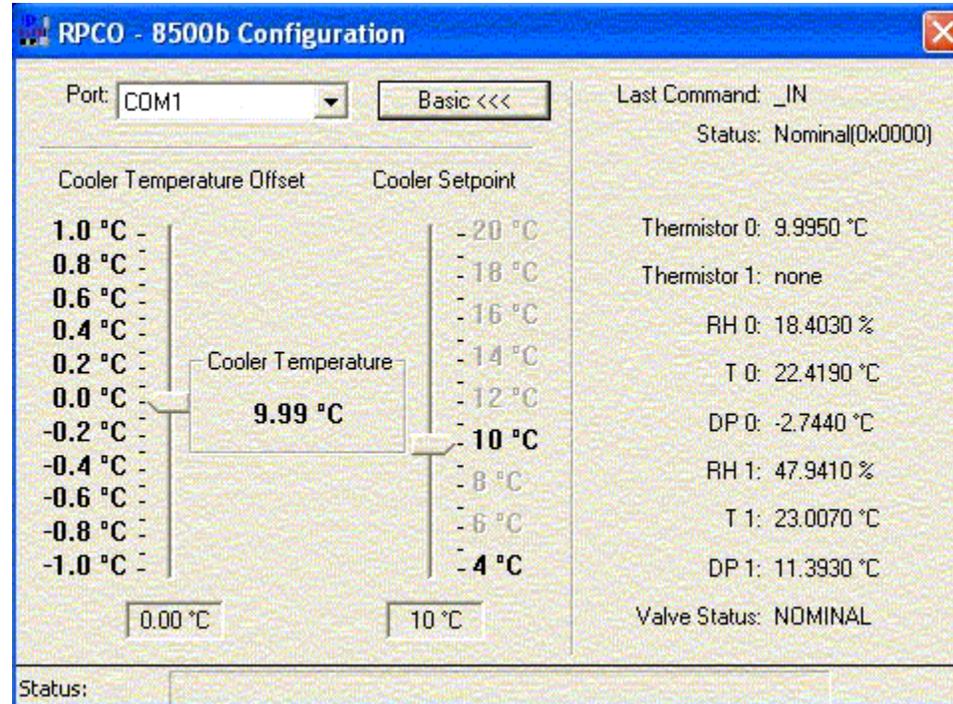
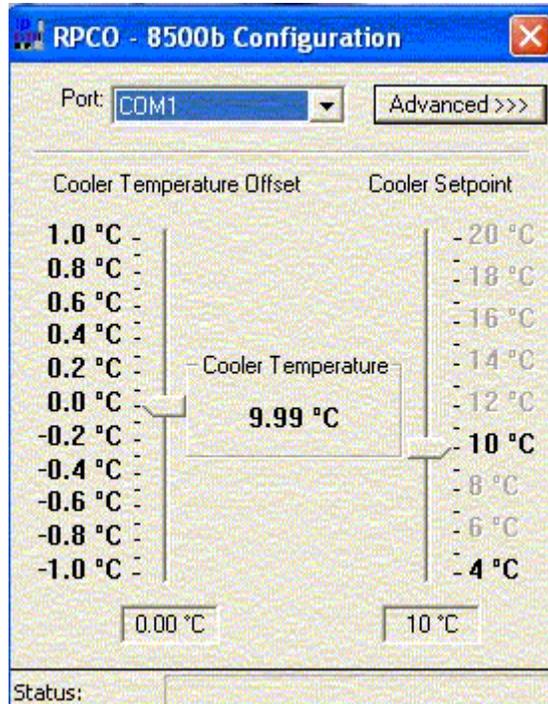


Figure K-86. Instrument placement inside the outdoor enclosure:  
A: Sample inlet  
B: 8500 module enclosure  
C: Control unit  
D: Air conditioner  
E: Sensor unit  
F: Pump  
G: Spacer.

# 8500 FDMS Condenser Kit Installation

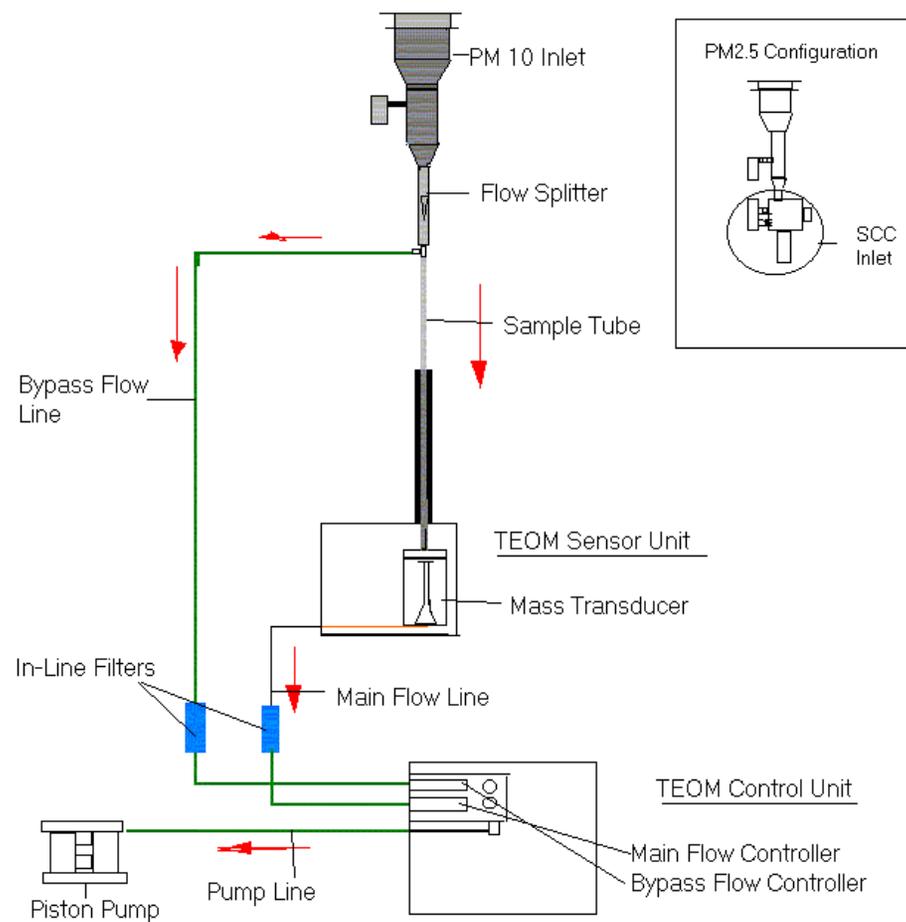


# 8500 FDMS Configuration Utility

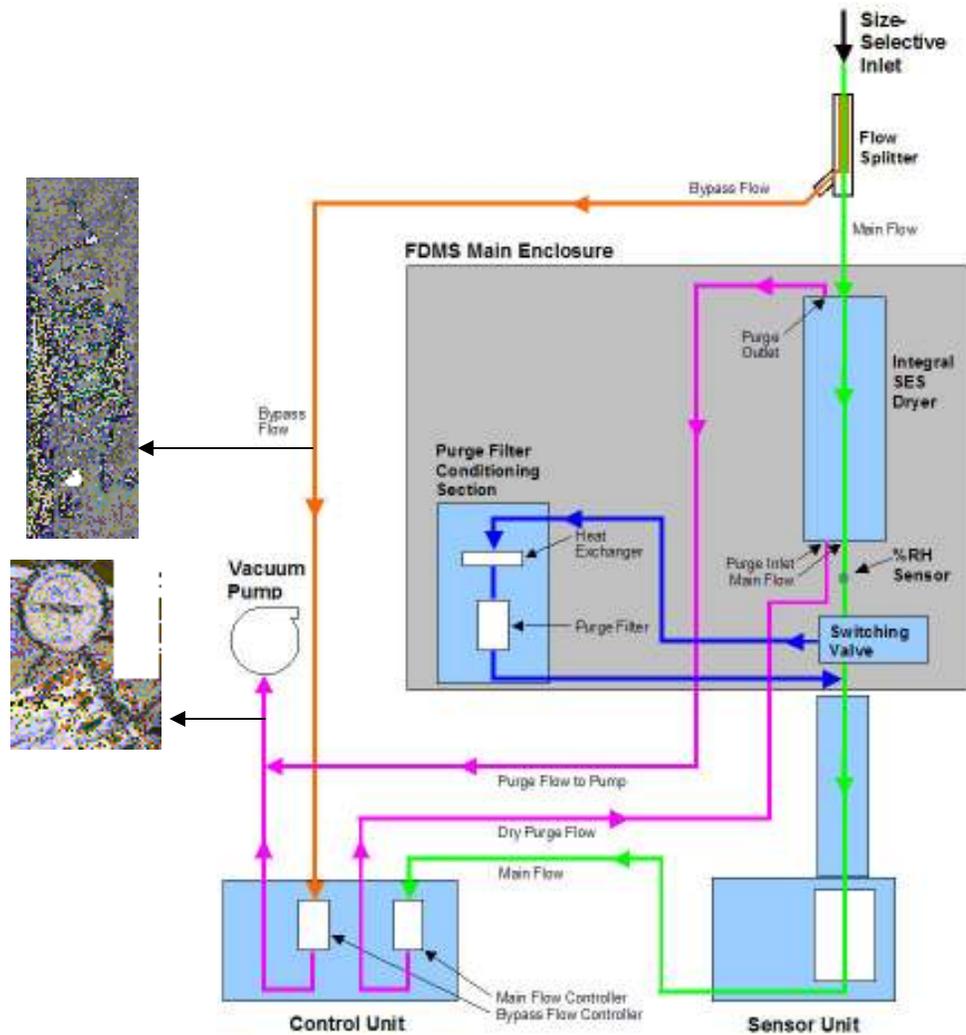


Need to set the 'Purge F T' parameter in the Set Hardware Screen of the TEOM

# 1400A TEOM Plumbing Diagram



# 8500 FDMS Rev B Plumbing Diagram



# 1400A TEOM Routine Maintenance

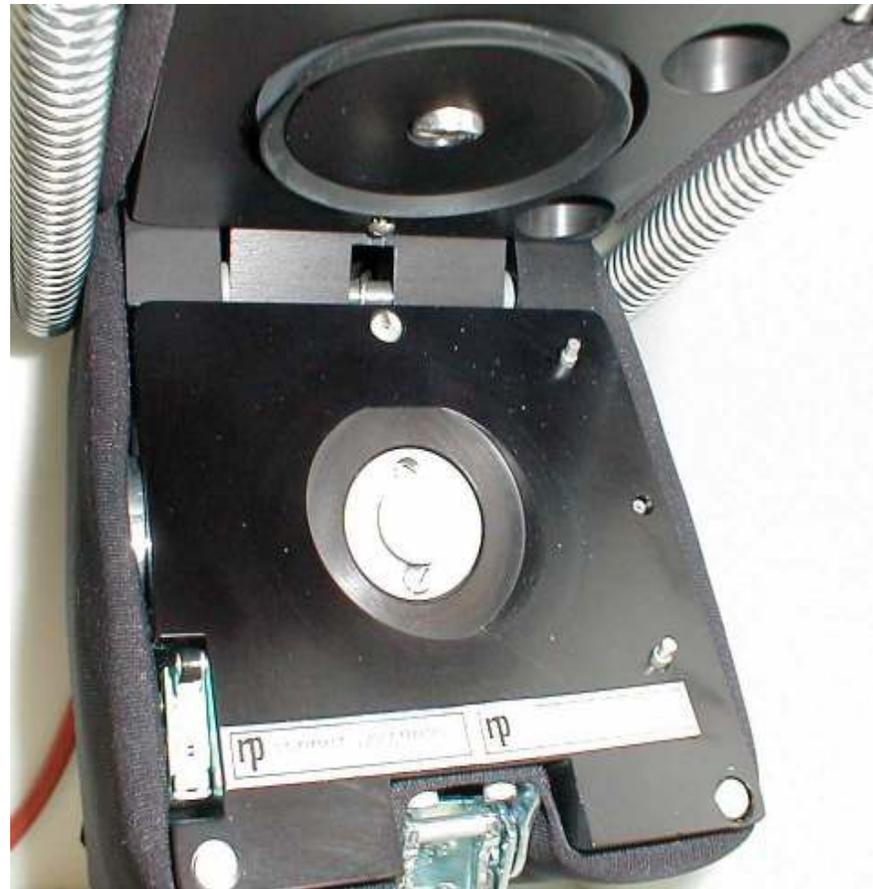
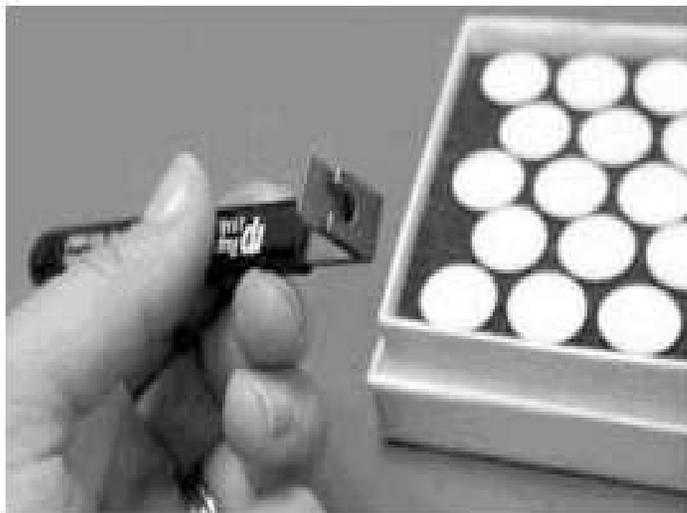
- Exchange sample filter @ 90%
- Clean inlet every filter exchange
- Clean sample line
- Replace in-line filters once every 6 mos.
- Pump test every 6 mos.
- Battery Check annually
- Temperature, Pressure and Flow audits
- Leak Checks

# 8500 FDMS Routine Maintenance

- Exchange sample filter and chilled filter
- Monitor the in-line pump vacuum. Recommended to stay above 65% of Ambient pressure @16.7 LPM for efficient dryer operation.



# Exchanging the Sample Filter



# 8500 FDMS Exchanging Chilled Filter

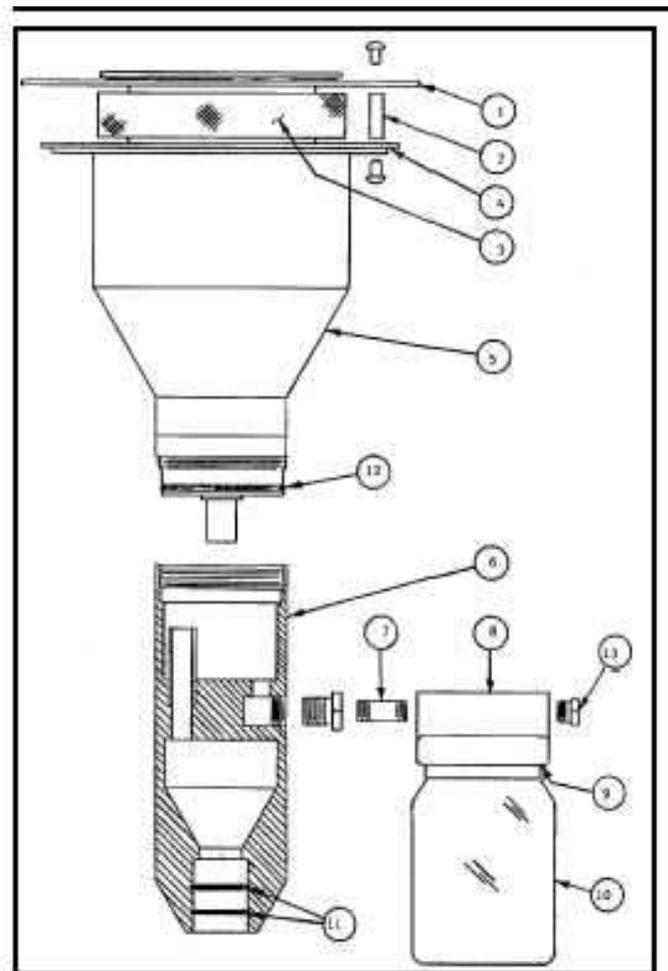


# 8500 FDMS Exchanging Chilled Filter



# PM 10 Inlet Cleaning

Figure 12-18. Removing the PM-10 inlet.

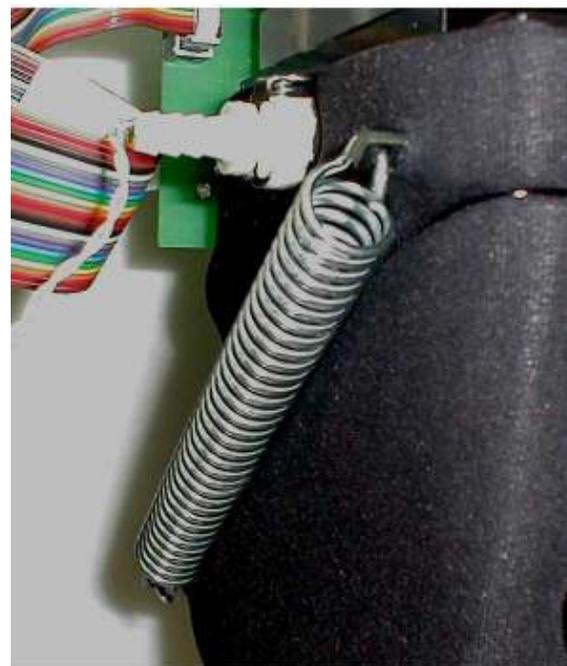


# Sharp Cut Cyclone Inlet Cleaning



# Sample Line Cleaning

- Locate and remove Air Probe Thermistor
- Open Mass Transducer to protect Tapered Element from damage



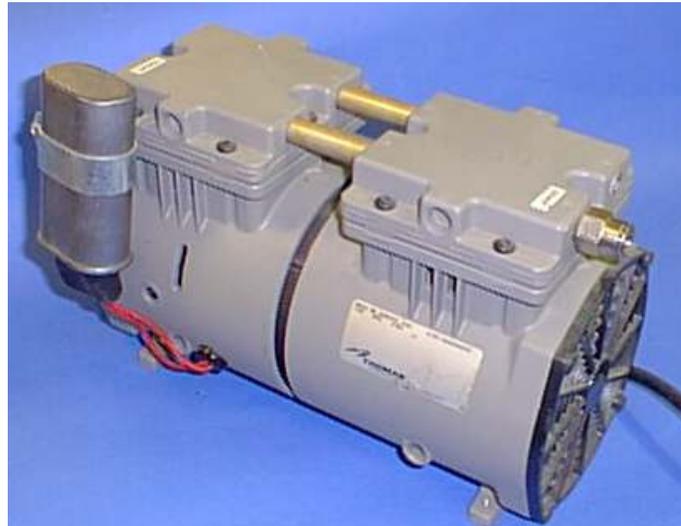
# In-line filter exchange

Figure 12-1. Replacing the large in-line filters.



# Maintaining Pump Assembly

- Pumps should be checked for quality vacuum every six months.
- Quality vacuum should be in the range of -27"Hg to -20"Hg at sea level. The pump vacuum range changes with elevation 80% new, low limit 65% of ambient pressure
- Pumps should be rebuilt once every 12 months to ensure quality data



# Rebuild Kit Old Style Pump Model: 2628CHI44



Model: 2628CHI44

Part number: 59-001741



# Rebuild Kit New Style Pump Model: 2688CHI44



Part number: 59-008630



Model : 2688CHI44



# Mass Verification (K0 Verification)

Figure 12-15. K0 Confirmation screen with additional lines displayed.

K0 Confirm	209.44188
>Filt Wght	0.07903
287.53182	209.44186
Audit K0	9683
Actual K0	9627
% Diff	0.58



## Submitted Questions

- Request for a one page spec sheet including cost of components and QC devices.
  - *Please stop by the Thermo Electron booth for this information*
- What are the plans to conduct testing to pursue equivalency for PM2.5 TEOM with and without FDMS? Will it be conducted under a wide range of environmental conditions as experienced throughout the country? Will Thermo be revisiting PM10 TEOM equivalency for comparability under wide range of environmental conditions of use?
  - *We will be testing all equivalency standards for all monitors. For more information recommend attend John Hiss's session Wednesday afternoon ~3:30*

## Submitted Questions

- How does Thermo recommend operating two single TEOMs or two TEOM/FDMS instruments to determine hourly and 24 hour (PM10 – PM2.5)? Aside from the dichot TEOM, will Thermo offer firmware and a method to provide communication between two single instruments to automate the real-time determination of the inhalable-coarse particulate concentration?
  - *The best solution is to utilize the analog output channels of the TEOM to the data logger. Make use of the data logger functionality to determine the (PM10 – PM2.5)*

## Submitted Questions

- We have the Thermo TEOM/FDMS monitors and sometimes we get negative hourly averages. Do these negative hourly averages indicate a monitor malfunction condition or can they occur when the monitor is essentially operating properly? Also if they do not represent a monitor malfunction condition how should they be handled during data validation?
  - *Negative hourly averages that exceed the single digits is a sign of possible instrumentation issues. We deal with these instances on a case-by-case basis and we recommend that you send data.*

# Submitted Questions

- Specifically, we have seen positive numbers in hourly volatile data as well as negative numbers in the hourly total mass data. How are other states handling this data and does Thermo have suggestions for validation of the FDMS volatile and total mass data?
  - *Validation of data can be handled by verifying the items that I covered. In summary they are:*
    - **Pump pressure**
    - **Sample dewpoint**
    - **Flow audits**
    - **Leak checks**
    - **Filter exchanges**
    - **Any other status conditions present**
  - *We will work with you on a case-by-case basis.*

## Submitted Questions

- How well do two FDMS instruments agree with one another or two TEOMs without FDMS?
  - *Two FDMS instruments in comparison is +/-2 ug/m3 for a 24 hour average.*
  - *Two TEOM instruments in comparison is +/- 0.5 ug/m3 for a 24 hour average.*
- Would Thermo update their operator's manual to include a section in the front that lists all criteria guidance for operating the monitor as a PM10 FEM and regionally certified PM2.5 monitor? Recommended criteria format to follow EPA data validation templates.
  - *Suggestion to create a section gathering critical criteria, operational criteria and systematic criteria is excellent. We like the suggestion and will pursue the idea.*