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INSTRUCTIONS FOR THE USE OF THE MODEL DR-SDU SAMPLING DILUTION UNIT

1.0 DESCRIPTION

The MIE Model DR-SDU Sampling Dilution Unit is an accessory specifically designed for use with the MIE model DR-2000 DataRAM. The DR-SDU cannot be used with any other MIE monitor unless custom modified. The DR-SDU is a passive sampling dilution device that makes use of the clean filtered air flow available at the EXHAUST port on the rear panel of the DataRAM (see DataRAM Instruction Manual, Figure 1) to achieve dilution of the sample stream. The dilution ration , i.e. the factor by which the sample stream concentration is reduced by dilution with clean air, can be adjusted over a range of 4 to 20. The sampling flow rate varies accordingly from 500 to 100 cm3/minute (0.5 to 0.1 lpm) as indicated on the flow meter of the DR-SDU.

2.0 INSTALLATION

Reference will be made to Figure 1.
To connect the DR-SDU to the DataRAM proceed as follows:

2.1 Align quick-connect fitting with knurled sleeve with DataRAM inlet fitting stem and slide the spring-loaded knurled sleeve back (upwards), pushing flow connector down on stem until it bottoms, and release knurled sleeve. Ensure the quick-connect fitting is seated and sealed properly.
2.2 Rotate engine DR-SDU so the flow meter faces forward with respect to the DataRAM front panel.
2.3 Connect the plastic tubing supplied with the DR-SDU to the EXHAUST fitting on the rear panel of the DataRAM. This completes the installation of the DR-SDU on the DataRAM.
2.4 Any tubing for extractive sampling (from ducts, stacks, chambers, etc.) should be connected to the DR-SDU sample inlet (see Figure 1).
2.5 To remove DR-SDU from DataRAM, disconnect plastic tubing from EXHAUST fitting of DataRAM, and slide spring-loaded knurled sleeve of quick-connect fitting back (upwards) and pull DR-SDU away from DataRAM.

3.0 USE AND OPERATION

3.1 Press the “ON” key on the DataRAM front panel.
3.2 Key "System Diagnos" and ensure that internal DataRAM "Flowrate" indicates 2.0 LPM (otherwise select that flowrate).
3.3 Adjust dilution control valve on DR-SDU to obtain the desired sampling flowrate and dilution ratio. Refer to the graph of Figure 2. For example, to obtain a dilution ratio of 10, adjust dilution control valve until a reading of 200 is obtained on the DR-SDU flow meter (as indicated by the middle of the ball).
3.4 Key “EXIT” , and then "Zero". Key “EXIT” again after "ZERO COMPLETE" is displayed.
3.5 Key "Run" from "MAIN MENU 1" screen.
3.6 To obtain the actual sample stream concentration, multiply reading (both "Conc" as well as "TWA") by the dilution factor corresponding to the DR-SDU flow meter reading, as obtained from the graph of Figure 2. For example: if the DR-SDU flow meter has been adjusted to 200, all concentration readings on the DataRAM should be multiplied by 10 to obtain the sample stream concentration.
3.7 The dilution ratio can be adjusted while operating in the Run mode. However; in TWA will not properly represent the actual time-averaged concentration.

4.0 APPLICATIONS AND LIMITATIONS

Two principal applications require the use of the DR-SDU with the DataRAM: a) high concentration measurements, and b) high temperature measurements (both conditions can coexist).

4.1 High Concentration Application
If concentrations in excess of 400 mg/m3 are to be measured (even if that level is only exceeded part of the time), dilution is required and the use of DR-SDU is indicated.
Although higher dilution ratios are to be preferred to minimize gradual contamination of the optical sensing surfaces of the DataRAM, use of such high dilution ratios entails low sampling flowrates (e.g. a dilution ratio of 20 results in a sampling flowrate of 0.1 lpm). Consequently, sampling line losses (particles depositing within sample transport tubing) become more significant.

This problem can be particularly severe for particles with aerodynamic diameters greater that a few micrometers. In general, it is advisable to minimize horizontal lengths of sampling lines in order to reduce gravitational settling losses.

Furthermore, isokinetic sampling becomes more difficult at such low sampling flowrates because of the required small inlet nozzle diameters. In practice, however, sub-isokinetic sampling (i.e. when using sampling inlet nozzles whose inner diameter is larger than that required for isokinetic conditions) results in over sampling of larger particles to which the DataRAM tends to be less sensitive, mitigating any measurable errors.

For sub-micrometer, particle sampling (e.g. tobacco smoke), it is advisable to use the highest possible dilution ratios, even if the concentration is expected to remain consistently below 400 mg/m3, as long as the dilute concentration remains well within the sensing range of the DataRAM.

4.2 High Temperature Applications

The DR-SDU can be used to sample high temperature streams. The sample stream is mixed with the recirculated clean airflow of the DataRAM, which is cooled by exposure to the room environment. The larger the dilution ratio the higher the stream temperatures that can be sampled without exceeding the permissible, operating temperature range of the DataRAM. Figure 3 shows the minimum required dilution ration as a function of the temperature of the sampled air, assuming a room temperature of 25°C (77°F).

DataRAM zeroing should be performed after the instrument has reached (or is near) thermal equilibrium.

Condensable vapors in the sampled high temperature stream may condense within the DR-SDU and/or the DataRAM, causing erroneous readings and/or instrument malfunction.

5.0 SPECIFICATIONS

- o Useful dilution ratio range: 4 to 20
- o Accuracy of dilution ratio: +5%
- o Sampling flowrates range: 0.1 to 0.5 liters/minute.
- o Sampled stream temperature range:
- o Weight: 0.64 kg (1.4 lbs.)

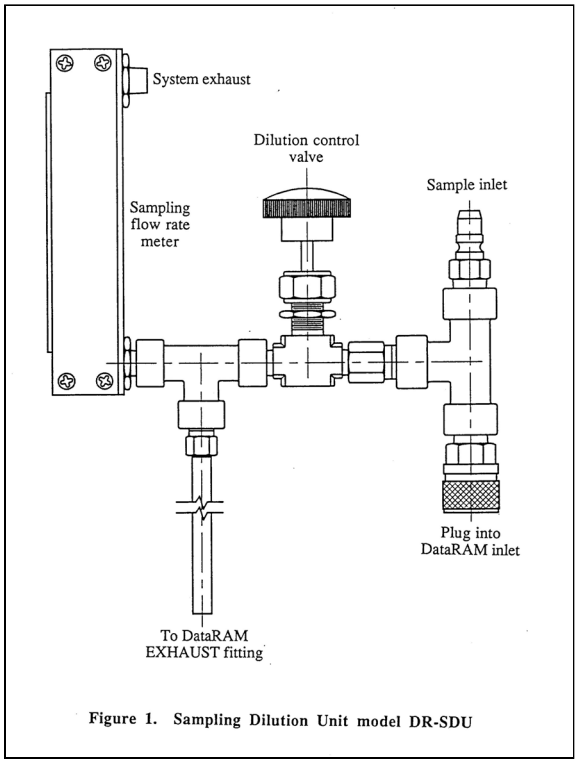

Figure 1. Sampling Dilution Unit model DR-SDU

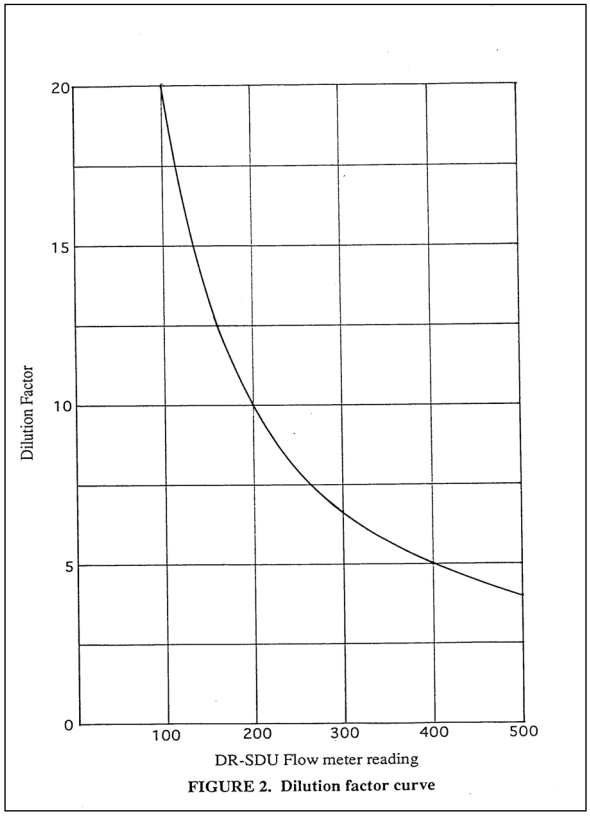

FIGURE 2. Dilution factor curve

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