

Microdust Pro Application Note

LEV (Local Exhaust Ventilation) Testing

About The Microdust Pro

The Microdust Pro is a hand-held, data logging instrument for the real-time detection of dust, fumes and aerosols. And because it is real-time, instant decisions can be made with regards to intervention. It's incredibly easy to use with a simple, colour coded user interface and you can start taking measurements within seconds of starting the instrument.



It has a simple calibration filter that can be used to provide a check of the instrument's linearity and has a large measuring range between $0.001\text{mg}/\text{m}^3$ to $250\text{g}/\text{m}^3$. The instrument itself automatically ranges. The Microdust Pro logs the real time data which can be downloaded later for report writing.

The Microdust Pro is the ideal survey tool for quick measurements and is ideal for testing the efficiency of Local Exhaust Ventilation Systems.

About LEV Testing

LEV or (Local Exhaust Ventilation) is an engineering control system to reduce exposures to airborne contaminants in a workplace such as dust, mists, fumes, vapours and gases. Figure 1 shows a diagram of a typical LEV system.

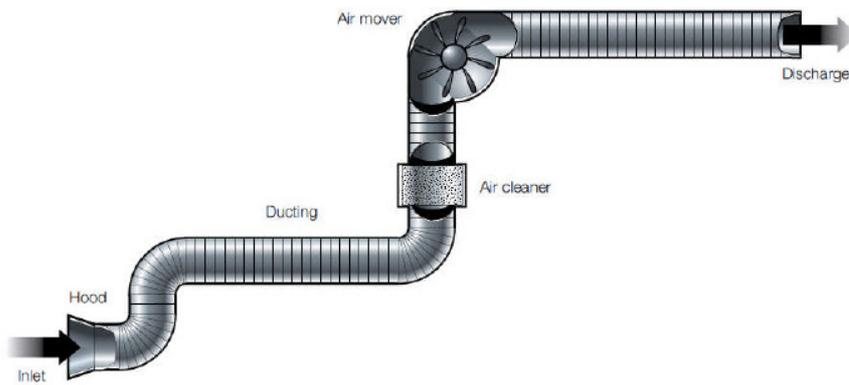


Figure 1

Figure 2 shows a diagram of a mechanical shaker type LEV unit.

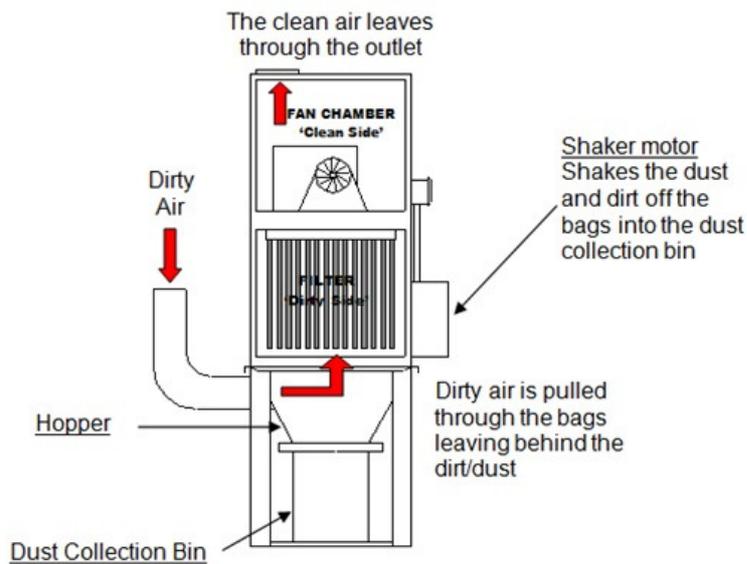


Figure 2

Unclean air is drawn through the unit by the fan and over the filter bags which trap the contaminants. The filter bags, in this unit, are shaken by a shaker motor and the particles fall off into the dust collection bin. This is the 'dirty side'. The clean air is then drawn through the fan chamber and let to exhaust, either by ducting to the outside, or back into the workplace. If the unit exhausts back into the workplace, a secondary HEPA type filter is needed to ensure the quality of the returned air. This is the 'clean side'. Figure 3 shows an LEV unit with the front cover removed for servicing.



Figure 3

There are different filter bags available to fit into the LEV unit, dependent upon the particular contaminant. They can be of a different pore size (down to around $5\mu\text{m}$) or treated for oil or heat resistance for instance. The filters wear over time, the seals on the bags may go, they get clogged and they become less efficient. If there is significant dust present on the 'clean side', this is a clear visual indicator that the filters need changing. However for routine checks, you would not make this visual inspection and a way to ensure that the unit is working efficiently is to test the 'clean air' leaving the outlet for levels of dust and for this the Microdust Pro is the perfect tool. Whilst the process of interest is ongoing, place the probe of the Microdust Pro close to the outlet and view in real time the data to give you a clear idea of the efficiency of the filtration compared to blank, ambient readings. Take average readings over time periods of, for example, 5 minutes.



Figure 4.

The COSHH Regulations 2002, Regulation 9 Refers to the Maintenance, Examination & Testing of Controls. All LEV systems should be thoroughly examined and tested at least once in a period of 14 months by a competent person. This is to ensure that your system remains effective at control.



Figure 5. HSG258, available for download at:
<http://www.hse.gov.uk/pubns/books/hsg258.htm>

The HSE publication HSG258, 'Controlling Airborne Contaminants at Work' is a basic guide in ventilation control and also covers the testing of efficiency of ventilation controls. It refers to certain industrial processes that are particularly hazardous and testing should be completed more often than the COSHH 14month minimum, Figure 6. However, common sense would dictate that if your processes are likely to cause a large amount of dust then more regular testing would be advisable, whatever your industry and process.

<i>Process</i>	<i>Minimum frequency</i>
Processes in which blasting is carried out in or incidental to the cleaning of metal castings in connection with their manufacture	1 month
Jute cloth manufacture	1 month
Processes, other than wet processes, in which metal articles (other than gold, platinum or iridium) are ground, abraded or polished using mechanical power, in any room for more than 12 hours a week	6 months
Processes giving off dust or fume in which non-ferrous metal castings are produced	6 months

Figure 6.

The Microdust Pro can also be used to assess the control effectiveness of the system by monitoring dust levels around the LEV and to ensure that it is doing its job effectively. Figure 7 is taken from the HSG 258 publication.

Stage 3 Assess control effectiveness
 343 This may include, as appropriate:

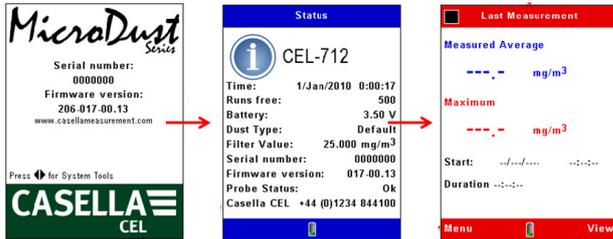
- careful observation of processes and sources;
- assessment of how effective the LEV is at controlling operators' exposure;
- challenge tests with smoke with the process running, to check for smoke leakage, eddying and breathing zone encroachment (when smoke testing, the examiner should warn employees and may need smoke alarms turned off);
- dust lamp tests with the process running to check for escape of dust or mist;
- observation of the way operators work, whether the LEV is providing adequate control and protecting the operators from any contaminants.

Figure 7.

It is possible to use something like a Tyndall lamp which gives a visual indication of the levels of dust around the process. However, to quantify the actual levels of dust that your worker may be breathing in, use the Microdust Pro to monitor the area around the worker. This will give you data to enable you to make decisions and assess the situation armed with more information. Is the positioning of the task and the worker to the LEV adequate for instance? If levels of dust are high around the worker, personal exposure monitoring may need to be carried out using a personal sampling pump and suitable media. The Microdust Pro in this instance is a great survey and assessment tool.

Operation of the Microdust Pro

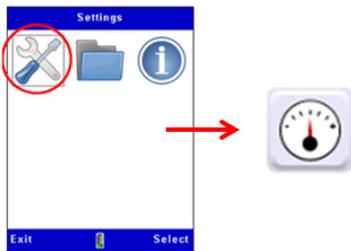
1. Switch the Instrument on:



The Microdust Pro will run through these screens and show you your last measurement.

Figure 8

2. Calibrate/Zero:



The Microdust Pro is a sensitive measuring instrument. Prior to making measurements and to ensure optimum accuracy, it is recommended that the user performs a 'Zero' and 'Span' check. Select Settings and then from this screen, select the Calibration icon to check the 'Span'.

Figure 9



Figure 10

The Microdust Pro is supplied with an optical 'Calibration Insert' which is inserted into the probe. The Calibration insert and the probe are a matched pair. Always ensure the correct insert is used.

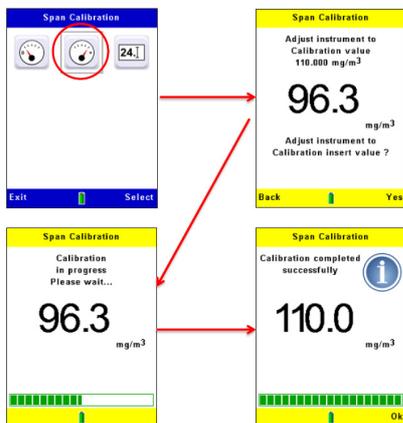


Figure 11

To Zero the Microdust Pro, the probe is purged with clean air and a **'Zero Adjustment'** is carried out. Attach the supplied purge bellows and squeeze and release 5-6 times over a 10 second period.

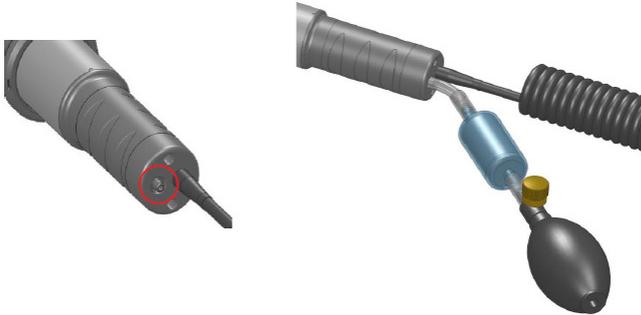


Figure 12.

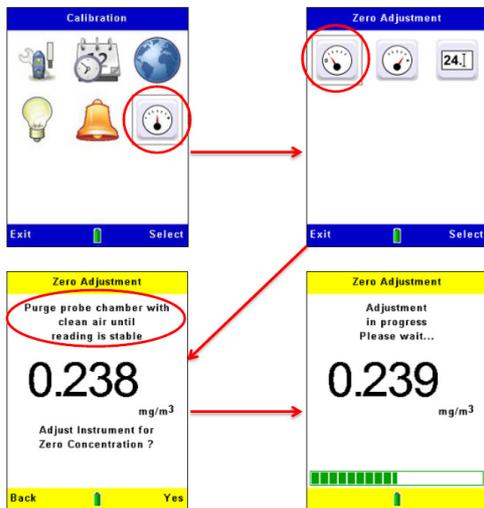


Figure 13

When the measurements stabilise during the clean-air purge, press the **Yes** soft key to start the zero adjustment. A progress bar is displayed during the zero adjustment and the screen will indicate whether the calibration is successful. After purging, don't forget to replace the inlet's protective cap

3. Starting a Run:

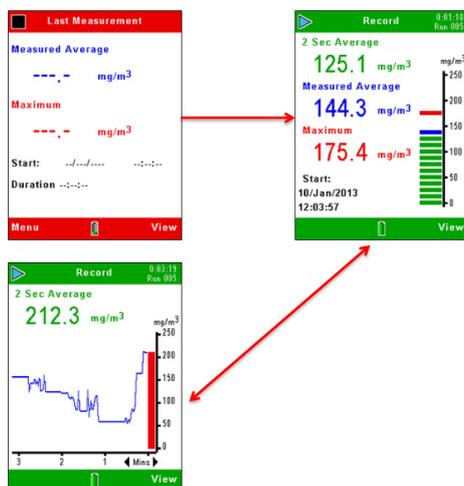


Figure 14

1. Press the 'Play' key to start taking a measurement. Press 'Stop' when you've finished.



4. Download your data: The data from your run can be downloaded to Casella Insight Data Management Software using the USB cable provided. Once downloaded, the time history of the dust level can be displayed and analysed as necessary.

In conclusion, the Microdust Pro is a simple to use tool to get real time dust readings for outlets from LEV systems or also to survey the effectiveness of the LEV system related to the industrial process.

For more information about the Microdust Pro, please visit us at: <http://www.casellasolutions.com>

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