USER MANUAL

Static Air Sampling Enclosure

HB3341-07

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Contents

Warnings

The Dust Detective does not present a safety risk when you use it as instructed in this User Manual. However, it is possible that the environment where you use the instrument may present a safety risk. For this reason, always follow correct, safe working practices.

The Microdust Pro and associated Static Sampling Unit is non-intrinsically safe and MUST NOT be used within a hazardous area.

DISPOSAL OF BATTERIES: Batteries and battery packs must never be disposed of by placing in a fire or incinerator, nor must they be punctured, crushed or otherwise mutilated or opened up in any way. Disposal must be in accordance to local environmental legislation.

Ensure the Apex2 and Microdust Pro are held firmly by the Velcro straps provided, otherwise damage to the instruments could occur.

All optical measurement systems are sensitive to the presence of moisture droplets both in the air and bonded to particulate matter. To prevent possible measurement errors, the system should not be used in conditions of high humidity, rainfall or condensation.

The purge valve must not be closed during operation. Failure to open it will result in pump shutdown errors.

Disclaimer

Do not use the Dust Detective until you have thoroughly read this manual or have been instructed by a Casella engineer.

At the time of writing, this manual was up to date but due to continual improvements the final operating procedures may differ slightly from those in the manual. If there are any questions please contact Casella for clarification.

Casella makes continual advancements in its products and services. We therefore reserve the right to make changes and improvements to any information contained within this manual.

Whilst every care is taken to ensure that the information in this manual is correct, Casella will assume no responsibility for loss, damage or injury caused by any errors in, or omissions from, the information given.

Introduction

With greater awareness of environmental pollution from fine particulates and increasing enforcement of COSHH and environmental legislation, the demand for more area and perimeter monitoring on a short to medium term basis is on the increase. This need for real-time particulate information is a requirement in general industry, when looking at Total Suspended Particulate (TSP), and at inhalable and respirable dust levels as a health issue.

Figure 1

CASELLA introduced the *"Dust Detective"* Static Air Sampling enclosure for exactly this application. This accessory provides a simple solution for short to medium term fixed area monitoring with the Microdust Pro and Apex2 sampling pumps and is designed specifically for use in indoor applications, but some short-term outdoor perimeter samples can be undertaken with the unit.

The IP65 case is designed to accommodate a standard Microdust Pro as well as an Apex2 air sampling pump which provides a precise inlet flow rate.

The Dust Detective has been designed as an accessory for existing Microdust Pro users as well as for potential customers looking for a complete system when supplied complete as the Dust Detective. In this format, the enclosure also doubles as the equipment carry case for the Microdust Pro.

System Overview

The complete system (Part number 206107A) would require the purchase of the static air sampling enclosure (Part number 206200D), plus the following additional items:-

- Microdust Pro,
- Apex2ISPlus air sampling pump and charger
- Pre weighed GFA filters – if gravimetric analysis is required
- PUF filters – if size selection of dust fractions is required

The key component to this accessory is the sampling inlet can utilise Polyurethane Foam (PUF) for size-selective filter techniques. If used without the PUF filters then total dust levels are sampled. Size-selective filters were originally developed for operation in the Conical Inhalable Sampler (CIS) as detailed within the Health and Safety Executive publication MDHS 14/4. The foam filter specifications and dimensions determine the desired aerosol size selection characteristics and eliminate particle sizes greater than PM_{10}, $PM_{2.5}$ or Respirable (4um) as appropriate. The larger particles become trapped and collect within the foam matrix, whilst all particles below these "cut-off points" pass through the PUF filters and enter the measurement chamber, where the real time mass concentration is established.

After passing through the Microdust Pro, particulate matter is deposited on a 37mm filter which may be used for gravimetric or chemical analysis.

Remember however, although the Dust Detective system has been designed to monitor particulate fraction concentrations in a variety of environments, it does have some operating limitations. The instrument is not designed to operate continuously out of doors for long periods over approximately 13 hours.

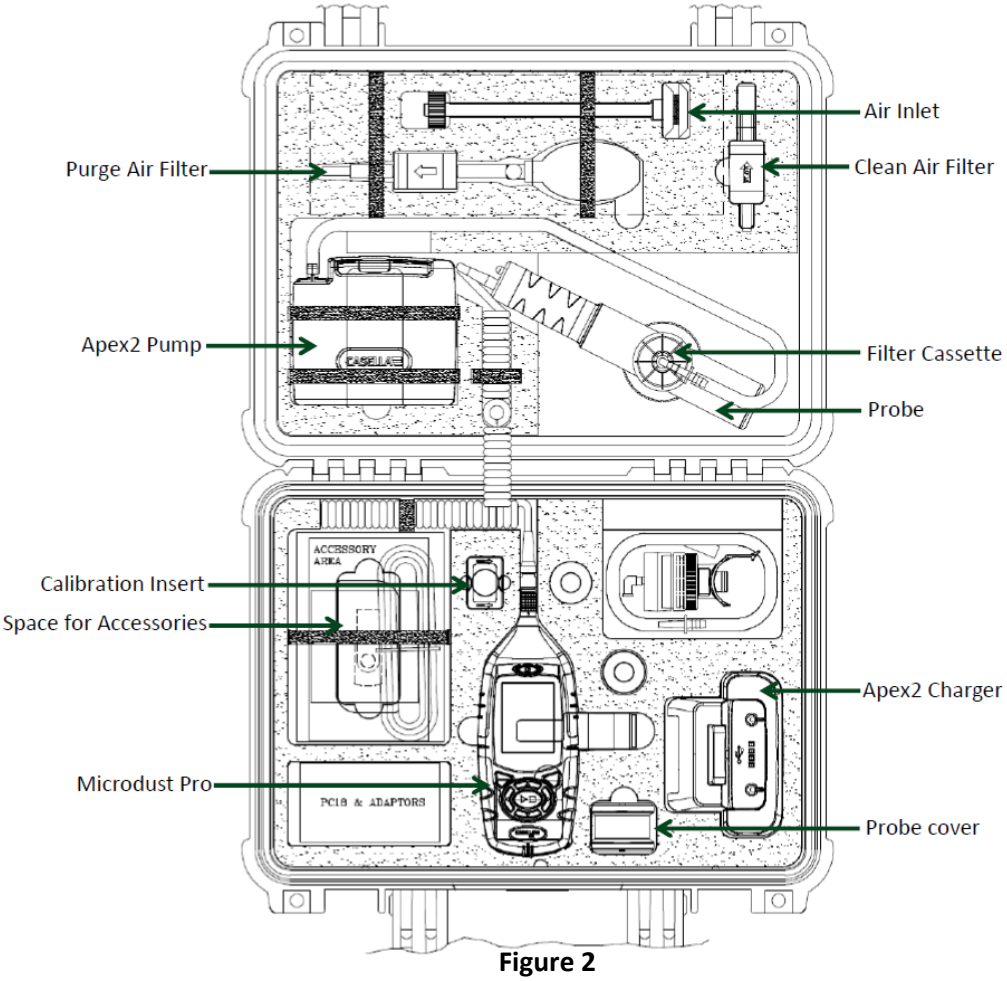


Figure 2

Due to the light scattering principle used within the instrument, any moisture which individual particles attract at periods of high humidity or temperatures approaching “dewpoint” will be “seen” by the instrument as larger particles. This biases results towards greater concentrations. Also, during these periods, any air being drawn through the instrument which is high in humidity may condense on the optics and distort the light beam, producing spurious results.

The system incorporates an Apex2 sampling pump to draw the sample air through the inlet pipe at a user selected flow rate. PUF filters are designed to operate at a flow rate up to 3.5 L/min, but running at 2L/min is adequate for the system. The inlet head is designed to prevent the ingress of insects and other large foreign objects. A dust cap is provided to seal the inlet port on the case lid whenever the inlet tube is removed for transit purposes.

Size selection of the sample stream is performed by passing the sample through a PUF foam filter appropriate to the chosen sampling strategy, ($PM_{10,}$ $PM_{2.5}$ or Respirable).

Operation

This section describes how to use the product to take air samples using the minimum of settings. The Apex2 and Microdust Pro have many other menu and settings options and these are described their individual manuals.

Installation

Cutouts are provided in the foam for the Microdust Pro and Apex2 sampling instruments. Ensure both units are fully charged up or have new AA cells if required before insertion.

Note: Ensure the Apex2 and Microdust Pro are held firmly by the Velcro straps provided; otherwise damage to the instruments could occur.

Connect the Apex2 pump to the sampling spigot as illustrated in Figure 1.

Connect the Microdust probe into the Adaptor (Figure 5). When locked correctly into position, the complete assembly is prevented from rotating or moving laterally on the Probe (see Figure 4). The body of the probe should be aligned so that the cable from the probe is aligned as shown in Figure 2.

The enclosure is fitted with purge valve which must be removed during operation (see Figure 3). Failure to remove will result in pump shutdown errors.

Figure 3

Storage of PUF Filters

The PUF filters should be kept in a clean and preferably air-conditioned environment.

PUF Filter Adaptor

For size-selective monitoring applications, it is necessary to load the appropriate foam filter(s) into the inlet adapter. If TSP (Total Suspended Particulate) monitoring is required, then no foams should be fitted within the inlet assembly and the pump run at 2L/min.

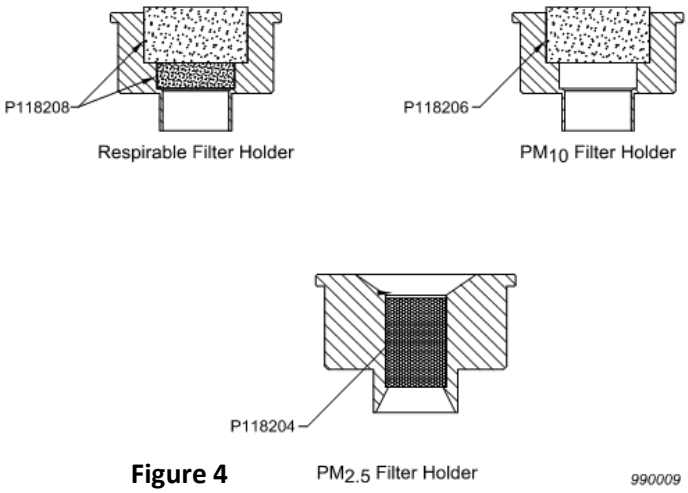


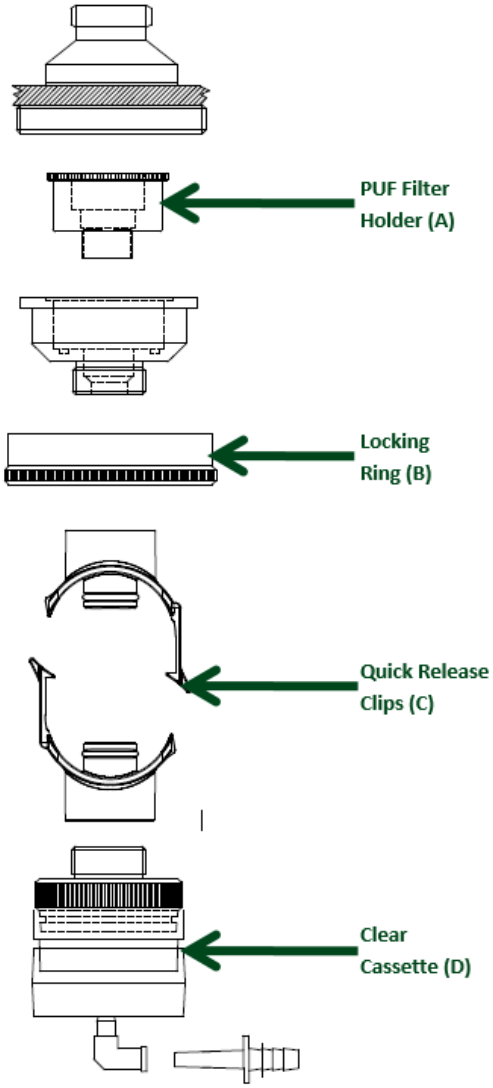
Figure 4

The type of foam filter loaded into the adapter determines the size of particulate matter being monitored by the Microdust Pro and collected on the filter. Although the PUF foam inserts have been designed as size-selective filters to capture particles larger than a specified mean aerodynamic size, it is also possible to weigh the PUF inserts before and after measurement to establish both the total suspended particulate (TSP) value and the desired size fraction.

Inserting / Removing PUF Filters

The PUF filters should be carefully inserted or removed from their respective cassettes using clean tweezers and plastic gloves. Avoid subjecting the filters to physical damage, creasing or folding. Filters should be loaded into the relevant housing as shown in Figure 4.

In Figure 5 below, the PUF filter holder is shown (A). To remove it unscrew the locking ring (B). It can be easier to remove the Microdust probe first by releasing the quick release clips (C). Note the clear cassette (D) can be removed to fit GFA filters as necessary.



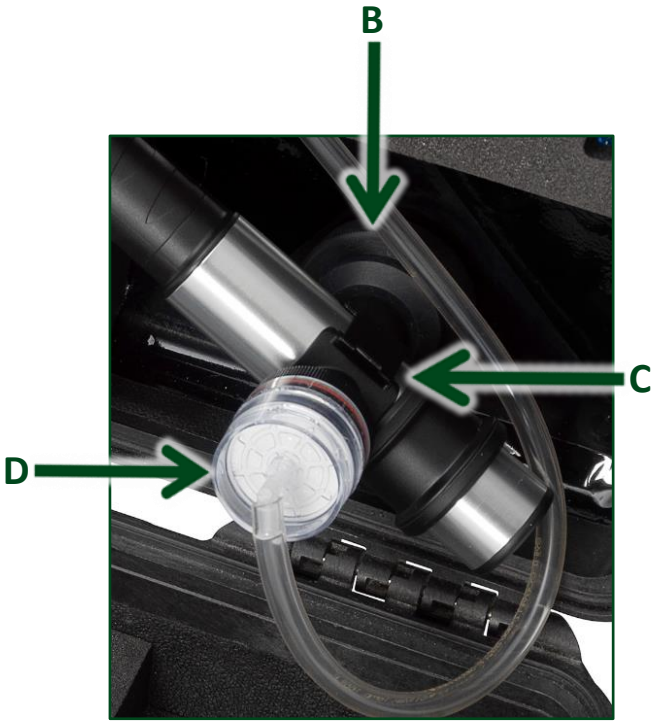


Figure 5

Collection Filter Cassette

A Clear filter Cassette holds a 37mm filter. The desired filter type (typically of the GFA type) should be conditioned and pre-weighed (if required) before being loaded into the cassette. Always handle filters with care to prevent contamination or physical damage. It is recommended that even if gravimetric analysis is not being performed a GFA filter (P102051) is still used to prevent particulate getting into the pump.

Note: The filter cassette holder comes with one support pad to support filters. This is not in itself a filter for gravimetric analysis. GFA filters should be purchased separately.

Starting measurements

Checking the Instrument's Zero

Check the zero calibration for the Microdust Pro before every use. This can be achieved either as described on Page 28 of the Microdust Pro Handbook, utilising the purge air bellows connected to the probe purge point. Alternatively, to zero in situ, remove the inlet cowl, and connect the clean air filter to the inlet tube, start the Apex2 pump. With clean air in the Probe, the display should be zeroed.

Checking Probe Span

The span of the Microdust Pro should be checked in accordance with Page 31 of the Microdust Pro Handbook. The span can also be checked by inserting the calibration filter and checking the reading. If required, adjust the span control according to the handbook.

Sampling Pump

The Dust Detective enclosure is designed to use the Apex2 range of personal samplers. This allows the user to take a standard personal sampling pump, charge the unit up and install inside the enclosure. The pumps are designed to provide a flow rate capability of up to 5 L/min whilst using a 37 mm GFA filter. Automatic flow control circuitry is used to maintain a stable sample flow rate over varying pressure drop conditions. PUF filters are designed to operate at a flow rate of up to 3.5 L/min, refer to the Apex 2 Handbook (page 13) for details on changing the flow rate.

To switch the pump on, press the power key on the pump. To start the pump running press the Enter Key. When running, flow rate will appear on the display and a blue flashing light will be visible at the top of the pump. To stop the pump, hold the Enter key again.

To switch the pump off, press and hold the Power key and the pump will countdown to off.

If the pump is unable to maintain the selected flow rate due to excessive pressure drop or an inlet blockage, the red LED will begin to flash and the warning tone will bleep rapidly.

Starting a Sample Run

1. Install the sample inlet tube/head to the case (see Figure 1).
2. Insert the PUF filter foam(s) and in line sample filter (if required) (see Figure 4 & 5).
3. Switch the Microdust and Apex2 on. Confirm the Zero and Span settings are correct as described above.
4. Set the Apex2 flow rate to 2L/min
5. With the unit located for measurement, start the Microdust logging by holding the Play key and start the pump by holding down the Enter key.
6. Shut and lock the Dust Detective Case.

Service

It is recommended that the unit is serviced annually, more frequently when used in areas of high dust concentrations.

CASELLA's in house service department offers a comprehensive range of repair and calibration services, designed to affect a fast and efficient back-up for all our Products. The service department is operated under the scope of our BSI registration for Products manufactured by us. We will however, undertake the repair of other manufacturers' equipment.

For further information please contact CASELLA's Service Department at our Bedford premises. We will be happy to Provide quotations for individual repairs or provide annual maintenance under contract.

We recommend factory service by technicians trained and equipped to repair your instrumentation.

Should you wish factory repair/calibration please complete a 'Returns Material Authorisation' online form http://rma.casellameasurement.com/ to obtain an RMA number.

Send your equipment in suitable transit packaging, insured to full value and ship pre-paid. Please quote the RMA number with any accompanying paperwork which will help us to identify the correct number of items and what needs to be done.

Send to:

CASELLA Service Department
Regent House
Wolseley Road
Kempston
Bedford
MK42 7JY

If purchased outside the United Kingdom, please return to your distributor.

Technical specifications

Enclosure	
Operating temperature range	+5 to +40°C in the absence of condensation
Storage temperature range	-25 to +55°C
Operating humidity range	30 to 90% RH provided there is no condensation
Storage humidity range	0 to 90% RH in the absence of condensation
Size	410 x 330 x 175 mm

Apex2	
Flow range	0.8 to 5.0 L/min
Flow control accuracy	±5% for selected flow
Status indicators	Red/Blue LED
Dimensions	112 x 37 x 102 mm (4.41 x 1.46 x 4.02 inches)
Weight	490g (including boot)

Microdust Pro	
Battery life	Up to 13 hours (3x AA batteries)
Range	0.001mg/m^3 to 250g/m^3
Logging interval	1s to 10 min
Memory	500 runs (86,000 data points)
Weight	600g

Part numbers

Spares and accessories

Spares	
P118204	Foam filter - $PM_{2.5}$ (pack of 10)
P118206	Foam filter - PM_{10} (pack of 10)
P118208	Foam filter - Respirable (pack of 10)
FM403	Spare clear cassette
P102113	Filter support pad 37mm (pack of 100)
P102051	Gravimetric GFA filter 37mm (pack of 100)
TUC139	Spigot (90 Degree) -from clear cassette
TUC133	Luer connector from TUC133 to ¼" ID tube

Ordering information

Part number	Description
206200D	Dust detective sampling enclosure
CEL-712/K1	Microdust Pro kit
Apex2ISPlus	Apex2 pump
209055B/KIT	Apex2 charger including PSU

Declarations

CE

CE DECLARATION OF CONFORMITY

Casella declares that this product is in compliance with the essential requirements and other relevant provisions of applicable EC directives. A copy of the EU Declaration of Conformity for this product may be obtained by clicking on the product compliance documentation link at www.casellasolutions.com.

WEEE - INFORMATION FOR EU MEMBER STATES ONLY

The use of the WEEE symbol indicates that this product may not be treated as household waste. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. For more detailed information about recycling of this product, please contact your local waste disposal service or contact the agent where you purchased the product.