cantium scientific

MicroBio MB1
Bioaerosol Sampler
Operating Manual

Contents

Regulatory Compliance

EC Declaration of Conformity

This is to certify that MicroBio MB1 products manufactured from **April 2014** meet the following European Community Directives:

Electromagnetic Compatibility (EMC) Directive 89/336/EEC repealed by 2004/108/EC to the following standard:

EN 61326-1	Scientific, Test and Measurement Equipment
Referencing:	
EN 55011 / CISPR11	Emissions for Industrial, Scientific and Medical Equipment
EN 61000-4-2	Immunity to Electrostatic Discharge
EN 61000-4-3	Radiated Immunity

Restriction on Hazardous Substances (RoHS) Directive 2002/95/EC

Signed:

S Plumridge CEng MIET MIEEE FRSA
Managing Director
Cantium Scientific Limited

WEEE and Recycling

Applicable to EC States only.

At the end of this product's useful life, please dispose at an appropriate recycling collection point provided in your country, or return to your distributor who is obliged to take the product for safe recycling and disposal under the Waste Electrical and Electronic Equipment Directive 2002/96/EC amended by 2003/108/EC.

Outside of the European Community, consult your local regulations or local distributor.

The MB1 enclosure and fan housing is manufactured from ABS plastic. The petri dish support plate and fan body are manufactured from glass reinforced nylon. Electronics need to be recycled by approved organisations.

Warranty

The manufacturer warrants this product to be free from defects in materials and workmanship for **24 months** from the date of purchase.

If your product is found to be defective within that period, please contact your local distributor who will arrange for repair of the instrument, or if necessary a replacement.

This warranty does not cover accidental damage, wear and tear, consequential or incidental loss.

The warranty excludes rechargeable batteries supplied with the sampler. Damage caused by use of cleaning materials not recommended by the manufacturer, use beyond the specification or any modifications without permission or advice from the manufacturer will invalidate the warranty.

This warranty does not affect your statutory rights.

Technical Specification

Flow Rate:	100 l/min
Sample Volume:	10 to 2,000 litres in varying steps
Sampling Volume Capacity:	> 60,000 litres before recharge*
d50 Particle size:	1.7μm (220 x 1mm hole head) 1.35μm (400 x 0.7mm hole head)†
Mean particle velocity:	9.62m/s (220 x 1mm hole head) 10.7m/s (400 x 0.7mm hole head)†
Other Features:	Auto switch off 4-digit 7-seg LED display Sample cancel feature Padded carry bag supplied
Weight (excluding charger and carry bag):	650g, (inc. battery and petri dish)
Dimensions:	196 x 100 x 110mm (inc. head)
Power:	4 x AA NiMh Cells 6V at 250mA (maximum)
Noise Level:	< 75dB @ 1m
Environmental Operating Range:	-10 to 40°C up to 90% RH
Sampling Plate:	55mm/65mm contact plate or 90mm petri
Sampling Head:	316 grade stainless steel 220 x 1mm diameter holes **or** lightweight anodised aluminium 400 x 0.7mm diameter holes†

* Based upon random volume samples at varying intervals until low battery warning given. These tests were undertaken on units fitted with new and fully charged Ansmann Max-e 2100 mA.Hr NiMh cells. Actual battery life may vary due to volume taken per sample, interval between samples, age of cells, and other environmental effects, such as humidity and temperature.

† 400 x 0.7mm hole sampling head is an optional item.

Introduction

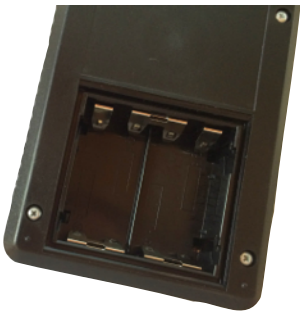
The MicroBio MB1 bioaerosol sampler is part of the MicroBio range and is one of the most economical hand-held samplers in the world for monitoring airborne micro-organisms or bioaerosols.

They have been fully validated by the UK Department of Trade and Industry Validation of Analytical Methods (VAM) programme to meet the standards required for a reference sampler.

The sampler collects airborne micro-organisms by drawing a stream of air at a constant flow rate of 100 litres per minute through a series of small holes in a metal head. The air stream then impinges onto a sterile culture medium in a 55mm contact plate or 90mm petri dish.

After exposure to the air stream for a fixed period, the contact plate is removed and incubated. The numbers of colonies which develop are counted, enabling a calculation to be made of the concentration of micro-organisms in the air (CFU/m^3 - colony forming units per cubic metre).

Installing Battery



The battery is held in a small compartment at the back of the MicroBio. The unit is supplied with 4 x AA NiMH cells. The cells must be removed for re-charging in the charger supplied.

When the battery needs re-charging the display will show four green dots below the volume setting. If the battery level is too low, the sampler will not take samples.

We recommend that cells are removed from the unit if it is to be left unused for extended periods to avoid corrosion.

NOTE: Please read instructions with the supplied charger before charging the NiMh cells.

Sampling

The selection of the sampling volume is important for reliable sampling. If the contact plate is overloaded with colonies it is difficult to make an accurate count. With experience, the user will anticipate the probable bioaerosol concentration in an area, but it may be necessary to make a preliminary survey at a number of sampling volumes to identify the optimum sampling volume. Each sample should be repeated several times and a statistical mean value and confidence value determined.

Selection of Media

The agar media used in the 55mm contact plate or 90mm petri dish should be chosen to suit the organisms which are being monitored. For a wide range of bacteria, consider using tryptic soy agar (TSA), casein soy peptone agar (CPSA) or nutrient agar (NA). There are other selective agars for more specific micro-organisms. For fungi (yeasts and moulds), consider using malt extract agar (MEA) or rose bengal agar (RBA). **Appendix B** details various types.

Inserting a Contact Plate or Petri Dish

Remove the sampling head cover carefully, unless it is being carried separately in a sterile container. Only hold the edge of the head. **Do not touch the front or rear (inside) surface close to the holes.**

Insert a petri dish (or contact plate if contact springs are fitted) inside the springs so that its base sits firmly on the three support posts, then re-fit the sampling head.

The MicroBio MB1 can use 220 or 400 hole† sampling heads. The 220 hole sampling head can be used with both 55mm / 65mm contact plates or 90mm petri dishes, but only the centre 55mm of the petri dish will collect samples. Using the 400 hole† sampling head will give nearly full coverage of a 90mm petri dish, improving reliability of counts.

† 400 x 0.7mm hole sampling head is an optional item.

Switching On and Off

To switch the unit on press any of the four buttons for at least half a second. If a button is held for too long, the unit switches off. This protects the sampler from being inadvertently switched on if an object is pushing down on the buttons. The MB1 remembers the last used volume setting and this will be displayed. The unit will switch itself off automatically if not used or after sampling has completed.

Setting Sample Volume

Use the increase (**+**) or decrease (**-**) buttons to select the volume of air to be sampled.

Volumes can be set as follows:

- 10 to 200 litres in 20 litre steps
- 200 to 500 litres in 50 litre steps
- 500 to 1000 litres in 100 litre steps
- 1000 to 2000 litres in 250 litre steps

Starting / Stopping Samples

Press the **start** button to start the sample process. When running the display will countdown showing how many litres remain to be sampled. The MB1 will stop sampling when the required volume of air has been sampled.

If at any point it is required to stop sampling early, press the **stop** button.

Temperature and Humidity

Make a note of these values at the time of each measurement. These are important factors in the likely concentration and continuing viability of airborne microorganisms. For example, some bacteria survival rates are 35 to 65 times higher at 80%RH compared to 40%RH.

Determining Results

Once the sample has been taken, the contact plate or petri dish should be removed immediately from the MicroBio and the lid replaced on the plate and sealed. A note should be made on the lid regarding time, location and volume sampled.

The plate should then be incubated for a period of time and temperature dependant on the requirements of the media.

Once incubated, the colony growths are then counted, either manually or using an automatic colony counter. Due to the statistical nature of the sampling method and the chance more than one colony impinged at one point on the dish, a count correction needs to be performed.

The table in **Appendix A** gives the corresponding corrected value based on the 220 hole sampling head used on the MicroBio.

Alternatively, the following equation can be used to determine a corrected count.

$$n_c = n_f \left(\frac{1.075}{1.052 - \frac{n_f}{n_h}} \right)^{0.483}$$

Where n_h is the number of holes on the sampling head, n_f is the number of counted colonies and n_c is the corrected count. If the counted colonies, (n_f) exceeds the number of sampling head holes (n_h), then the mathematics will fail and the results cannot be trusted.

If this is the case, then the sample dish can be considered as overloaded with organisms and the user should consider lower sampling volumes.

The colony concentration is the corrected count per volume of air sampled. The results are normally expressed in colony forming units per cubic metre.

To convert the corrected count to CFU/m^3 use the equation:

$$CFU/m^3 = 1000 . \frac{n_c}{V_s}$$

Where n_c is the corrected number of colonies counted and V_s is the sampled volume in litres.

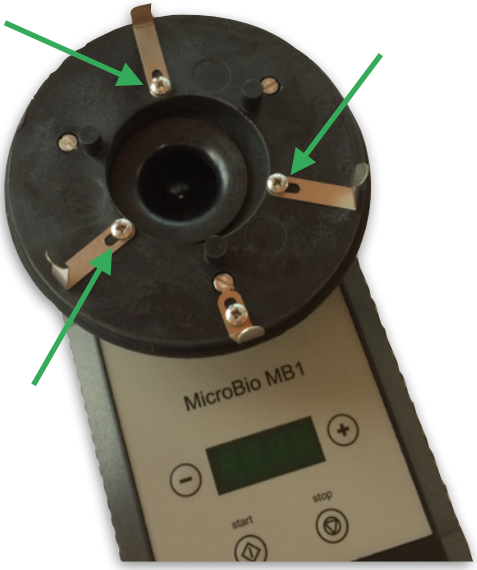
Spreadsheets to automate the correction process and to collate and present results are available for free download from:

http://www.cantiumscientific.com/Support.html

Change Plate / Dish Type

The MicroBio MB1 can accommodate both 55mm contact plates or 90mm petri style dishes. The MB1 is factory fitted with the petri dish springs, but these can be removed and replaced with the supplied contact plate springs (Cantium Scientific Limited part number P0001M007). The springs for both types have slots to allow a degree of adjustment to suit dish / plate manufacturer variations.

To change the spring type first remove the three screws and springs, as highlighted by the arrows, then refit using the same screws and the contact plate springs. Care must be taken not to over-tighten or cross-thread any of the screws.



A small Pozi-head screwdriver (size 0) is required. These are available from any local tool supplier.

Replacement screws are available from Cantium Scientific, part number P0001SCR003, or contact your local distributor.

Cleaning

The sampling head should be sterilised preferably by autoclave, but in the field disinfect with suitable sterilising wipes, such as IPA wipes or Tuffie 5 wipes (VernaCare part number 901SW225TY). Wipes may also be used for general cleaning of the body of the sampler.

In areas of low bioaerosol levels, observe a disinfection regime between each sample. Always sample from areas of lower contamination towards those of higher contamination. Wash exposed skin and clothing before sampling and avoid drinking, eating and smoking in the test area. All equipment should be handled aseptically.

The MicroBio is suitable for use with Hydrogen Peroxide Vapour (H_2O_2 vapour) bio-decontamination.

Tests have been carried out by Bioquell (UK) Ltd on a range of sensitive electronic equipment to determine effects of such processes. The conditions of these tests were:

Gas Concentration	1000 ppm
Conditioning time	20 minutes
Gassing time	30 minutes
Aeration time	150 minutes

As the MicroBio has a fan within the sampling head, it is recommended that during the decontamination process the MicroBio is set to sample at maximum volume so that the H_2O_2 vapour may be drawn through the head, fan and exhaust for optimum decontamination.

Throughout the tests, Bioquell demonstrated that bio-decontamination with H_2O_2 vapour does not appear to be detrimental in any way, affect operational aspects or aesthetics of sensitive electronic equipment. For further information on Bioquell H_2O_2 vapour material compatibility, please refer to their document BDS-3-MATCOMP-V3.2 available from their website **www.bioquell.com**.

Calibration and Validation

It is recommended that the MicroBio should be regularly calibrated in accordance with specific industry best practice. Typically this will be on the anniversary of the instrument entering service.

The only calibration adjustment on the instrument is the flow rate, by default set to 100 litres per minute.

To arrange calibration, please contact your local distributor or send the instrumentation back to Cantium Scientific Limited.

To ensure sample flow rate is within calibration limits on a daily basis, a validation kit (Cantium Scientific part number P0059) is available from your local distributor.

IQ / OQ / PQ

Documentation templates are available from Cantium Scientific Limited or your local distributor to support in-house Installation, Operational and Performance Qualification (IQ / OQ / PQ).

Troubleshooting

The MicroBio should give many years of trouble-free service with minimal routine maintenance. However, below are some common questions and answers relating to the use of the MicroBio MB1 Air Sampler.

Q. The unit will not switch on.

A. Check the batteries are inserted correctly and fully charged. If this does not resolve the situation, please contact the manufacturer.

Q. The sampler cuts out and switches off during sampling.

A. This is due to exhausted or low quality batteries. Replace batteries or recharge. Low quality cells may present a high terminal voltage, but as soon as a load is applied, this will drop drastically under load below a point where the sampler will not function.

Q. The sampling head fits loosely.

A. There is a retaining spring inside the sampling head area that keeps the head tight. This may, with time and use, have moved. Loosen the screw, slide the spring to the edge of the sampling head plate and re-tighten. Try this until a secure fit is obtained.

Q. The contact plate or petri dish fit loosely.

A. With time the springs that hold them in place may have loosened. Undo the screws, move the springs and re-tighten until a secure hold of the plate / dish is obtained. There is variation in the outside diameter of plates from one manufacturer to another. The MicroBio holding springs can be adjusted to accommodate this variation.

Technical Support

The first point of call for technical support should be your local distributor, details of which can be found on our website at:

http://cantiumscientific.com/Distributors.html

Otherwise, please contact Cantium Scientific Limited by email:

support@cantiumscientific.com

Appendix A - 220 Hole Count Correction Table

Count	Corrected	Count	Corrected	Count	Corrected	Count	Corrected
1	1	41	46	81	101	121	175
2	2	42	47	82	102	122	177
3	3	43	48	83	104	123	179
4	4	44	49	84	106	124	182
5	5	45	50	85	107	125	184
6	6	46	52	86	109	126	186
7	7	47	53	87	110	127	188
8	8	48	54	88	112	128	191
9	9	49	56	89	114	129	193
10	10	50	57	90	115	130	196
11	11	51	58	91	117	131	198
12	12	52	59	92	119	132	201
13	14	53	61	93	120	133	203
14	15	54	62	94	122	134	206
15	16	55	63	95	124	135	208
16	17	56	65	96	126	136	211
17	18	57	66	97	127	137	213
18	19	58	67	98	129	138	216
19	20	59	69	99	131	139	219
20	21	60	70	100	133	140	222
21	22	61	71	101	135	141	224
22	23	62	73	102	136	142	227
23	24	63	74	103	138	143	230
24	26	64	76	104	140	144	233
25	27	65	77	105	142	145	236
26	28	66	78	106	144	146	239
27	29	67	80	107	146	147	242
28	30	68	81	108	148	148	245
29	31	69	83	109	150	149	248
30	32	70	84	110	152	150	251
31	34	71	86	111	154	151	254
32	35	72	87	112	156	152	257
33	36	73	89	113	158	153	261
34	37	74	90	114	160	154	264
35	38	75	92	115	162	155	267
36	39	76	93	116	164	156	271
37	41	77	95	117	166	157	274
38	42	78	96	118	168	158	278
39	43	79	98	119	170	159	282
40	44	80	99	120	173	160	285

Appendix B - Culture Media Types

Micro-organism	Agar Culture Medium	Incubation Temperature
Bacteria:		
Human Flora	Blood Agar	35 - 37°C
Possible Pathogens	Heart Infusion Agar Soya bean-casein digest agar (SCDA)	35 - 37°C
Environmental saprophytic	SCDA or R2A	25 - 30°C
Thermophylic	EMB or Endo Agar	35 - 37°C
Fungi:		
Environmental saprophytes	Malt Extract Agar(MEA)	Room Temp
	Sabouraud Dextrose	Room Temp
	Rose Bengal Agar (RBA)(with streptomycin), Inhibitory Mould Agar	20 - 25°C
Xerophylic	Malt Extract Agar with added NaCl, sucrose or dichloran- glycerol	20 - 25°C

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