

Operating Instructions

# Air Sampler MD8 airscan



Read these operating instructions carefully  
before switching the instrument on!

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## Dear new user

Congratulations on your choice of the MD8 airscan for your microbiological air sampling!

This latest model in a series of practice-proven air samplers is manufactured for quality by high standard German electrical and precision engineering.

We are sure that it will provide you with trouble-free service for many years.

Please do not hesitate to contact us, should you need further information or assistance on installation or on your specific applications.

Göttingen, 2002

# 1. Introduction

The MD8 airscan is an air sampler which works according to the filtration principle. It draws a defined volume of air through a gelatin filter or equivalent. The microorganisms and viruses contained in the sampled air are retained by the filter, where they are available for processing by microbiological or virological methods.

When the microorganism content of the sampled air is to be quantitatively determined, the usual method is to subsequently plate the filter directly on an appropriate culture medium, incubate and count the resulting number of colony forming units (cfu). This number is related to the volume sampled to give cfu/m<sup>3</sup>.

When the virus concentration is to be determined, the gelatin filter must be dissolved after sampling, so that retained viruses can be cultivated in the solution and analysed by virological or molecular biological methods. Detailed procedural information is given in the application notes "Collecting Airborne Viruses and Phages Using the Gelatin Membrane Filter Method" and "A method for detecting and enumerating airborne virulent bacteriophage of dairy starter cultures" (publication numbers SLF-4028-e and SM-4021e respectively) as well as in further publications on this topic.

Further information on request.

## 2. Safety precautions

1. The MD 8 airscan is a modern air sampling instrument for the collection of airborne microorganisms or viruses. It is only intended for use with 80 mm diameter membrane filter discs of pore size 0.8  $\mu\text{m}$  or larger. Use of smaller diameter or smaller pore size filters will result in damage to the pump.
2. Use for other than the intended purpose, or improper operation, frees the manufacturer from all liability.
3. Only start the instrument when a holder which contains an appropriate membrane filter is attached to the air inlet.
4. Before starting the system, check that the electrical supply is appropriate to that imprinted on the identification label attached to the base of the sampler.
5. Ensure that the air outlet exhaust is completely free and not covered in any way. Do not attach a filter to it without first discussing this with the manufacturer and obtaining approval.
6. Do not open up or make changes to the instrument. Damage resulting from such ingress or changes are not covered by the guarantee given by the manufacturer.
7. The service menu should only be accessed by authorized service staff. No one other than authorized service staff should make changes to the service program. Such changes could result in invalidation of the Validation Certificate supplied with the instrument.

### 3. EEC – Declaration of Conformity

We hereby declare that the 230 V version of the MD8 airscan (order number 16746) conforms, in its design and construction, to the requirements of the following standards:

EN 50081-1

EN 55011 Cl. B

EN 50082-2

EN 61000-4-2, -3, -4, -6

EN 50204

Status: February 1997

This declaration becomes invalid, when changes which have not been authorized by us are made to the instrument.

## 4. Unpacking and checking the equipment supplied:

Sartorius Stedim Biotech products are very carefully packed, but despite this, damage could possibly occur during transport, so please check the equipment supplied for such damage while unpacking it. Check the equipment supplied against the following list, to ensure that everything has been correctly delivered and that nothing is left in the packaging:

- 1 × MD 8 airscan air sampling instrument (check the voltage)
- 1 × Filter holder for 80 mm membrane filters
- 1 × Line cord (country specific)
- 1 × Instructions for use (German/English)
- 1 × Calibration certificate

## 5. Specifications

### 5.1. Specifications of the MD8 airscan

Order numbers:	16746      230 V/50 Hz version 16747      115 V/60 Hz version Each version can be switched from 50 to 60 Hz and back
Air throughput:	Can be set between 2.0 m <sup>3</sup> /h to 8.0 m <sup>3</sup> /h, in steps of 0.1 m <sup>3</sup> /h
Max. deviation of air throughput:	±5% within the temperature range 15°C to 35°C
Air throughput settings in m <sup>3</sup> /h and l/min:	2.0 m <sup>3</sup> /h = 33.33 l/min 2.5 m <sup>3</sup> /h = 41.67 l/min 3.0 m <sup>3</sup> /h = 50.00 l/min 3.5 m <sup>3</sup> /h = 58.33 l/min 4.0 m <sup>3</sup> /h = 66.67 l/min 4.5 m <sup>3</sup> /h = 75.00 l/min 5.0 m <sup>3</sup> /h = 83.33 l/min 5.5 m <sup>3</sup> /h = 91.67 l/min 6.0 m <sup>3</sup> /h = 100.00 l/min 6.5 m <sup>3</sup> /h = 108.33 l/min 7.0 m <sup>3</sup> /h = 116.67 l/min 7.5 m <sup>3</sup> /h = 125.00 l/min 8.0 m <sup>3</sup> /h = 133.33 l/min
Correction of the air throughput setting:	When the entered air throughput cannot be attained, the display shows the maximum attainable throughput. A new setting, which is below this value, must then be entered.
Power:	700 W
Safety fuses:	6.3 Amp. 115 V 3.15 Amp. 230 V
Noise level:	Max. 62 dB(A) with gelatin filters, Max. 70 dB(A) with 0.8 µm pore size membrane filters
Weight:	Approx. 6.5 kg
Dimensions of air sampler:	375 × 242 × 228 mm (L × W × H).
Length with filter holder attached:	407 mm
Air inlet connector:	Bayonet-type quick connect

## 5.2. Specifications of Gelatin Filter Units

Filter holder:	For 80 mm diameter membrane filters
Filtration area:	38.5 cm <sup>2</sup>
Material:	Cyrolite (recyclable plastic)
Max. temperature:	85°C
Dimensions:	93 x 16 mm

### 5.2.1 Specifications of the Gelatin Filters

Material:	Gelatin
Nominal pore size:	3 µm
Filter diameter:	80 mm
Behaviour with water:	Soluble
Residual moisture:	Approx. 46–49%
Thickness:	Approx. 250 µm
Air flow rate per cm <sup>2</sup> :	2.2–3.2 l/min at $\Delta p = 0.05$ bar
Temperature limit:	60°C
Limiting operating conditions:	Max. 30°C ambient temperature, max. 85% relative humidity
Sterilization method:	Gamma irradiation
Retention of bacteria:	99.9995% for <i>Bac. subtilis niger</i> at 0.25 m/s inlet velocity
Retention of viruses:	99.9% for phage T1 (coli phage) at 50% relative humidity and an inlet velocity of 0.3 m/s. 99.94% for phage T1 (coli phage) at 80% relative humidity and an inlet velocity of 0.3 m/s.

## 6. Description of the MD8 airscan

The air inlet opening for attachment of a filter holder projects out of the plastic housing (Fig. 1) at the front of the MD8 airscan.



Fig. 1

The air outlet connector (exhaust) is at the rear (Fig. 2), together with the combination of power plug socket and green on/off switch. The two fuses (3.15 AT for 230 V and 6.3 AT for 115 V) are also situated in this switch. An optional remote control interface is on the left of the on/off switch.



Fig. 2

The operating elements are on the top of the instrument (Fig. 3), with the LCD on the left of the carrying handle and the membrane-covered keypad on the right. The use of these is described in section 7.



Fig. 3

The filter holder supplied, or an adapter for gelatin filter units, can be screwed directly onto the air inlet connector of the sampler (Fig. 4).



Fig. 4

The filter holder or the gelatin filter unit adapter can be held at a distance from the air sampler and positioned as required (e.g. for sampling in isolators or clean rooms, and for isokinetic sampling) by the use of accessories, including a length of flexible hose (17085 or 17662) and a set of connectors (17657). Other accessories, such as adapters (17016 or 17030), clamps for sanitary flanges (17033) and filter capsules (5181307T9-SS), may be required for installing the filter unit in isolators or clean rooms.

A holding system consisting of a stand (16970), clamp holder (16976) and clamp (17037) are recommended for an adjustable positioning of the filter holder, e.g. in clean rooms where it is not installed in a fixed position. See also the foto on the front cover and the accessories listed in section 11.

**Connecting the hose to the MD8 airscan:**

Press the connecting piece 17658 (hose/MD8 airscan) against the sampled air inlet of the MD8 airscan and turn it clockwise (Fig. 5).



Fig. 5

Fit one end of the hose (e.g., 17085) onto the hose barb of the connecting piece 17658, and the other end onto the second connecting piece (17659) of the connecting set 17657 (Fig. 6).



Fig. 6

Connect the adapter for gelatin filter units (17801, Fig. 7), or the filter holder (17655) containing a gelatin membrane filter, onto the second connecting piece (17659) by turning it clockwise.



Fig. 7  
Use the clamp 17037 and clamp holder 16976 to fix the connector on the stand 16970.

Fix a gelatin filter unit to the adapter.



Fig. 8

In principle, sampling can now be started.

## 7. User interface – Description of the keypad

Aside from the power on/off switch, the MD8 airscan is operated entirely using the membrane-covered keypad that has 6 keys and is located on top of the unit. Interactive prompts and messages are shown on an LCD with  $2 \times 16$  characters (Fig. 9).

The keys of the keypad have the following functions:

⇒: Selects parameters to be displayed so that values can be checked and changed.

**Enter:** Stores a change made to the parameter value on display.

↑: Increases the parameter value on display.

↓: Decreases the parameter value on display.

**Start:** Starts an air sampling procedure.

**Stop:** Interrupts an air sampling procedure.



Fig. 9

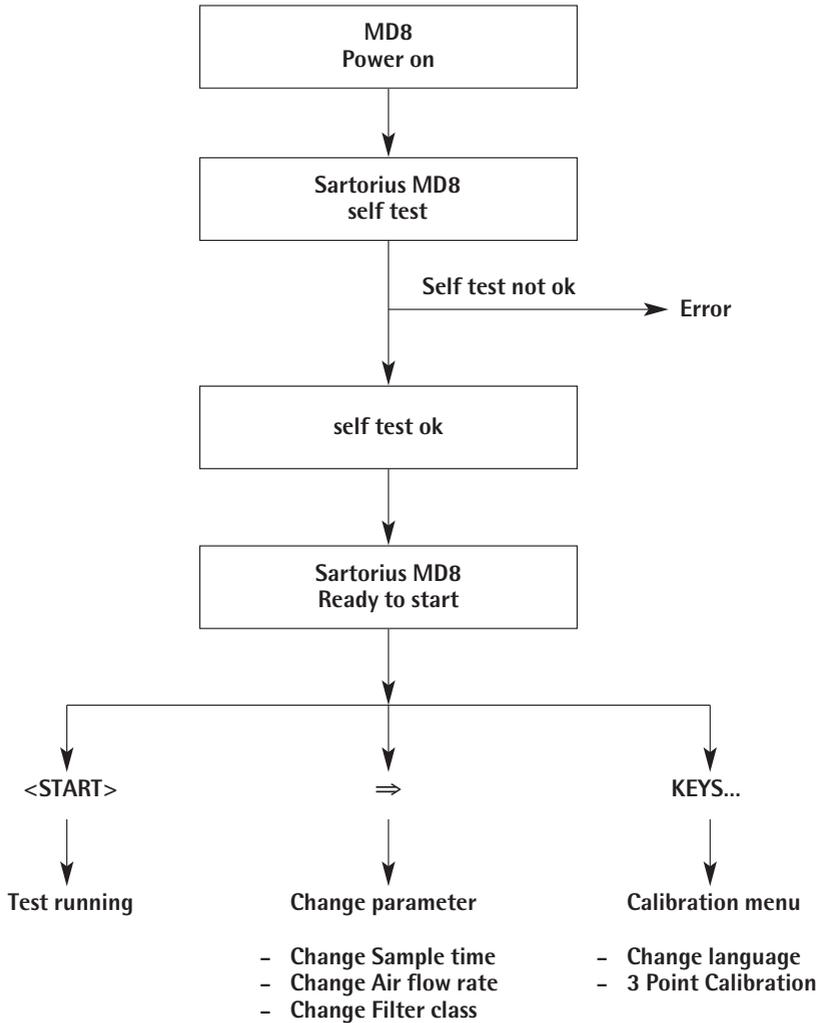
### **7.1. Switching the air sampler on**

The power switch located on the rear panel of the MD8 airscan is used to switch it on. The switch lights up green when power is on and the instrument runs a self-test during which the memory chips of the system are checked. During this test, the message "sartorius MD8 selftesting" is displayed (flow chart 1).

Upon successful completion of the selftest, the message "sartorius MD8 ready to start" is displayed and an air sampling procedure can be started.

If the instrument fails the selftest, an appropriate error message will be displayed. Refer to Section 7.5 for a list of possible error messages.

Flow chart 1: Self test MD8 airscan

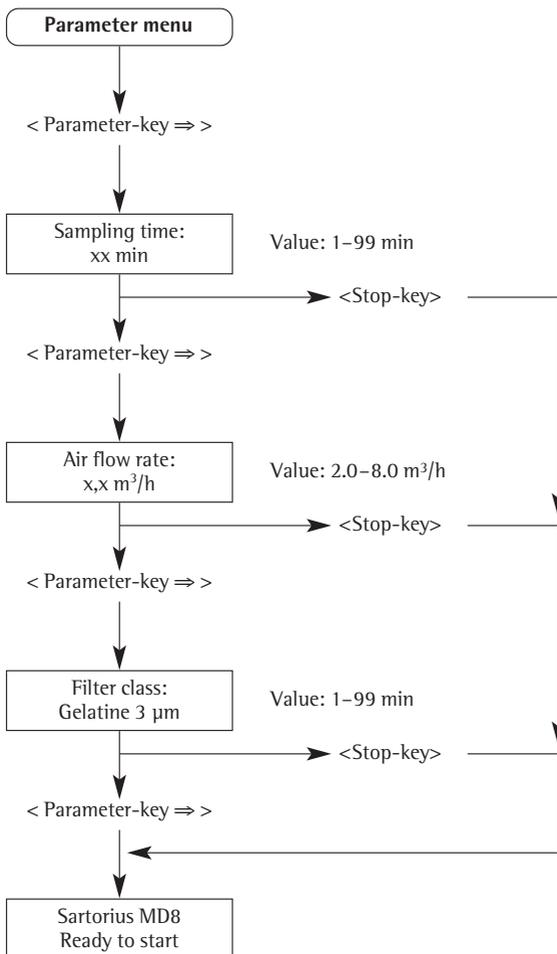


## 7.2. Checking and changing the parameters for the sampling procedure

When the instrument is in the initial starting mode, as indicated by the message “sartorius MD8 ready to start”, you can access the menu for displaying and checking or changing parameter settings by pressing the parameter key “⇒”.

When “⇒” is first pressed, the message “sampling time: ## min” is displayed.

Flow chart 2: Parameter-Input



Each further press on the key moves the display further through the menu (to airflow rate and then filter class), and finally back to the initial starting mode “sartorius MD8 ready to start” (flow chart 2).

You can press **Stop** at any time to return to the initial starting mode.

To change the setting of the parameter on display, press either the  $\uparrow$  or the  $\downarrow$  key. The new setting will flash to indicate that it has not yet been stored. If you exit the parameter input menu without saving the new setting with **Enter**, the change will be ignored and the former setting will remain stored.

When the  $\uparrow$  or  $\downarrow$  key is only briefly pressed, the value will change by 1 (0.1 for air flow rate, 0.01 for calibration values). If you hold down one of these keys, the value displayed will automatically be increased or decreased by 1 (or 0.1, 0.01) every 0.5 second following a brief delay of 1 second. After 3 seconds, the change rate doubles, and after a further 3 seconds, redoubles.

The instrument always limits the entered values to meaningful values.

The air sampling time can be set from 1 to 99 minutes.

The air flow rate can be set from 2.0 to 8.0 m<sup>3</sup>/h.

The filter class is not a value. The filter type used must be set here, from the choice of “gelatin 3  $\mu\text{m}$ ”, “cellulose 0.8  $\mu\text{m}$ ” or “cellulose 8  $\mu\text{m}$ ”. Pressing the  $\uparrow$  or  $\downarrow$  key moves from one to the next of these. This setting influences the internal control parameters of the MD8 airscan.

**NOTE!**

When “cellulose 0.8  $\mu\text{m}$ ” is selected, the air flow rate is limited to 6  $\text{m}^3/\text{h}$ .

If you have selected an air flow rate setting higher than 6  $\text{m}^3/\text{h}$  and then enter the filter class parameter “cellulose 0.8  $\mu\text{m}$ ”, the air flow rate will automatically be reset to 6  $\text{m}^3/\text{h}$ .

Other filter types than those listed can be used, but you must then check the regulatory behaviour and the air throughput of the MD8 aircan by tests/recalibration.

When a displayed parameter is changed with the  $\uparrow$  or  $\downarrow$  key, the new setting flashes to show it has not been stored. If you wish to store the change, make sure to press **Enter**. If you exit the parameter input menu, either by pressing the **Stop** or **Parameter** key, without first pressing the **Enter** key, all changes will be ignored.

If you exit a menu item by pressing **Stop**, the current function (parameter display or input, service menu or calibration) will be aborted, and the instrument returns to the initial starting mode.

You can return to the initial starting position at any time by pressing **Stop**.

### 7.3 Starting and ending an air sampling procedure

A measurement can be started when the message “sartorius MD8 ready to start” is shown in the display. The parameters which were used in the previous sampling procedure are those which are stored, so if you wish to perform a new air sampling with the same parameters, you can start sampling immediately by simply pressing the **Start** key (see flow chart 3). Use the “⇒” key to change or check the individual parameters as described above.

On pressing **Start**, the turbopump starts and the air flow rate set is normally attained within 15 seconds of start-up, and then held constant.

When the preset sampling time is up, air sampling is automatically ended, and the prompt “test completed (press Enter)” is displayed. On pressing the **Enter** key, the initial message “sartorius MD8 ready to start” is displayed.

Should it be necessary for you to interrupt sampling ahead of time, press the **Stop** key. This stops the turbopump and the message “user break! (press Enter)” is displayed.

If the instrument detects an error, e.g. a defective filter, during sampling, it stops the turbopump and so interrupts air sampling. In this case, an appropriate error message is displayed, e.g. “Filter defect (press Enter)”. Error messages are listed in section 7.5.

In each of these two interruptions, the message given must be confirmed by pressing the **Enter** key.

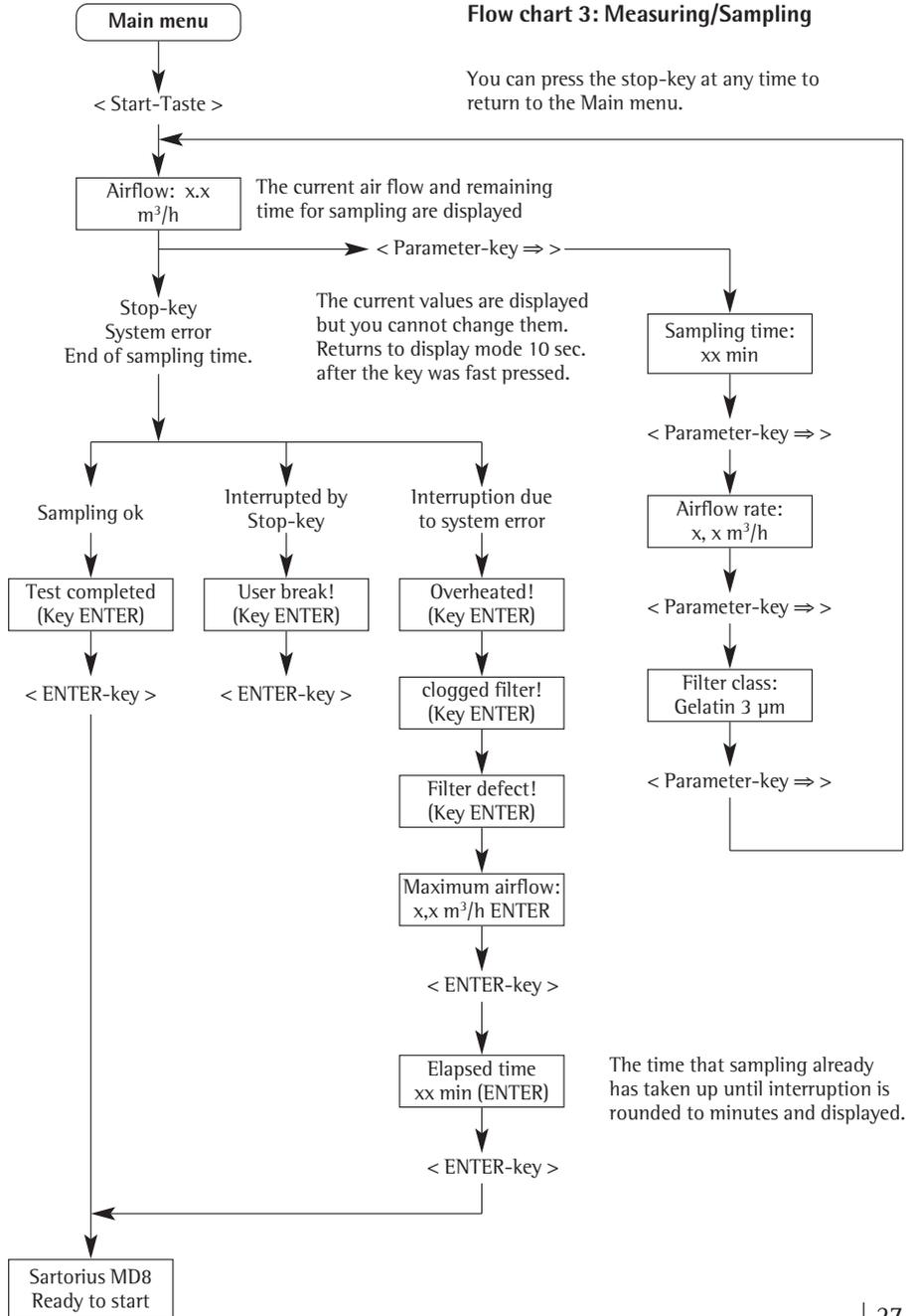
Once you have confirmed the message, the prompt “elapsed time ## min (Enter)” will appear on the display. This shows the time for which sampling was carried out before the interruption took effect, so allowing you in some cases still to evaluate the measurement, or to make a restart to continue with the air sampling.

#### **7.4. Display functions during air sampling**

Throughout air sampling, the current air flow rate and the remaining time are continuously updated on the display (“airflow #.# m<sup>3</sup>/h timer ## min”). Moreover, you can also press the ⇒ key to check the nominal settings during air sampling. You simply use this key to recall each parameter the same way as when checking or changing the individual parameters, one after the other. The only difference is that you cannot change the parameter settings during air sampling.

This display function does not affect the air sampling procedure which is in progress. The instrument automatically returns to the mode for displaying the current air flow rate and the remaining time 10 seconds after a key was last pressed.

### Flow chart 3: Measuring/Sampling



### 7.5. Error messages during air sampling

The MD8 airscan detects 4 different kinds of errors that will cause it to abort an air sampling procedure in progress (see flow chart 3).

1. The operating temperature of the instrument has reached a critical level (approx. 65°C above the turbopump). Error message: “overheated device (Enter)”
2. The installed filter is too fine, or the filter is heavily loaded with particles (clogged), so that the motor output required to reach the selected flow rate is not attainable. Error message: “clogged filter! (press Enter)”
3. The installed filter is too coarse, or the filter is damaged (torn), so that the required motor output is too low for the air flow rate. Error message: “filter defect ! (press Enter)”
4. The instrument cannot attain the preset air flow rate or cannot reach it fast enough. In this case, the air flow rate attained up to the time the air sampling procedure is aborted is displayed. Error message: “maximum airflow: #.# m<sup>3</sup>/h (Enter)”

### 7.6 Changing the language (English or German)

When the MD8 airscan is in the initial starting position, i.e. the message “sartorius MD8 ready to start” is displayed, you can call up the calibration menu, which contains the language setting, with a two-key combination. Press the ↑ and ↓ key simultaneously for 3 seconds.

The setting for the dialog language can be moved between German and English by pressing the ↑ or ↓ key. Store the appropriate setting by pressing **Enter**. All messages in the text display will now be in the language selected.

The setting is maintained after switching off the instrument.

As with parameter entries, pressing the ⇒ key moves you to the next calibration menu point. On repeated pressing of this key, you return to the menu point “language”. You can return leave the calibration menu at any time by pressing **Stop**. The MD8 airscan then returns to the initial starting position.

Details on calibration are given in the next section 8.

## 8. Calibration of the MD8 airscan

As already described above, you can call up the calibration menu with a two-key combination when the MD8 airscan is in the initial starting position, i.e. the message “sartorius MD8 ready to start” is displayed.

Press the  $\uparrow$  and  $\downarrow$  key simultaneously for 3 seconds.

The calibration function is shown in the display by the message “calibration – 3 point (START)”.

When **Start** is now pressed, the 3-point calibration mode is started.

To perform calibration, a Sartorius Stedim Biotech calibration unit 16740 must be connected. Exact details on how to do this are given in section 5 of the operating instructions provided with the calibration unit (publication number SL-6051a).

A complete reference curve for the flow rate sensor is stored in the MD8 airscan software, which can be brought into line with each instrument by the 3-point calibration. In the 3-point mode, the air flow rates at the 3, 5 and 7 m<sup>3</sup>/h settings are successively run and compared with the values measured by the calibration unit.

Calibration can be interrupted at any time by pressing the **Stop** key, and is done so automatically when the unit becomes overheated. The points measured and recorded up to this interruption are not stored, however. The last calibration values remained valid.

## 8.1 Calibration procedure

1. The MD8 airscan moves to the first measurement point and continually displays the nominal and actual values (“nominal: #.# m<sup>3</sup>/h actual: #.# m<sup>3</sup>/h”).
2. As soon as the nominal value is reached and stabilized, which can be recognized from the actual value display, press the parameter key.
3. The MD8 airscan now continues to run uncontrolled, i.e. the setpoint of the motor does not change, so that the air flow rate remains constant. The display shows “nominal 3.0 m<sup>3</sup>/h real ##.## m<sup>3</sup>/h”.
4. As soon as the calibration unit has stabilized and displays a constant value, set this on the MD8 airscan using the ↑ or ↓ key, then confirm and store it with Enter.
5. If this is not the last calibration point, the next one is automatically called up and process 1–4 is repeated. When the 7 m<sup>3</sup>/h value has been calibrated, the calibration is finished. This is shown by the message “calibration completed (ENTER)”.
6. Confirm by pressing **ENTER**. The instrument returns to the initial starting position and is ready to start.

### Note:

If the calibration is interrupted ahead of time, either the message “user break! (press ENTER)” or “overheated device (ENTER)” will be displayed. Confirm this message by pressing **ENTER**. The MD8 airscan returns to the initial starting position.

The altered calibration curve is stored immediately when the calibration has been finished or interrupted.

## 8.2 Resetting of default values

If, when calibrating the MD8 airscan, data were entered which are so absurd that they make it impossible for the instrument to be controlled correctly by the phase controller, it may be very difficult to recalibrate correctly.

Even though this case is very unlikely, because the consequences would be serious, a hidden option has been implemented in the MD8 airscan, allowing the service technician to reset the instrument to its default values.

Procedure:

Switch off the MD8 airscan. While holding down both the  $\Rightarrow$  and **STOP** keys simultaneously, switch the instrument on. Do not release the keys until the message “self-testing” is displayed.

Now press the  $\uparrow$  key while this message is displayed.

Pressing of the  $\uparrow$  key must be made while the “self-testing” message is displayed, as only then will the display change to “delete data? <Start> = yes”.

By now pressing **ENTER**, you confirm this and all data will be overwritten to the default settings. A self-test is then re- started.

If you press any other key, instead of **ENTER**, the MD8 airscan will enter its standard operating mode without altering the data.

## 8.3 Service menu

The service menu should only be accessed by authorized service staff. No one other than authorized service staff should make changes to the service program. Such changes could result in invalidation of the Validation Certificate supplied with the instrument.

To hinder incorrect usage, access to the service menu has been made difficult.

For information on the combination of keys required to call up this menu in the “sartorius MD8 ready to start” mode, contact the Sartorius Stedim Biotech Service Department.

## 9. How to use Gelatin Filter Units for air sampling

Gelatin filter units consist of 80 mm diameter gelatin filters which are fitted between the top and base parts of a disposable plastic holder. They are individually packed in single or triple bags and presterilized by gamma irradiation. Full details are given in the Directions for Use supplied with them (publication number SM-6043-p).

### 9.1 How to fit a filter unit to the adapter

With a single-packaged filter unit, cut open the polyethylene bag on the side where the seam is located (Fig. 10).



Fig. 10

With a triple-packaged filter unit, cut open the outer bag on the side where the seam is located, open the middle bag at the zip-lock seam and cut open the innermost bag on the side where the seam is located.

Remove the filter unit by hand, touching only the outer edge of the unit (Fig. 11), and lock it onto the adapter which is either subsequently attached, or was previously attached, to the MD8 airscan (Fig. 12) inlet or to a hose connector. While doing this, avoid contamination of the filter, or damage to it, by not allowing the open filter face to contact anything.



Fig. 11



Fig. 12

The adapter (order no. 17801) can be locked onto the air sampler inlet or the hose connector, by turning it clockwise, either before or after the filter unit is attached (Fig. 12).

## 9.2 How to remove a filter unit with the adapter

After sampling, detach the adapter holding the filter unit by turning it counterclockwise (Fig. 13). Hold the adapter and base of the filter unit firmly and with the filter face up, then detach the top part of the filter unit by turning it counterclockwise (Fig. 14). Invert an agar-filled petri dish base over the gelatin filter (Fig. 15), and make contact so that the gelatin filter can adhere to the agar surface (Fig. 16). Put the lid on the petri dish.

The gelatin filter starts to dissolve and become transparent (Fig. 17) because of the moisture in the agar, and is completely dissolved within a few minutes. (Fig. 18)



Fig. 13



Fig. 14



Fig. 15



Fig. 16

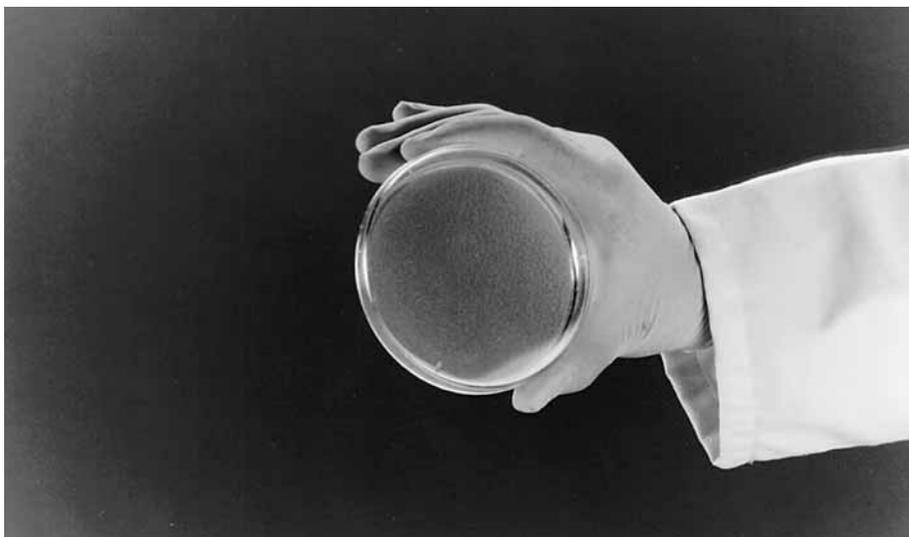


Fig. 17



Fig. 18

### **9.3 How to remove a filter unit without the adapter**

You can remove the complete disposable from the adapter by holding the edge of the bottom part of the disposable. The adapter has a bevelled edge to make it easier for you to grasp the disposable. Now proceed as under 9.2.

If you prefer to use forceps to remove the gelatin filter and place it on the agar surface (a notch has been provided in the base of the filter unit for this purpose), do not grasp the filter too firmly, as it is somewhat brittle and may then break.

### **9.4 Incubation and evaluation of collected microorganisms**

After transferring the gelatin filter to the culture medium, incubate it with the petri dish lid facing up, to avoid condensed water on the lid. The relative humidity of the air in the incubator should be between 40-50%, and can be maintained by placing a petri dish containing water in the incubator. The petri dish should have cams of some sort so that excess condensed water can evaporate out. To avoid excessive accumulation of liquid on the agar, use only plates which are 1 to 2 days old and pre-dried at room temperature.

Alternatively, the agar plates can be dried open for up to 3 hours in a clean bench. To be certain of avoiding contamination during this, place the dish open side down but held at a tilt with the lid beneath one side of it (Fig. 19).



Fig. 19

Choose the time, temperature and type of culture medium according to your microbiological application, for instance, Standard, Caso or Plate Count Agar are suitable for determining the colony count; Sabouraud, Malt Extract or Wort Agar for detecting yeasts and molds; and Blood Agar for detecting pathogenic microbes causing hemolysis. You can obtain the number of colony forming units per cubic meter of air by relating the colony count obtained to the volume of air sampled (cfu/m<sup>3</sup>).

We recommend that you plate the gelatin filter on a suitable agar immediately after sampling is completed, as this avoids possible inactivation of very sensitive bacteria due to drying-out effects.

If the filter is transported to the laboratory, then the filter unit should be protected from contamination by covering it with a sterile petri dish lid or wrapping it in sterile aluminium foil, until its removal under sterile conditions (sterile bench, laminar-flow glove box or isolator).

### **9.5 Dissolving the gelatin filter prior to evaluation of collected microorganisms**

Gelatin filters can be dissolved in 100 ml of sterile liquid, such as physiological saline or 0.1% peptone water, warmed to 40°C. Dissolution should be finished within about 15 minutes. Stirring the liquid using a sterile magnetic stirrer accelerates dissolution of the filter.

The solution can then be processed by a pour plate or membrane filter method.

During the dissolving and stirring process, groups of microorganisms are separated into individual microorganisms, so that a higher count will be obtained with this method than by direct plating of the gelatin filter. This method is recommended when very high colony counts are expected (dilution series) or when sampling is carried out in areas which have been sprayed with disinfectants or where antibiotic dust could be present (subsequent filtration of the solution through an 0.45 µm cellulose nitrate membrane filter, e.g. 11406, and rinsing this with an osmotically appropriate sterile medium prior to incubation, ensures removal of growth inhibiting substances).

### **9.6 Dissolving the gelatin filter after collecting viruses and phages**

When the virus concentration is to be determined, a gelatin filter must be used and subsequently dissolved, so that retained viruses (phages) can be cultivated in the solution and analysed by virological or molecular biological methods. Detailed procedural information is given in the application notes “Collecting Airborne Viruses and Phages Using the Gelatin Membrane Filter Method” and “A method for detecting and enumerating airborne virulent bacteriophage of dairy starter cultures” (publication numbers SLF-4028-e and SM-4021e respectively) as well as in further publications on this topic.

Further information on request.

## 10. How to use 80 mm gelatin filters in the aluminium filter holder and the filter stack

### 10.1 Preparation and sterilization of the filter holder

The filter holder supplied consists of a top and a bottom part (Fig. 20). The top part fits on the bottom part by turning it clockwise all the way to the stop. Before first use, clean the parts with hot water. If necessary, add a little gentle laboratory detergent and rinse subsequently with hot water. Use distilled water for a final rinse. Dry the parts with hot air and assemble the filter holder.



Fig. 20

For microbiological work, sterilize the filter holder or assembled stack in a drying oven at 180°C for up to 2 hours. Autoclaving is not possible, since the aluminium material would corrode on account of the moist heat.

## 10.2 Placing gelatin filters in the filter holder

Turn the top part counterclockwise to detach it from the bottom part (do this under sterile conditions for microbiological work), place the filter to be used on the filter support of the bottom part, centering it properly (Fig. 21). Close the holder with the bayonet catch without damaging or displacing the filter.

Wrap the holder in aluminium foil or similar (sterile if appropriate) and do not unwrap it until it has been transferred to the point of sampling and is to be attached to the air inlet of the sampler or the connector on the hose.



Fig. 21

### 10.3 Removing gelatin filters from the filter holder after sampling

Detach the filter holder containing the exposed filter from the air inlet of the sampler (Fig. 22) or the connection on the hose and protect it from contamination until the gelatin filter is removed for plating on agar and incubation (see sections 9.4. and 9.5.).



Fig. 22

#### 10.4 Using the aluminium filter stack

An aluminium filter stack (accessory order no. 17656, Fig. 23) consists of 10 filter holders fitted together in a stack, in which used and unused holders can be separated.



Fig. 23

Before first use, clean all parts with hot water, adding a little gentle laboratory detergent if necessary, then rinse with hot water followed by distilled water. Dry the parts with hot air and assemble the filter holder.

To assemble the stack, place the holders in numerical order and insert the top of the first holder in the intermediate adapter that accepts holders on either side (Fig. 24). Fit the top of the second holder in the bottom of the first holder (snap them together). Continue by fitting the third holder on the second one, etc. Fit an end cap on the bottom of the last holder (Fig. 25) and the other end cap on the open side of the intermediate adapter.



Fig. 24

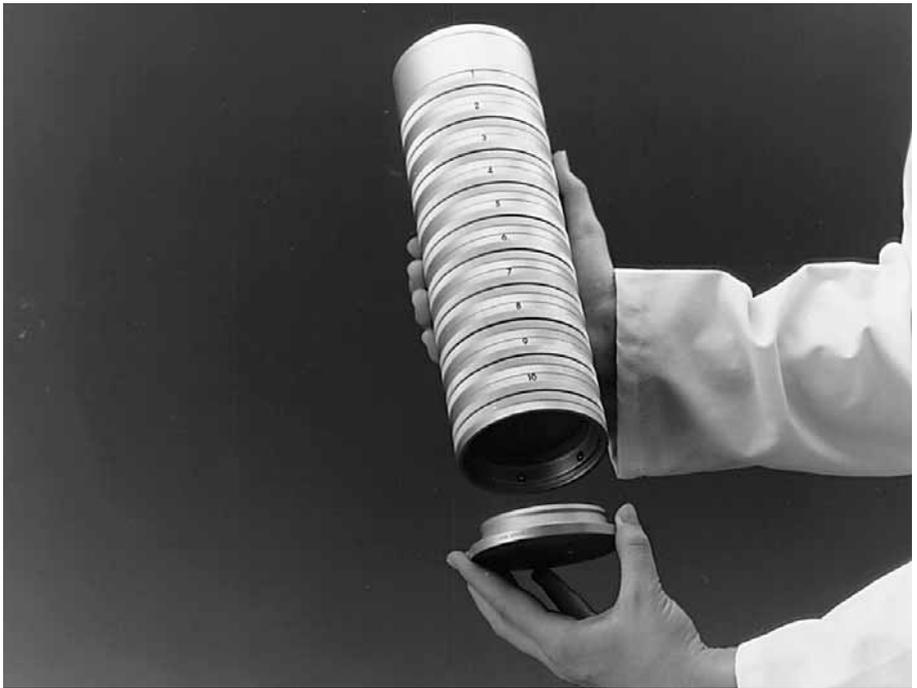


Fig. 25

The spring-loaded spherical retainers in each holder permit easy attachment and detachment .

**Note:**

Should the spring-loaded spherical retainers be somewhat stiff at any time, they can be loosened by using a special alkaline detergent in an ultrasonic bath (details on request).

For microbiological work, sterilize in a drying oven at 180°C for up to 2 hours. Autoclaving is not possible, since the aluminium material would corrode on account of the moist heat.

Insert filters in the individual holders (see section 10.2), under sterile conditions, and restack them as above. The filters are now protected from contamination until sampling is carried out.

For sampling, remove the first filter holder from the stack and immediately attach the intermediate adapter to the top part of the second filter holder. Fit the filter holder on the MD8 airscan or the connecting piece 17659 (see section 6).

After sampling, remove the holder used, fit it on the other side of the intermediate adapter (Fig. 26) and cover it with the end cap.



Fig. 26

The filters which have been used for sampling are so separated from the unused filters and are protected from contamination until removed e.g. for plating on agar and incubation (see sections 9.4. and 9.5.).

## 11. Accessories and consumables

### 11.1 Accessories for MD8 airscan

17655	Filter holder
17656	Filter stack (10 filter holders, individually numbered)
17657	Set of connectors (consisting of 17658 and 17659)
17658	Connector (air sampler inlet to flexible hose)
17659	Connector (flexible hose to filter holder/adaptor)
17208	Carrying case for MD8 airscan
17085	Flexible PVC hose with reinforced ends (2 m)
17088	Flexible PVC hose with reinforced ends (5 m)
17662	Silicone tubing, sterilizable (1 m, state length required)
16970	Support stand
16976	Clamp holder for 16970
17037	Clamp for 16970
17801	Adapter for gelatin filter units
17016	Adapter (DN 25 hose barb to 1" – 1½" Sanitary flange) to connect MD8 airscan to an isolator via silicone tubing and a filter capsule
17030	Adapter (DN 30 hose barb to 1" – 1½" Sanitary flange) to connect MD8 airscan to an isolator via flexible PVC hose and filter capsule
17033	Clamp for 1" – 1½" Sanitary flanges
5181307T9-SS	Sartofluor Capsule with PTFE membrane and Sanitary flange inlet and outlet, for sterile air filtration inserted between the MD8 airscan and isolator.
1ZE-0003	Remote control (Interface) for MD8 airscan designed for PLC units.
1ZE-0004	Remote control for MD8 airscan for use with PC (dialog system software)

Further accessories like the calibration unit 16756 on request.

Details on further accessories, e.g. for installation of the filter holder remote from the MD8 airscan in isolators, and for calibration of the MD8 airscan, on request.



17655



17656



17657



17657



17657



17208



17085



17088



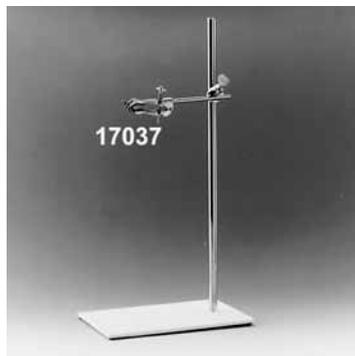
17662



16970



16970



16970



17801



17016



17030



17033



5185307T9--SS--A

## 11.2 Consumables

17528-080-ACD	Gelatin filter units (pack of 10, each sterile and individually packed in a polyethylene bag)
17528-080-BZD	Gelatin filter units (pack of 10, each sterile and individually packed in three successive polyethylene bags)
17528-080-VPD	Gelatin filter units (pack of 10, each sterile and individually packed in three polyethylene bags, but label on innermost bag)
12602-080-ALK	Gelatin disc filters, 80 mm diameter (pack of 50, presterilized)



17528-080



12602-080-ALK

Under conditions where gelatin filters cannot be used (air humidity > 85%, temperature > 30° C), we recommend the use of the following 80 mm diameter filters:

11404-080-ALN	Cellulose nitrate membrane filters, white with black grid, 0.8 $\mu\text{m}$ , (pack of 100, presterilized in bags of five)
13004-080-ALN	Cellulose nitrate membrane filters, gray with white grid, 0.8 $\mu\text{m}$ , (pack of 100, presterilized in bags of five)

## 12. Guarantee

The guarantee conditions can differ somewhat in various countries. Should no guarantee card be included with the instrument, please contact the Sartorius Stedim Biotech subsidiary in your country at the address given on the back of this publication.

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