

# DBM610 AIRFLOW METER





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# 1. Introduction

DBM610 airflow meter allows **control and balancing** of airflow in air conditioning system. **Thanks to the interchangeable hoods**, the airflow can be used on any type of grids or diffusers in air supply or exhaust.

Easy to handle, lightweight, it allows **accurate, sturdy and fast measurements**.

It is supplied in standard with a **610 x 610 mm** hood. Four other dimensions are available as options:

- 1020 x 1020 mm
- 720 x 720 mm
- 720 x 1320 mm
- 420 x 1520 mm

These hoods are airtight and have a transparent part on each side, allowing the user to see through the vent and ensure that the hood is in a good position. The rods, made of fibreglass, provide a sturdiness of hoods.

The measurement grid, attached to the base, allows the measurement through **48 points** all over the surface of the grid. Measurement is performed using a **differential pressure sensor**, calibrated and compensated in atmospheric pressure and temperature.

**The measuring unit of the airflow meter, removable, can be used as a micromanometer.**

Real addition to airflow measurement, this instrument allows, by connecting a Pitot tube, to measure airflow velocity in air duct or, by connecting two silicone tubes, to check filter fouling of air station. It is also possible to connect the matrix grid designed for air velocity measurements on any types of large ceiling vent or diffuser. This grid calculates the average air velocity from 24 points to guarantee a reliable measurement.

## 1.1. Key points

- Measuring range from **40 to 3500 m<sup>3</sup>/h**
- **Quick and simple** hood changes
- Software for data processing on computer (datalogger 10)
- Sturdy, lightweight and easy to handle
- **Removable** measuring unit
- **Interchangeable** hoods

## 1.2. Technical features

- Airflow:
  - Measuring range:** from 40 to +3500 m<sup>3</sup>/h
  - Accuracy:** 3% of measuring  $\pm 10$  m<sup>3</sup>/h
  - Resolution:** 1 m<sup>3</sup>/h
- Air velocity:
  - Measuring range:** from 0.2 to 10 m/s
  - Accuracy:** 3% of measuring  $\pm 0.04$  m/s
  - Resolution:** 0.01 m/s up to 3 m/s and 0.1 m/s beyond
- Temperature (on the base)
  - Measuring range:** from 0 to 50°C
  - Accuracy:** 2% of measuring  $\pm 0.1$ °C
  - Resolution:** 0.1°C
- Thermocouple Temperature (on the micromanometer)
  - Thermocouple type:** K, J, T, S
  - Measuring range:** K: from -200 to 1300°C
  - J: from -100 to 750°C
  - T: from -200 to 400°C
  - S: from 0 to 1760°C

**Accuracy:** K, J, T: from -200 to 0 °C:  $\pm 0.4^{\circ}\text{C} \pm 0.3\%$  of reading  
from 0 to 1300 °C:  $\pm 0.4^{\circ}\text{C}$

S:  $\pm 0.6^{\circ}\text{C}$

**Resolution:**  $0.1^{\circ}\text{C}$

- Pressure:

**Measuring range:** from -2500 to +2500 Pa

**Accuracy:**  $\pm 0.2\%$  of measuring  $\pm 2$  Pa

**Resolution:** from 0.001 to 0.1 Pa

**Tolerated overpressure:** 34473 Pa

### **1.3. General technical features**

<b>Display</b>	Large graphic back-lighted LCD / Sizes: 86 x 51 mm
<b>Connectors</b>	ABS connectors, $\varnothing 7 \times 4$ mm
<b>Storage capacity</b>	200 datasets of 100 points
<b>Housing</b>	Shock-proof made of ABS, IP54 protection
<b>Keypad</b>	12 keys
<b>Conformity</b>	Electromagnetical compatibility (NF EN 61326-1 guideline)
<b>Power supply</b>	4 alkaline batteries LR6 Rechargeable battery Li-ion 3.7 V 4400 mAh (optional)
<b>Environment</b>	Neutral gases
<b>Operating temperature</b>	From 0 to $+60^{\circ}\text{C}$
<b>Storage temperature</b>	From $-20$ to $+70^{\circ}\text{C}$
<b>Auto-shut-off</b>	Adjustable from 0 to 120 min
<b>Weight</b>	3600 g
<b>Languages</b>	French, English, German, Finnish, Dutch, Italian, Norwegian, Portuguese, Slovak, Swedish, Chinese

## 2. Presentation of airflow meter

### 2.1. Base

- Outside of the base:



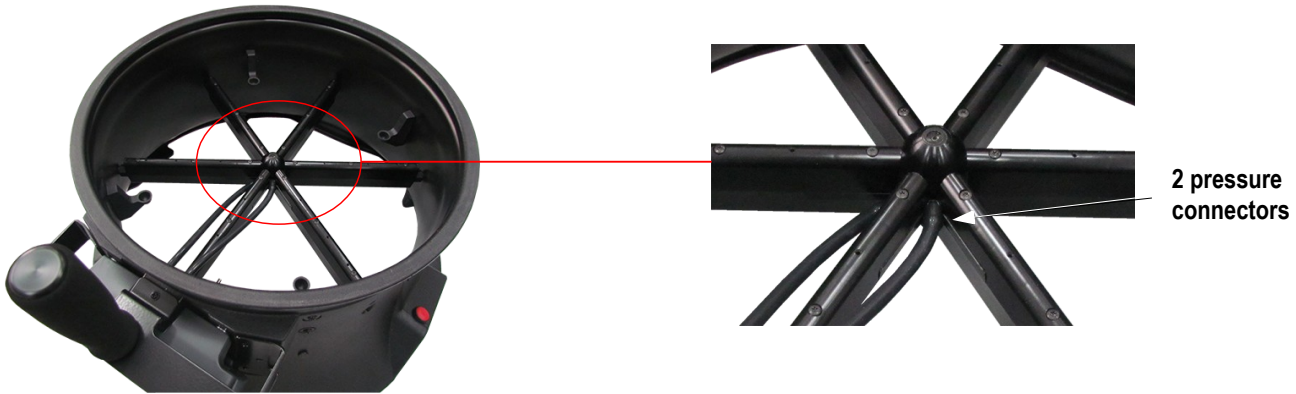
- Inside the base:



## 2.2. Grid

The measurement grid is fixed to the base in 6 points and is made up of the following elements:

- two chambers (for total pressure and for static pressure)
- 2 pressure connectors



The measurement grid allows to measure differential pressure. It takes into account atmospheric pressure and temperature compensation and works automatically in supply or exhaust.

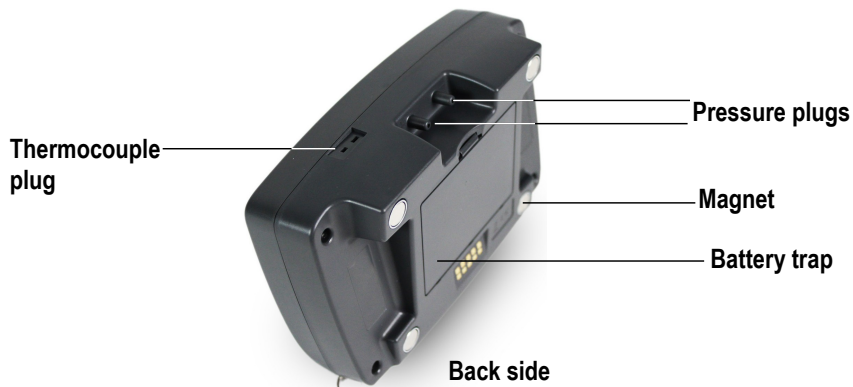
## 2.3. Electronic housing

### Features:

- Shock-proof made of ABS
- IP54 protection
- Large graphic back-lighted LCD (86 x 51 mm)
- Auto shut-off adjustable from 0 to 120 min
- Manual or automatic autozero
- Removable housing for micromanometer function



- 4 magnets at the back allow the mounting on the base (airflow meter mode)
- 2 pressure plugs allow to set the housing on the base and the connection of silicone tube for the measurement with a Pitot tube
- 1 thermocouple plug on the top of the housing (micromanometer mode)



### 2.3.1. Airflow meter mode

In airflow meter mode, the device has following functions:

- Simultaneous display of airflow, pressure and temperature
- Automatic airflow direction (supply or exhaust)
- Automatic average and point by point average
- HOLD function (measurement is fixed)
- USB interface for PC operation
- Languages choice



### 2.3.2. Micromanometer mode

In micromanometer mode, the device has following functions:

- Measurement of air velocity with Pitot tube S, L or Debimo blades
- Measurement of thermocouple temperature
- Automatic average and point by point average
- HOLD function (measurement is fixed)
- USB interface for PC operation
- Languages choice



### 2.3.3. Power supply of electronic housing

The airflow meter is supplied in standard with 4 batteries type AA LR6 1.5V. Rechargeable batteries and Li-Ion battery are available as options.

**To replace batteries (rechargeable or not):**

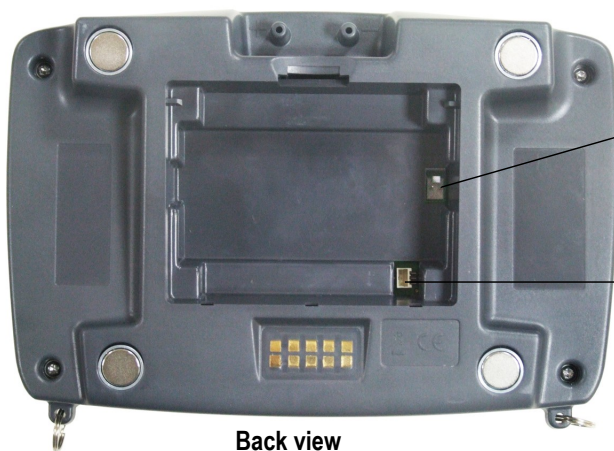
- Remove the batteries cover then used batteries.
- Disconnect the batteries support.
- Replace batteries then reconnect the support.
- Replace the batteries cover.

**To put the Li-Ion battery (optional):**

- Remove the batteries cover then the batteries support.
- Connect the battery.
- Replace the batteries cover.



**Respect the connections (see below).**



Back view

Connection for LR6 batteries support (rechargeable or not)

Connection for Li-Ion battery



Side view

USB connection

Connection for main adapter/charger

**To load the device:**

- If the device is on Li-Ion battery: connect the main adapter/charger on the side of the device
- If the device is on rechargeable batteries: remove batteries load them an external charger

It is also possible to load the electronic housing with the main adapter/charger supplied with Li-Ion battery.



## 2.4. Hoods



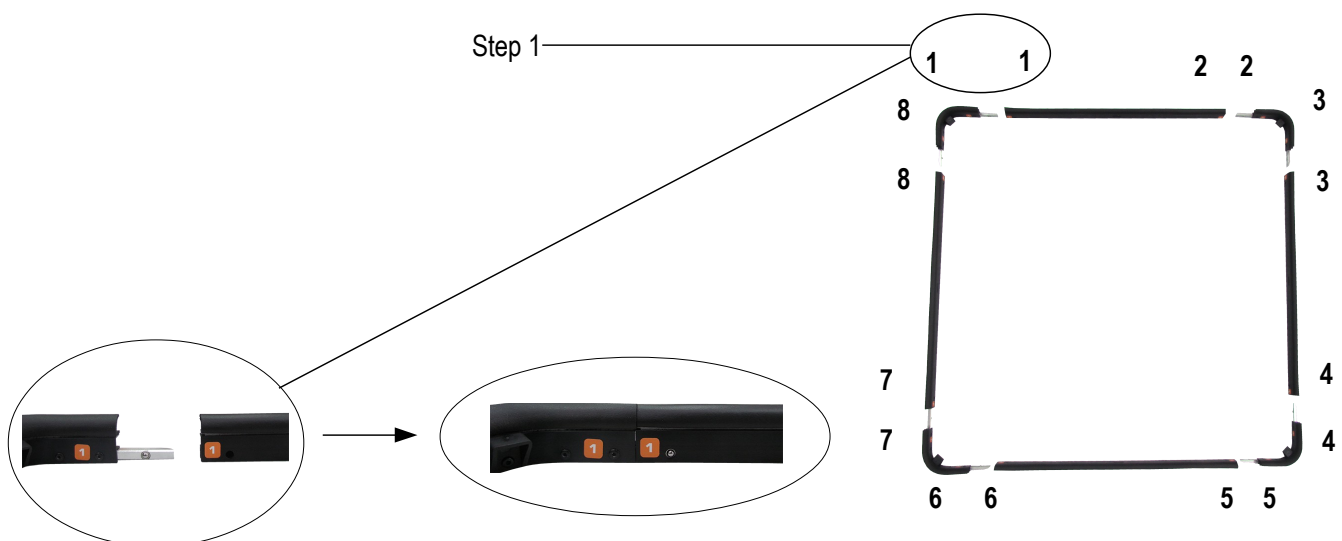
## 3. Mounting the airflow meter

### 3.1. Mounting of frame

To mount the different optional frames of airflow meter, just fit together the elements of the frame.

Stickers numbered from 1 to 8 are stuck on each end of the elements:

Example with 720 x 720 mm frame:



### 3.2. Setting of the cloth

Before set the cloth on the frame, frame must be mounted.

- First, insert a corner of the frame inside a corner of the cloth.
- Insert the opposite corner of the frame in the corresponding corner of the cloth.  
*The colour mark must be in the middle of the frame side. (1).*
- Press on the corresponding side of the cloth to put it in the rail of the frame.
- Proceed the same way for the rest of the cloth.



When the cloth is fixed on the frame:

- Place the cloth on the base.  
*The mark on the cloth and the Velcro tape are opposed to the carrying handle of the base.*
- Put the elastic of the cloth around the DBM base.
- Tighten the Velcro tape of the cloth on the base.
- If necessary, turn the cloth to match the mark of the cloth with the mark on the base.



Cloth on the base



Elastic to be set around the base



Zoom on the back of the base with tightened Velcro tape



Mark on the cloth

Mark on the base

### 3.3. Setting of rods

- Maintain the hood with the base and put the four rods inside.
- Take a rod and insert the rounded end of the rod in the reception holding cup of the base.
- Slightly bend the rod and insert the flat end of the rod on the opposite corner of the holding cup. The crossing rods must be on the same plan as the KIMO logo.
- Proceed the same way for the three other rods.



Rounded end in the holding cup



Rounded end in the holding cup

Flat end in the opposite corner



For the 1020 x 1020 mm, 1320 x 720 mm and 1520 x 420 mm length frames, the plastic supple protections on the hood must be positioned in front of the cups on the frame.

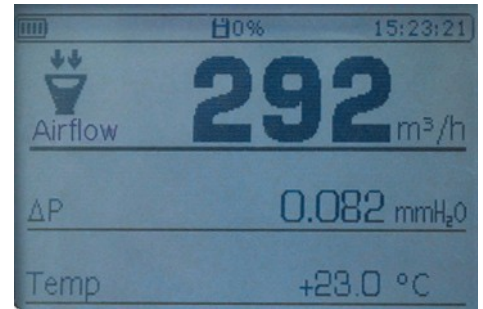
## 4. Using DBM610 in airflow meter mode

### 4.1. Starting up

When the airflow meter is correctly set and the housing mounted on the base, press **On/Off** button:

The device directly displays the data below (see photo):

- airflow
- delta pressure
- temperature



The solenoid valve is active and flaps every second.

### 4.2. Configure the airflow meter

- Press **"Menu"**.
- Press **"Left arrow"** or **"Right arrow"** key until reach **"Configuration"**.
- Press **"OK"**.

The sub-menu **"Configuration"** appears with following data:

- **Correction coefficient:** allows to set the correction coefficient
- **Units:** allows to set unit for airflow, pressure and temperature
- **Damping:** allows to smooth the measurement and avoid unwanted
- **Standard airflow:** allows to activate or not the standardized airflow as per DIN1343 standard

#### 4.2.1. Set the correction coefficient

- Go to **"Correction coef"** line then press **OK**.
- Select the required correction coefficient with up and down arrows then press **OK**.  
*Screen displays the selected coefficient. It is possible to modify it with arrow keys.*
- Press **OK** to validate and back to **"Configuration"** menu.

#### 4.2.2. Set measurement units

- Go to **"Unit"** line then press **OK**.
- Go to the required line (airflow, temperature or pressure) then press **OK**.
- Select unit with up and down arrows then press **OK**.

Available units are:

- **Airflow:** m³/h, L/s, cfm
  - **Pressure:** Pa, mmH₂O, mmHg, inWg
  - **Temperature:** °C, °F
- Press **Esc** to quit **"Units"** sub-menu and back to **"Configuration"** menu.

#### 4.2.3. Set a damping

- Go to **"Damping"** line then press **OK**.
- Select the required coefficient (from 0 to 9) then press **OK**.

#### 4.2.4. Activate or deactivate standardised airflow

The standardised airflow allows to have a calculation of airflow as per DIN 1343 standard.

- Go to **"Standard airflow"** then press **OK**.
- Select **ON** or **OFF** with up and down arrows then press **OK**.

*When standardized airflow is activated, **"NORMO"** indication is shown on screen on the left of time.*

### 4.3. Perform averages

During measurement, it is possible to perform an automatic average. This automatic average is calculated on the basis of one measurement each seconds. It is also possible to get an addition of several dataset of automatic average.

#### 4.3.1. Perform an automatic average

- Press **"Moy/Avg"**.
- Press **OK** or the red button on the right of the base to launch measurement.  
*Measurement duration appears at the lower right of the screen.*
- Press **OK** or the red button on the right of the base to display the results when required measurement duration is reached.  
*Screen displays the following results in the left column:*
  - Average
  - Minimum value
  - Maximum value
  - Deviation: standard deviation on all the measured values
- Press up and down arrows to get to results of the different parameters.
- Press **"Save"** to save the dataset.  
*Screen backs to the display of results with:*
  - Left column: measurement results
  - Right column: addition of averages on several datasets of automatic averages



*Results displayed in both columns are identical because based on a single dataset.*

#### 4.3.2. Perform an aggregate of automatic averages

Results of the aggregate of averages are based on several datasets of automatic average, it means that the DBM 610 should not be turn off and the **"Esc"** key should not be pressed.

Once a 1<sup>st</sup> dataset of automatic average has been realized and saved:

- Press **OK** or the red button on the right of the base to go to measurement screen.
- Press **OK** again or the red button on the right of the base to launch a new measurement.
- Press **OK** again or the red button on the right of the base to display results when required measurement duration is reached.
- Press up and down arrows to get to results of the different parameters.  
*Screen displays the following results in the left column:*
  - Average
  - Minimum value
  - Maximum value
  - Deviation: standard deviation on all the measured values*No result is displayed on the right column ( $\Sigma$ ).*
- Press up and down arrows to get to results of the different parameters.
- Press **"Save"** to save the dataset.

On measurement screen:

- Press **"Esc"** to cancel and not include these results. It will be possible to launch a new measurement.
- Press **"Save"** to save results.  
*Screen displays the following results in the left column:*
  - Left column: measurement results
  - Right column ( $\Sigma$ ): aggregate of averages on several datasets of automatic averages



## 5. Using DBM610 in micromanometer mode

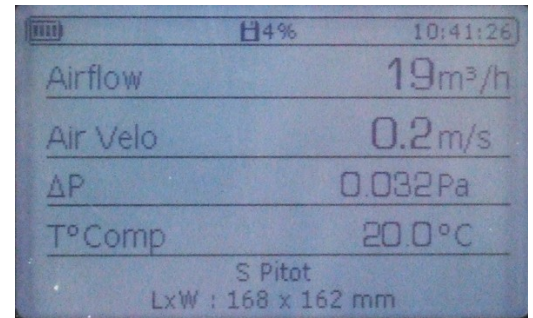
### 5.1. Starting up

The device is disconnected from airflow meter base.

- Press **On/Off**.

The device directly displays data below (see photo):

- Airflow
- Air velocity
- Pressure delta
- Temperature compensation
- Type of airflow sensor used and size of the surface



### 5.2. Set the micromanometer

- Press **"Menu"**.
- Press **"Left arrow"** or **"Right arrow"** until reach **"Configuration"**.
- Press **"OK"** button.

The sub-menu **"Configuration"** appears with following data:

- **Airflow sensor:** allows to select the airflow sensor used for the measurement: Pitot tube L, S, Debimo blade, Matrix grid or Coefficient
- **Surface:** allows to define the of surface and its size
- **Units:** allows to define unit for airflow, air velocity, pressure and temperature
- **Damping:** allows to smooth the measurement and avoid unwanted variations
- **Solenoid valve:** allows to activate or not the solenoid valve
- **Thermocouple:** allows to set the thermocouple type: K, J, T or S
- **Temp Compens:** allows to set the compensation temperature
- **Standard airflow:** allows to activate or not the standardized airflow as per DIN1343 standard

#### 5.2.1. Select the airflow sensor

- Go to **"Airflow sensor"** line then press **OK**.
- Press **OK** on the **"Element"** line.
- Select the airflow sensor (Pitot tube L, Pitot tube S, Debimo blade, Matrix grid or Coefficient) with up arrow and down arrow then press **OK**.

It is also possible to select the corresponding coefficient to the airflow sensor:

- Go to **"Airflow sensor"** line then press **OK**.
- Press **OK** on the **"Coefficient"**.
- Select the coefficient from 0 to 9 with up arrow and down arrow then press **OK**.  
*Screen displays the required coefficient. It is possible to modify it with arrow buttons.*
- Press **OK** to back to **"Airflow sensor"** sub-menu .
- Press **Esc** to quit **"Airflow sensor"** sub-menu and back to **"Configuration"** menu.

#### 5.2.2. Set the surface

Set length and width of the surface:

- Go to **"Surface"** and press **OK**.
- Go to **"Type"** line then press **OK**.
- Press **OK** on **"LxI"** line.
- Select the required dimensions with up and down arrows then press **OK**.
- If necessary, modify the length then the width with arrows then press **OK** (if no modification, just press **OK**).

Set diameter of the surface:

- Go to **"Surface"** then press **OK**.

- Go to **"Type"** line then press **OK**.
- Press **OK** on **"Diameter"** line.
- Select the required dimension with up and down arrows then press **OK**.
- If necessary, modify the diameter with arrows then press **OK** (if no modification, just press OK).

Set surface unit:

- Go to **"Surface"** then press **OK**.
- Go to **"Type"** line then press **OK**.
- Press **OK** on **"Unit"** line.
- Select the unit (mm or in) with arrows then press **OK**.

Set K factor:

The air flow in a ventilation opening,  $Q_v$  (m<sup>3</sup>/h), can be evaluated from a differential pressure measurement on this ventilation opening,  $\Delta P$  (Pa). The K factor is a coefficient used to measure the volumetric flow rate on an air vent. This coefficient is given in the technical features of the air vent.



If the coefficient is not specified in the air vent technical document or directly on the air vent, please request the manufacturer to know this coefficient.

From the air vent coefficient, named K, it is possible to calculate the volumetric flow rate:

$$Q_v = K \times \sqrt{\Delta P}$$

- Go to **"Surface"** then press **OK**.
- Go to **"K factor"** line then press **OK**.
- Select the K factor with up and down arrows then press **OK**.
- If necessary, modify the value of K factor with arrows then press **OK** (if no modification, just press OK).
- Press **Esc** to quit **"Surface"** sub-menu and back to **"Configuration"** menu.

### 5.2.3. Set measurement units

- Go to **"Units"** line then press **OK**.
- Go to the required line (airflow, air velocity, pressure or temperature) then press **OK**.

Available units are:

- **Airflow:** m<sup>3</sup>/h, L/s, cfm
  - **Air velocity:** m/s, fpm, km/h, mph
  - **Pressure:** Pa, mmH<sub>2</sub>O, mmHg, inWg
  - **Temperature:** °C, °F
- Press **Esc** to quit **"Units"** sub-menu and back **"Configuration"** menu.

### 5.2.4. Set a damping

- Go to **"Damping"** line then press **OK**.
- Select the required coefficient (from 0 to 9) then press **OK**.

### 5.2.5. Activate or deactivate the solenoid valve

- Go to **"Solenoid valve"** line then press **OK**.
- Select **ON** or **OFF** with up and down arrows then press **OK**.

### 5.2.6. Set the thermocouple type

- Go to **"Thermocouple"** line then press **OK**.
- Select thermocouple type: K, J, T or S with up and down arrows then press **OK**.

### 5.2.7. Set the compensation temperature

- Go to "**Temp Compens**" line then press **OK**.
- Set the temperature with arrows then press **OK**. This temperature must be between **-20 and 80°C**.

### 5.2.8. Activate or deactivate the standardised airflow

The standardised airflow allows to have a calculation of airflow as per DIN 1343 standard.

- Go to "**Standard airflow**" line then press **OK**.
- Select **ON** or **OFF** with up and down arrows then press **OK**.

*When standardised airflow is activated, "**NORMO**" indication is shown on screen on the left of time.*

## 5.3. Activate or deactivate air velocity and airflow

It is possible to activate or deactivate measurement in air velocity and/or airflow.

- Press "**Menu**".
- Go to "**Measurement**" with left and right arrows then press **OK**.
- Go to "**Airflow**" or "**Air velocity**" then press **OK**.
- Select **ON** or **OFF** then press **OK**.

## 5.4. Use the Matrix grid

The Matrix grid is designed for the air velocity measurement on any types of ceiling vents or diffusers with a large useful area.

To use the DBM610 in Matrix grid mode, place the grid on the telescopic pole and add the positioning struts that will be against the ceiling. Struts are available in 3 different lengths:

- 3 x 5 cm
- 3 x 15 cm
- 3 x 25 cm

These struts allow to remain parallel to the ceiling. The length of the struts allow to be more or less distant from the ceiling, it can be useful in case of high air velocity. Indeed, the air velocity decreases as soon as we keep away from the ceiling vent.

To connect the silicone tubes:

- Ensure that each silicone tube is connected correctly. For example, the white one connected on the "+" sign of the micromanometer and on the "+" sign of the Matrix grid and the black one connected on the "-" sign of the micromanometer and on the "-" sign of the Matrix grid

## 5.5. Perform averages

The micromanometer can perform 3 types of averages: automatic average, point/point average and automatic point/point average.

- Press "**Moy/Avg**" button.
- Select the type of required average then press **OK**.

### 5.5.1. Automatic average

*This function allows the calculation of the average value measured by the device in a selected time interval.*

*First, select "**Auto average**", the device displays measurement screen.*

- Press **OK** to launch measurement.  
*The device displays measured values and measurement duration.*
- Press **OK** to stop measurements and get results.
- Press up and down arrows to get to results of different parameters.
- Press "**Save**" button to save dataset or **Esc** to cancel and back to measurement screen.

### 5.5.2. Point/point average



*This function allows the calculation of the average between different measurement points selected by the user. First, select "Pt/Pt average", the device displays measurement screen.*

- Press **OK** to validate the 1<sup>st</sup> point.  
*The device displays measured values and the number of measurement points.*
- Press **OK** to add measurement points.
- Press **"Moy/Avg"** button to get to screen results when the required number measurement points has been reached.
- Press up and down arrows to get to results of different parameters.
- Press **"Save"** to save dataset or **Esc** to cancel and back to measurement screen.

### 5.5.3. Point/point automatic average

*This function allows the calculation of average value of different measurement points which are calculated on a given duration. It is necessary to give the duration while each point will be calculated.*

First, select **"Auto Pt/Pt average"**, the device displays measurement screen.

- Press **OK** to validate the 1<sup>st</sup> point.
- Enter the duration in minute and second with arrows then press **OK**.
- Press **OK** to launch the measurement of the 1<sup>st</sup> point.  
*The device displays measurements and the remaining measurement duration.*
- Press **OK** to add measurement points.
- Press **"Moy/Avg"** button to get to screen results when the required number measurement points has been reached.
- Press up and down arrows to get to results of different parameters.
- Press **"Save"** to save dataset or **Esc** to cancel and back to measurement screen.

### 5.6. Perform an autozero

The autozero allows to offset from time to time any drift of the sensitive element during time by a manual adjustment of the zero. The autozero is made automatically when the solenoid valve is activated.

- Press **"Zero"** during measurement.

### 5.7. Hold the measurement

During the measurement, the **"Hold"** function key of the device allows to fix the measurement:

- Press the **"Hold"** function key.  
*The current measurement is fixed. The **"HOLD"** indication is displayed on the top of the screen.*
- To fix a second measurement value, press again the **"Hold"** function key.  
*The device displays both of the fixed values: on the right the first value and on the left the second value.*
- Press **"Hold"** to restore the display of the first value only.
- Press **"Esc"** to quit the **"Hold"** mode.  
*The device displays the current measured values.*

## 6. Manage dataset recordings

This part allows to display or delete recorded dataset in the device.

To get to dataset from **"Measurement"** screen:

- Press **"Menu"** or **"Save"** button.
- Go to **"Savings"** with left and right arrows.
- Press **OK**.

### 6.1. Get to recorded datasets

- Go to **"Display"** line then press **OK**.  
*Dataset list is displayed.*
- Go to the required dataset then press **OK**.  
*Dataset opens with following features:*
  - *Number of points*
  - *Dataset type*
  - *Date and time of beginning and end*
- Press **OK** to display values.  
*Values table opens.*
- Use left and right arrows to change of page.
- Use up and down arrows to change parameters.
- Press **Esc** to back to the recorded dataset list.

### 6.2. Delete recorded datasets

- Press **"Delete"** line then press **OK**.  
*A message is displayed asking to all erase.*
- Press **OK** to all erase or **Esc** to cancel.



**Totality of recordings will be definitively deleted**

## 7. Set the device

This part allows to set the different general parameters of the device.

- Go to **"Menu"**.
- Go to **"Settings"** with left and right arrows.
- Press **OK**.

### 7.1. Set date and time

- Go to **"Date/Time"** line then press **OK**.
- Set date and time with arrows.
- Press **OK** to validate and back to **"Settings"** sub-menu.

### 7.2. Set language

- Go to **"Languages"** line then press **OK**.
- Select the required language (French or English) with up and down arrows.
- Press **OK** to validate.

### 7.3. Set automatic shut-off

- Go to **"Extinction"** line then press **OK**.
- Select **OFF** to deactivate it or the time before automatic shut-off (15, 30, 45 min or 1h).
- Press **OK** to validate.

### 7.4. Set brightness

- Go to **"Brightness"** line then press **OK**.
- Select the required level of brightness (from 1 to 9 or AUTO) with up and down arrows.
- Press **OK** to validate.

### 7.5. Set contrast

- Go to **"Contrast"** line then press **OK**.
- Select the required level of contrast (from 0 to 3) with up and down arrows.
- Press **OK** to validate.

### 7.6. Activate or deactivate beep

- Go to **"Beep"** line then press **OK**.
- Select **ON** to activate or **OFF** to deactivate beep of the keyboard of device
- Press **OK** to validate.

## 8. Information about the device

This part allows to have any information about identification, calibration and after sales service.

To get to it from measurement screen:

- Press **"Menu"**.
- Go to **"Informations"** with left and right arrows.

### 8.1. Identification

- Go to **"Identification"** then press **OK**.  
*Screen displays software version number and device serial number.*
- Press **Esc** to back to **"Informations"** menu.

### 8.2. Calibration

- Go to **"Calibration"** then press **OK**.  
*Screen displays calibration date of the device.*
- Press **Esc** to back to **"Informations"** menu.

### 8.3. After sales service

- Go to **"After sales service"** then press **OK**.  
*Screen displays Kimo after sales services phone number and email.*
- Press **Esc** to back to **"Informations"** menu.









Once returned to KIMO, required waste collection will be assured in the respect of the environment in accordance to 2002/96/CE guidelines relating to WEEE.

**[www.kimo.fr](http://www.kimo.fr)**

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