

# BSK SCHOLAR 500/700 HEAT RECOVERY UNIT

## SERVICE AND USER MANUAL



# **PREFACE**

Thank you for choosing the BSK Heat Recovery Units. The purpose of this document is to inform the users of the BSK Heat Recovery Unit about the parts and features of the device, to give information about operation and maintenance.

BSK heat recovery unit ensures high indoor air quality and energy savings at the same time. Heat transfer between the fresh air and the exhaust air is achieved by means of a plastic plate, counter-flow heat exchanger. It ensures high performance and high thermal conductivity, and efficient heat transfer between warm and cold air. The devices are designed to be easy to assemble, use and maintain. They work quietly thanks to the low noise self-motorized fans and noise isolation inside the device. Extensive controls, and accessory options give users the ability to custom fit their required needs perfectly.

## **WARRANTY DETAILS**

BSK guarantees that the heat recovery units it produced to a very high quality. It ensures repair and exchange during the warranty period for faults which could manifest from structural weld flaws, material defects, or manufacturing problems as well as fans, damper system or electronics. BSK does not accept any liability for damage caused by improper and irresponsible use conditions.

Failings related to all mechanical and electrical components such as fans, motors, and circuitry, caused by defective modules or incorrect assembly are covered by warranty for 1 year, starting from the date of invoice to the customer.

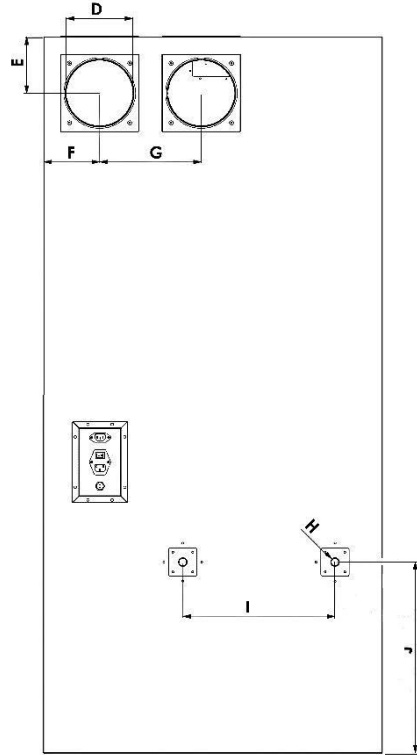
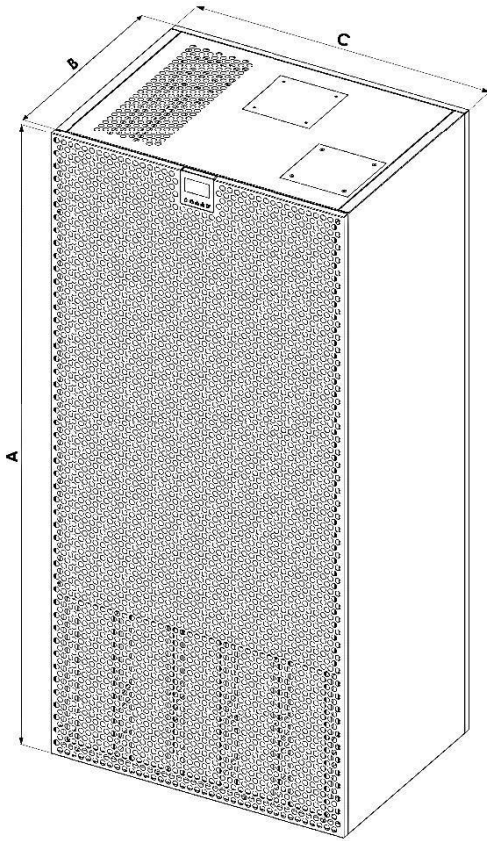
If repairs or modifications to parts have been made without the written permission of BSK or the authorized service, the device will not be covered by the warranty. Repairs carried out, and all defective parts changed by technical staff appointed by BSK or an authorized service will not void the warranty. Also the replacement of the G4 / F7 cassette filters contained in the device, made by BSK, will be excluded from this scope.

BSK warranty includes the replacement spare parts for fans, damper motor and system, and electronic components. It does not include the wages of service personnel, operation and / or maintenance costs. these costs must be met by the customer.

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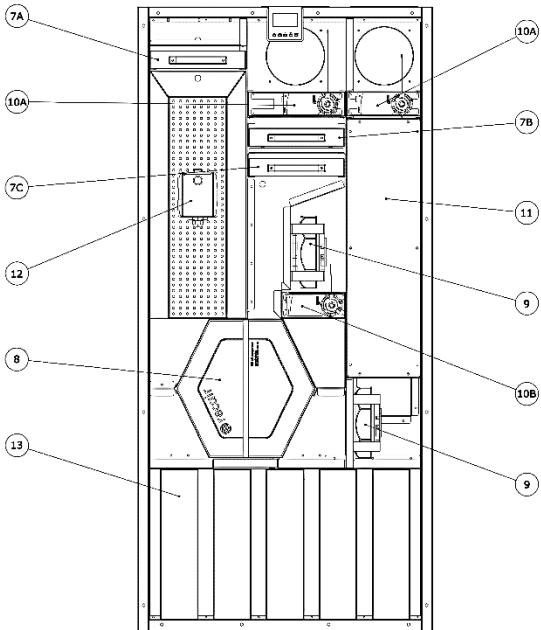
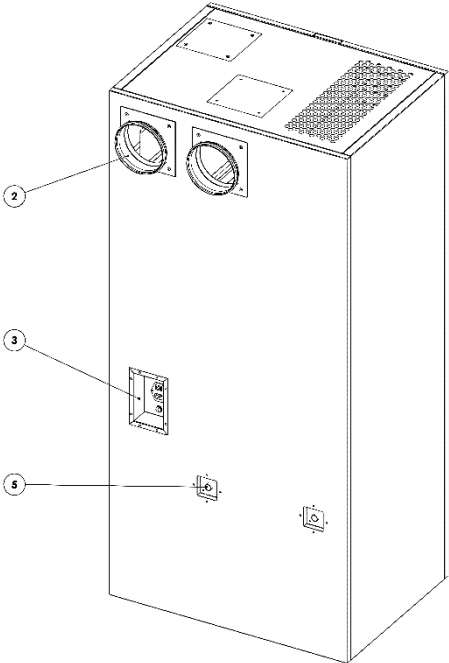
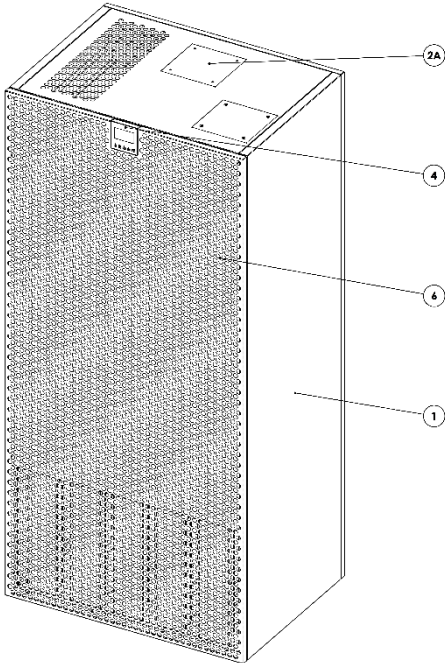
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# BSK SCHOLAR 500/700 DIMENSIONS



(mm)	A	B	C	D	E	F	G	H	I	J
<b>SCHOLAR 500</b>	1650	575	780	160	130	140	225	19	350	440
<b>SCHOLAR 700</b>	1650	625	780	180	130	140	225	19	350	440

# HEAT RECOVERY UNIT'S PARTS



## ITEM PARTS LIST

- 1 Body
- 2 Air Inlet/Outlet Connections
- 3 Electrical Connections
- 4 Digital Control Panel
- 5 Drainage Pipe
- 6 Front Cover(Service Door)
- 7 Filters
  - 7A - M5 Filter
  - 7B - G4 Filter
  - 7C - F7 Filter
- 8 Heat Exchanger
- 9 Fans
- 10 Automatic Dampers
  - 10A - Air Damper
  - 10B - By-pass Damper
- 11 Electrical Control Section
- 12 Co2 Sensor
- 13 Silencers (Baffel Plates)

## 1. Positioning and Clearances

Both the Scholar 500/700 can be positioned against an external wall or at an internal wall and ducted to the outside (This method will give a slight decrease in performance due to the longer duct pressure increase, as the units are designed to be used with a short duct run or no ducting.)

For access and maintenance leave at least 50mm clearance on both sides and 100mm at the rear.

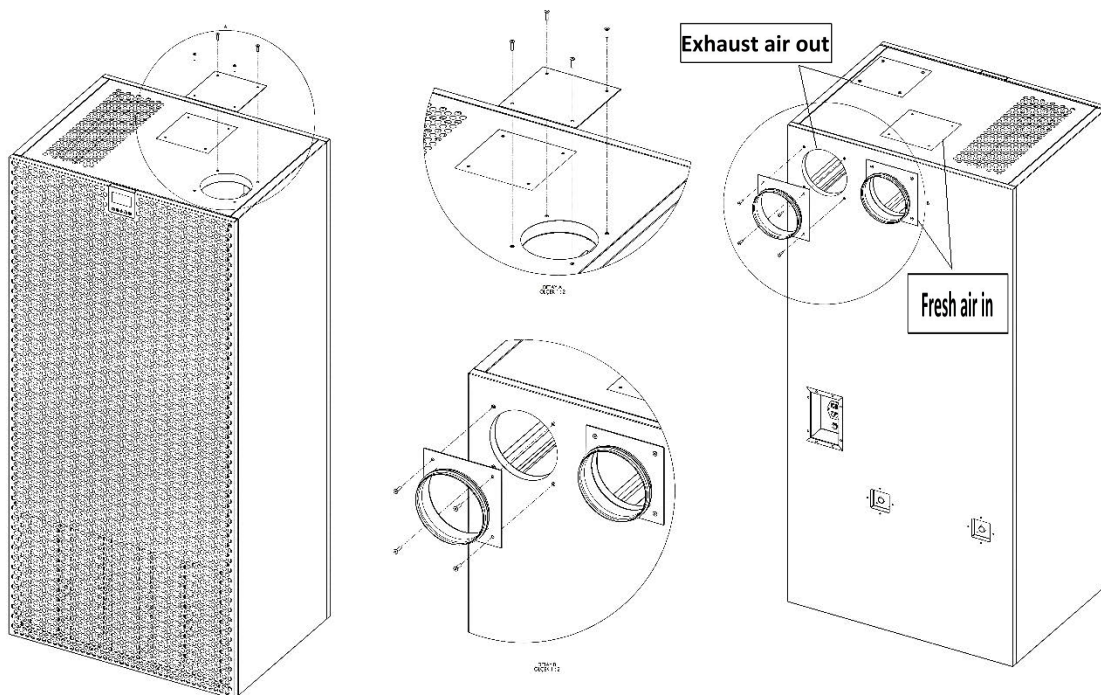
Leave at least 500mm gap from the ceiling to the top of the device. Do not obstruct the air intake grill on the top of the unit by any means.

Leave at least 1000mm of free space in front of the device. Do not obstruct the air outlet grill on the front of the unit.

## 2. Air Connections

Air connection pipes have a round cross-section. The duct connectors are sealed with double lipped rubber joints. All connections made should be made in accordance with diameter of the device model (Scholar 500  $\varnothing$ 160 or Scholar 700  $\varnothing$ 180 mm).

The device needs 2 air connections. These are indicated on the device near the air connection pipes with stickers.



The air connections can be changed from back to top, depending on the user's preferences. Simply remove the screws as shown above and swap the plates with the spigots.

### 3. Electrical Connections

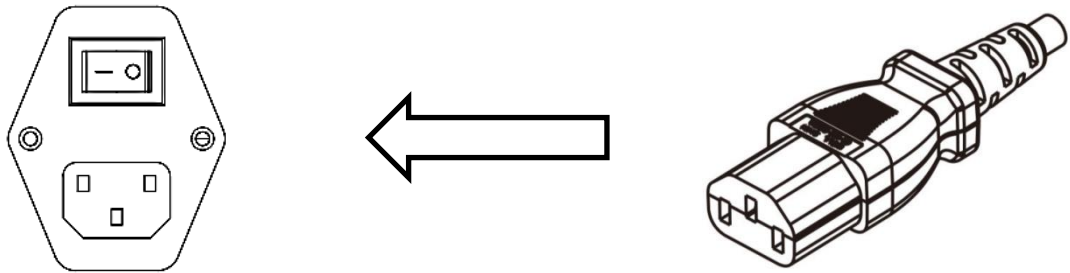
SCHOLAR units are designed to be plug and play, and all the electrical connections come with pre-connected sockets for this purpose.

#### A. Power Input

This is the main power source of the device. The socket is equipped with an on/off switch. “I” is the **ON** and “O” is the **OFF** position.

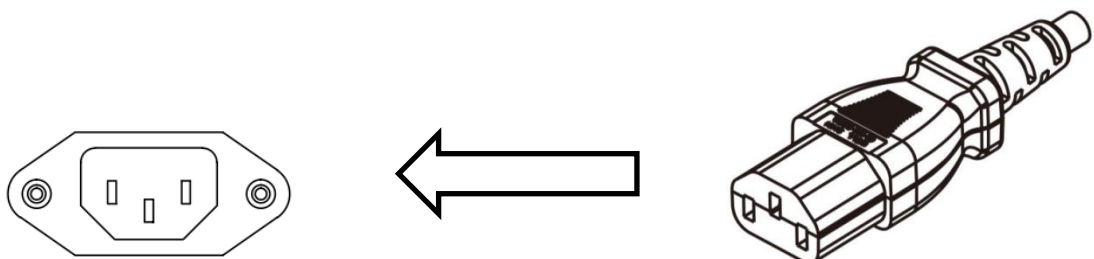
The switch must be on **OFF** position before all the connections to the device are made.

The socket is protected by a 10A fuse.



#### B. Boost Input

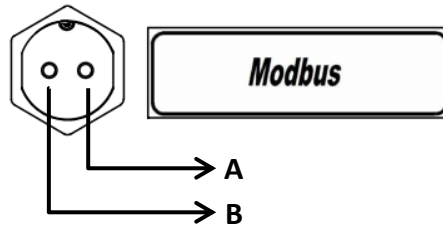
An additional power connection can be connected to the device via this port. When the connected switch is turned on, the device will enter Boost Mode which will override all other settings.



Users can change the aspirator and ventilator fan levels for Boost Mode to best suit their needs. To change the boost levels according to your needs, please refer to Digital Control Panel user guide (Pages 13 - 15).

### C. Modbus Port

The device can be connected to a building management system (BMS) via the ModBus protocol.



### 4. Digital Control Panel

The Digital control panel fitted to the device is used to control the various features within the Scholar 500/700. For more information on how to use the digital control panel please refer to the Digital Control Panel User Guide (Pages 13 -15)

### 5. Drainage Pipes

There is a collector tray made of galvanized sheet metal, to collect the condensing water droplets which can be formed inside the device. The drainage pipe has been taken out to be able to connect to the waste water system.

The drainage pipes must be connected to the waste water line before the device is started. The connection is made with a  $\varnothing 19$  mm pipe.

The drain must never be led to the gutter directly, since it can cause water damage when it freezes outside

The connection of the drain must always have a water lock to prevent smells from the waste water line.

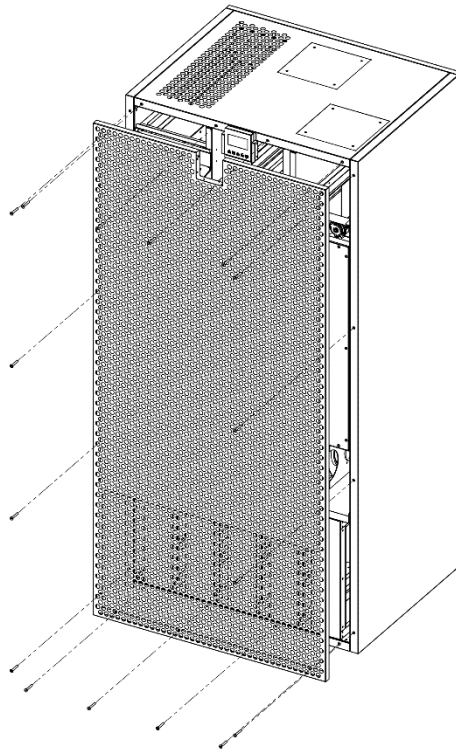




## 6. Service Door

The units have service doors that can be opened and sealed with hexagonal screws for maintenance and replacement.

To open the cover, unscrew all 16 bolts on the cover as shown below, with an M3 Allen key, and remove the cover.



## 7. Cassette filters

There are 2 filters (G4 and F7) after the fresh air and 1 (M5) after the extract air inlet which filters the air going into the device to protect the heat exchanger and other commodities from dust and abrasive particles.

**7A** – M5 Filter

**7B** – G4 Filter

**7C** – F7 Filter

All 3 filters are equipped with a pressure switch, which will notify the user when the respective filter is full. The warning message can be seen on the control panel.

To change the filters, remove the service door (Front Cover). Pull the filter from its slot, put replace with new filter in the same orientation and location, and replace the Service door (Front Cover).

## **8. Heat exchanger**

Plastic plated, high efficiency, hexagonal counter flow heat exchangers are used in all of the units.

To clean the heat exchanger, open the service cover and simply pull the heat exchanger from its slot. After removing the heat exchanger, wash it with water and dry it out before putting it back in. Tightly screw the service door (Front Cover) back on.

It is recommended to clean the heat exchanger once every 6 – 12 months depending on the usage.

## **9. Fans**

All devices utilize self-motorized, silent, monophase (220 V) and variable speed-controlled EC fans.

To change the speed of the fans from the digital control panel, please refer to the Digital Control Panel User Guide (Pages 13 -15)

## **10. Automatic dampers**

The device utilizes 3 automatic dampers.

### **A. Air dampers**

These dampers automatically open when the device is started, and close when it is turned off from the control panel. They prevent air draft to the device from the outside when the device is not running.

### **B. By-pass damper**

At the back of the device, inside, there is a channel which by-passes the heat exchanger. By-pass damper opens or closes this channel along with the heat exchanger. (When the canal is closed heat exchanger is open and vice versa).

By-pass damper is used to control the flow of air to the by-pass channel. This is called the Free-cooling mode, as it allows direct intake of the outside air, without conditioning it in the heat exchanger.

## Free-cooling mode

When the outside temperature is warm enough, heat recovery from the inside air is not always necessary. For these situations, usually on seasonal changes, free cooling mode is activated and the air flow is directed from the heat exchanger to the by-pass canal. This will decrease the pressure drop and the load on the fans can work with less energy, improving the power consumption of the device.

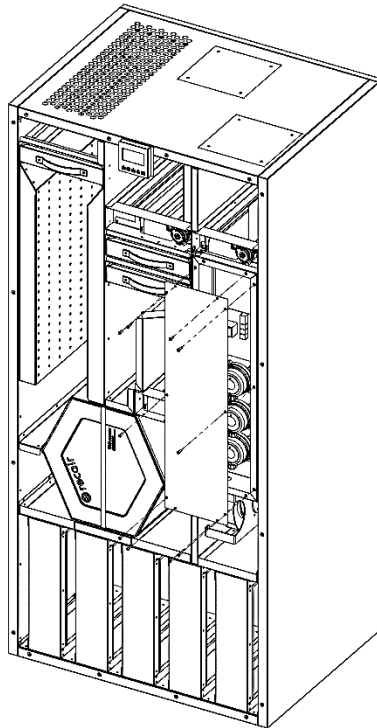
You can change the set temperature from the digital control panel to arrange the range of temperature when the free cooling mode is needed. For more information, please refer to the Digital Control Panel User Guide. (Pages 13 - 15)

## 11. Electric Control Box

All devices have a box on the body which encloses the electronic control, differential pressure switches and other electrical connections.

\*To access the controller box, open the service cover first. Then unscrew the controller box cover shown on the drawing below.

\*Qualified / Authorized personal only to access controller box.



## **12. Carbon dioxide (CO<sub>2</sub>) Sensor**


The device is equipped with a CO<sub>2</sub> sensor for automatic crowd detection. When the CO<sub>2</sub> ppm levels rise above a set value, the device will enter boost mode and increase its fan speeds to dissipate the CO<sub>2</sub> build-up. These levels can be controlled from the digital panel. For more information, please refer to the Digital Control Panel User Guide (Pages 13 - 15)

## **13. Box Silencers**

The device is fitted with silencers to reduce the fan and air noise. There are 2 regions of perforated silencers, located at exhaust air intake and fresh air output. There are also special cage silencers in front of the fans.

# BSK Scholar Digital Panel User Guide

## PANEL BUTTONS

 : Use it to turn the device on and off from the control panel. If the BSK Logo is on the screen, the device will be turned off.

**SETUP:** Use it to enter settings menus.

**▲ / ▼:** Use up and down keys to navigate through menu items or increase / decrease values of various settings.

**Mode/OK:** Use it to navigate through main screen, and some setting items. Can also be used as select/enter for some menu items.

## HOME SCREEN

If the device is turned on, you can control and change fan speeds, automatic mode, set temperature and other various settings of the device from the home screen.

Use **Mode/OK** button to cycle through ASP, VNT, SET and Auto mode. Use **▲ / ▼** keys to change values.

ASP and VNT are aspirator and ventilator fan level controls. You can select the level of fan speeds.

SET; is the value of Set temperature. This temperature is used for Free-cooling mode control. Bypass damper will open if the EXT temperature is within the range of +2/-2 of the SET temperature

Auto Mode; If selected, the device will adjust its fan speeds automatically according to the difference between the room temperature and set temperature. Device will try to keep the room temperature as close to the set temperature as possible.

**IMPORTANT:** You can press **SETUP** and **▼** keys together for 3 seconds to activate 7 deactivate the keylock for the control panel. When keylock is active, buttons on the panel will be locked until the keylock is deactivated.

## SETTINGS

To enter *Settings menu*, press and hold **Setup** button while the control panel is turned on (main screen). You can access various user settings and view information about the device from this menu. You can use ▲ / ▼ keys to navigate through and select the menu items and **Mode/OK** button to enter.

**1. Weekly Program:** You can set a weekly schedule for the device for automatic ON/OFF and control.

- Use ▲ / ▼ keys to cycle through the days. Press **Mode/OK** button to select a day, and then use **Mode** button to cycle through Start hour, Start minute, Stop hour, Stop minute. Use ▲ / ▼ keys to change the hour / minute values.

### IMPORTANT:

- If Start time is greater than Stop time (Eg. Start time: 15:00, Stop time 12:00), the device will be turned off for the whole day.
- If Start time is equal to the Stop time (Eg. Start time: 12:00, Stop time 12:00), the device will not be automatically controlled on that day.

**2. Date and Time:** Set the date and time of the device.

- Use **Mode/OK** button to cycle through the Date and Time. Use ▲ / ▼ keys to change the values.

**3. Language:** Set the language of the control panel. (Default to English)

- Use ▲ / ▼ keys to select between English / Turkish. Press **Mode/OK** button to continue.

**4. Display Light:** Set the brightness value of the control panel. (Default 50)

- Use ▲ / ▼ keys to select a value. Press **Mode/OK** button to continue.

**5. Display Const. :** Set the contrast value of the control panel. (Default 50)

- Use ▲ / ▼ keys to select a value. Press **Mode/OK** button to continue.

**6. Device Monitor:** Use it to view various states and/or sensor values of the device.

## SERVICE SETTINGS

**IMPORTANT:** These settings will change the behavior and function of the device. Only authorized service personnel should change these settings.

To enter *Service Settings menu*, press and hold ▲ / ▼ keys while the control panel is turned off (Logo screen). You can access various advanced settings and view information about the device from this menu. You can use ▲ / ▼ keys to navigate through and select the menu items and **Mode/OK** button to enter.

**1. Fan Level:** Set fan level percentages for the ASP and VNT fan stages. (Default levels are 25%, 40%, 55%, 70%, 85%, and 100%)

- Use ▲ / ▼ keys to change the fan level and press **Mode/OK** button to save and continue to the next fan stage.
- Stages start with the 1<sup>st</sup> (lowest) stage of ASP up to 6 (by default) and then cycles to the 1<sup>st</sup> stage of VNT up to 6.

**2. Fan Stage:** Set fan stage number between 1 and 6 (Default stage number is 6).

- Use ▲ / ▼ keys to change the stage number and press **Mode/OK** button to save and return to the main menu.

**IMPORTANT:** For maximum precision of control, you should keep this setting at 6

**3. CO2 Set value:** Set the CO2 ppm level, above which the device will enter boost mode.

- Use ▲ / ▼ keys to change the set level and press **Mode/OK** button to save and return to the main menu.

**IMPORTANT:** Do not change any other settings not stated above. If you accidentally change a setting here and your device starts to work incorrectly, please try resetting to factory settings. If the problems continue, please inform an authorized service personnel.

## GENERAL WARNINGS

- Installation and commissioning of the device must be done by Qualified / Authorized personnel.
- The heat recovery device should not be disassembled in any case. Only Qualified/Authorized service personnel can disassemble and repair. Otherwise, electric shocks or injuries may result.
- All protective materials (wrapping, etc.) placed on the device to prevent damage during transportation must be removed before the device is switched on. These materials can be inside or outside of the device.



- This appliance is not to be used in heated swimming pools, cold storage rooms, environments where humidity and heat are very different. It is not used in environments exposed to rain. (Otherwise, you may be exposed to electric shocks, and your device will not operate correctly.)
- Do not use this device in corrosive environments such as acids and in corrosive environments. (oil mist, paint, toxic gases etc ...) Do not use the device in flammable media (containing explosive gas).
- These devices operate at 230V - 50 Hz.



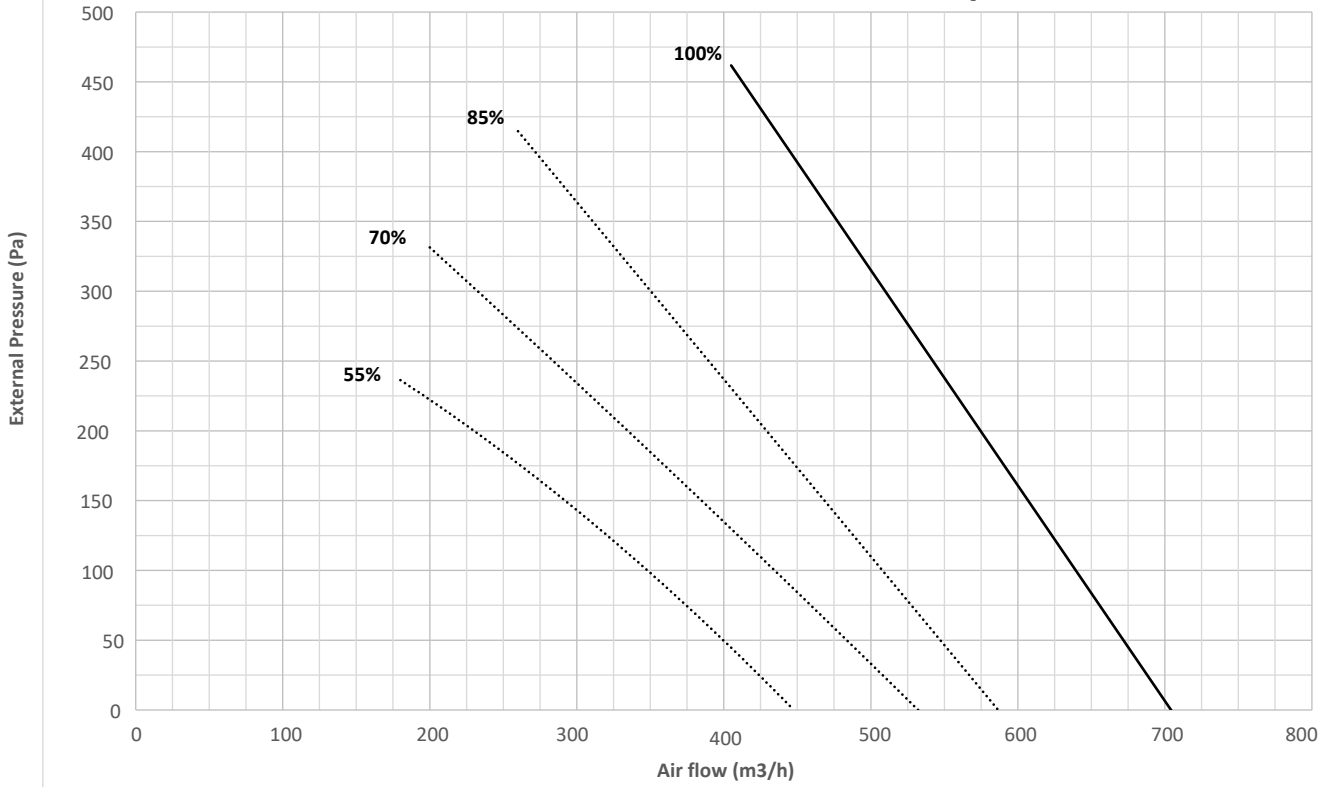
- Any repair of the device should be by Qualified /Authorized personnel only.
- Do not apply force to electrical connections and control box while lifting the device..
- When connecting the device, caution must be observed within the service spaces, as filter changes etc. cannot interfere with the fan motors.
- The drain pipes must be properly connected to the waste water lines before the device is started.
- If the control panel displays a warning about filter, you must change your filter.
- The fresh air inlet (exterior part) of the device with exhaust should be such that it does not permit ingress of water i.e. rainwater, into the device.
- This device should be used in a temperature range of -10 ° C to +40 ° C, where the relative humidity is below 60%.

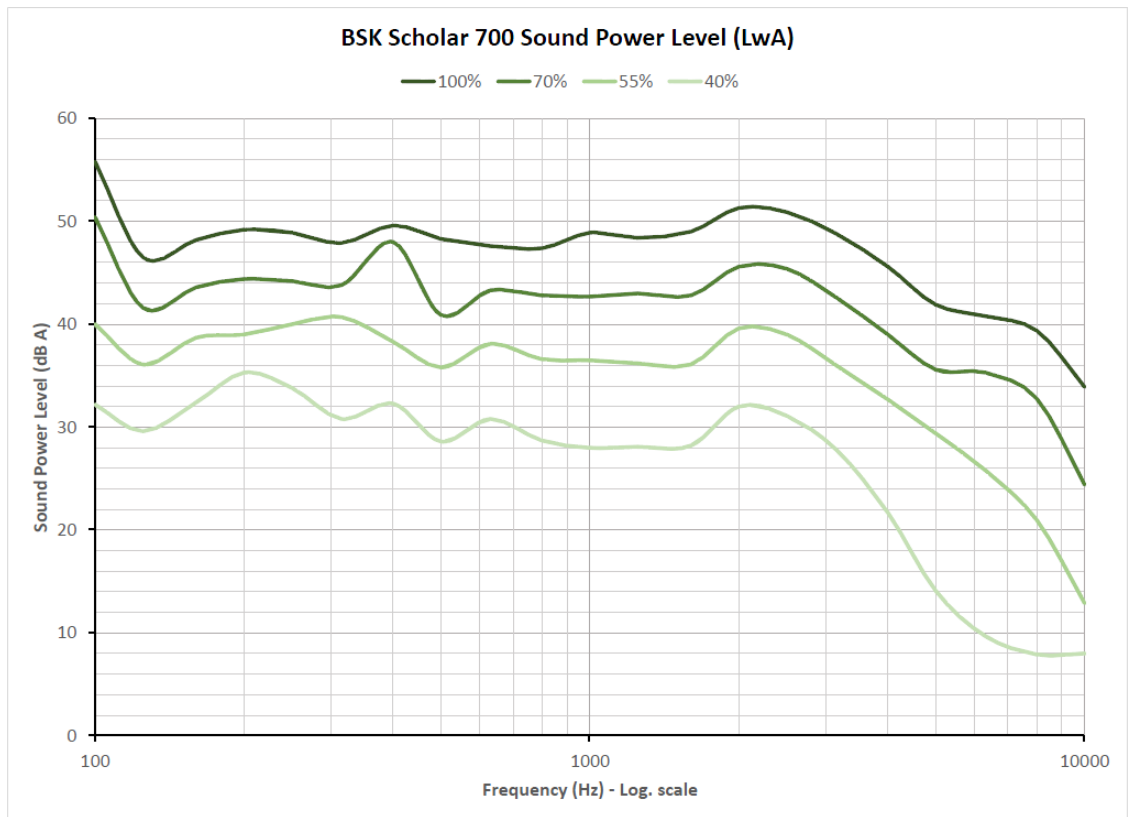
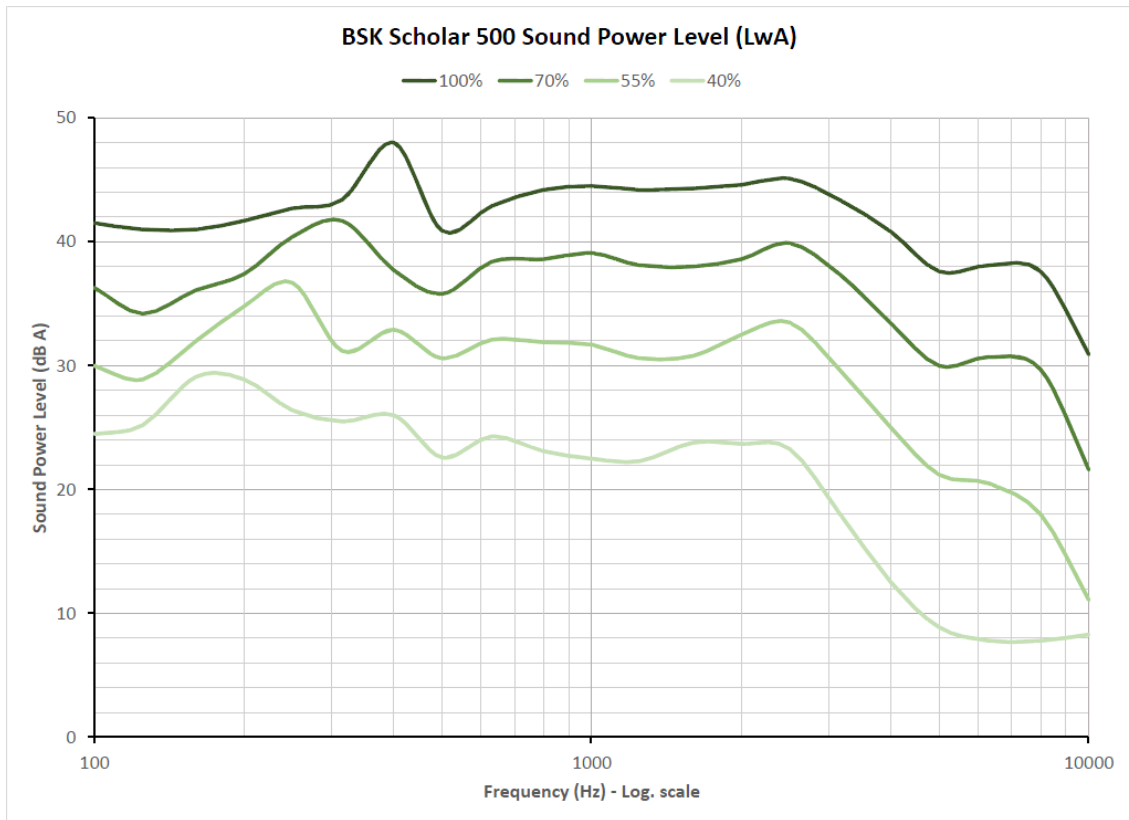




- Make sure that the power supply to the device is connected from a 10A spur using appropriately sized cable.
- Make sure that the device is completely isolated from all conductive material i.e. air ducts and building steel constructions.
- Switch off and disconnect all electrical connections before any work is started on the device.
- Ensure that all foreign substances be removed from the unit before the Front cover (Service Door) is replaced.
- During installation of the device the duct system should have no sharp turns, sudden contraction or expansion which could effect the correct airflow within the system.

### BSK SCHOLAR 700 Performance Graph





Average noise testing results @ 3 meters

Operation speed %70 - 40 dB

Operation speed %85 - 43 dB

Operation speed %100 - 45 dB