

# **User Manual**

## **Air Pressure Stabiliser**

### **Standard (aps)**

### **Fire-rated (apsf)**

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## **About**

Air Pressure Stabilisers provide an effective means of differential room pressure control suitable for use in Operating Theatres, Cleanrooms and many other applications. Using gravity as the motive force, they are extremely stable and are not subject to drift as are electronically controlled systems using sensors, controllers and dampers.

Though simple in construction they are very sensitive to differences in air pressure and must be treated with care to avoid upsetting the balance system.

Installation requires very little expertise, though selection of locations does require some forethought in order to avoid conflict with other equipment that might be required, or ventilation duct terminations the draught from which can affect stabiliser operation.

# Section 2.0 Handling and Care

## **Important:**

Air Pressure Stabilisers are precision instruments, factory balanced and preset to operate at designated pressure differentials. No major on-site adjustments will be necessary if the air movement regime is as specified.

Apreco offer a UK mainland on-site commissioning and maintenance service should it be required. Details are available on request.

Bearings are stainless steel, sealed for life and require no routine maintenance.

Air control blades are free of surface mounted balance weights and can be removed and easily wiped clean for sterilisation purposes. Care should be taken not to bend the air control blade in any way as this will affect its balance and the pressure setting.

To alter the threshold pressure please refer to the relevant data sheet.

Insertion and removal of the blade is a simple task provided the following instructions are followed.

Please note:

- This is a precision piece of equipment
- Care must be taken when removing or replacing a blade
- Do not apply undue heavy pressure as this will disturb the factory pre-set pressure.

These instructions assume that the actions are being carried out on the high pressure side and that the frame has been installed conventionally as per Apreco installation instructions with the main frame installed on the high pressure side.

When inserting the blade(s) into the frame, the serial number inscribed on the rear side of the blade MUST correspond to the serial number on the sticker on the frame.

When inserting or removing the blade, do not skew it and keep it in the horizontal position to avoid the blade scratching the frame and/or becoming jammed.

## Non-Locked Blade Type

**Clearly identify the type of Blade System utilised on the Stabiliser unit before trying to remove the blade.**  
If you require assistance tel. + 44 (0)1885 485 070

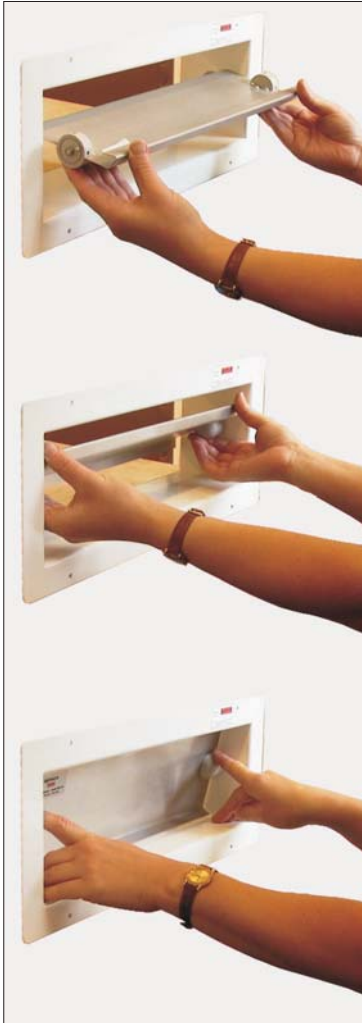
### Blade Removal

- ▶ With palms uppermost, place tips of index fingers on the underside of the grey hubs at either end of the blade. Apply pressure to rotate the top of the blade towards you until movement becomes restricted.
- ▶ Now apply down-wards pressure with the thumbs to the top outermost edge of the blade whilst applying gentle upward pressure on the grey hub with the index fingers to continue the rotation.
- ▶ Keep rotating gently until the hubs pop upwards out of position.
- ▶ Keep blade horizontal and lift upwards and withdraw the blade from the frame, taking care not to scratch the inside walls of the frame.

**DO NOT AT ANYTIME APPLY PRESSURE TO THE MIDDLE OF THE BLADE. THIS WILL BEND THE BLADE AND DISTURB THE BALANCED SET PRESSURE.**

### Blade Insertion

- ▶ Rest the blade horizontally on palms of hands, resting the grey hubs on your index fingers.
- ▶ Ensure that the face of the blade with the six screw heads & commission sticker is uppermost, making sure that the 'hooked turnover at the top of the blade is closest to you.
- ▶ Taking care not to scratch the inside walls of the frame, introduce the blade into the frame, retaining the horizontal position - keeping the blade above the support yokes (fixed to the inside walls of the frame).
- ▶ When the hubs are directly above the yoke, line up the bearing with the top of the yoke, then gently lower into the yoke.
- ▶ Allow blade to rotate into resting closed position.
- ▶ In this almost vertical position, apply downwards pressure with fingertips to the top of the outermost edge of each hub until the bearings pop into place. The blade is now secured into position.



## Security Lock Type

**Do not try to remove the blade without ensuring that the security lock is unlocked.**

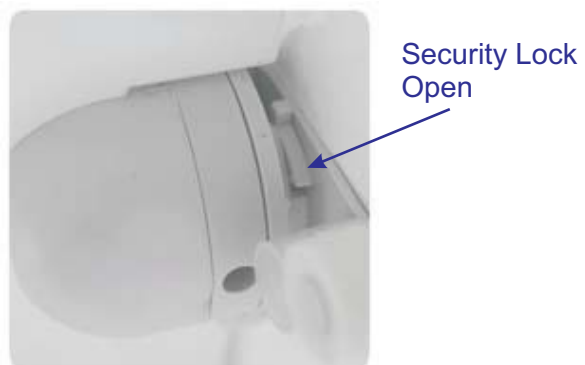
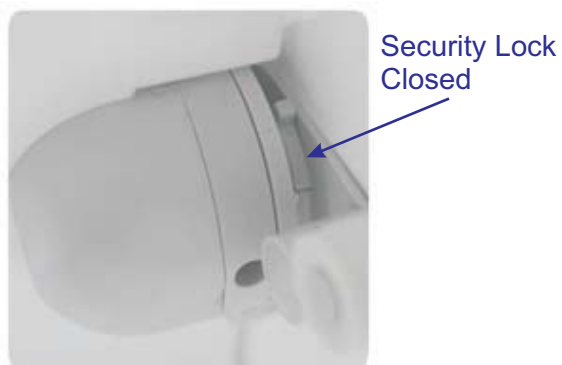
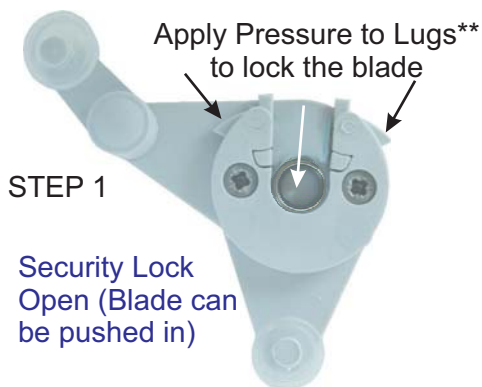
Blades fitted into frames with this system cannot be removed in the same way as the Non-Locked type. On each assembly there are two movable lugs which, in one position, will retain the blade bearing in the assembly, and in the other allow its release (see diagrams and images below).

Note: When fitting a blade into a frame it is not necessary to rotate the 'lugs' to the release position as the bearing will open them up as it is introduced downwards into the yoke path.

### Opening the Security Locking System



### Closing the Security Locking System



\*\* Pressure applied with an Allen Key.

# Section 3.0 Installation

## Timing of Installation

Once the wall aperture has been prepared, the fitting of the Air Pressure Stabilisers can be left until the walls have been plastered and painted. This will ensure a clean installation and will help to avoid damage to the unit.

## Handling

Air control blades are finely balanced. Care **MUST** be taken to make all but the lightest contact and avoid altering the balance. Air control blades can be removed from the frame and stored until final commissioning takes place.

## Safety

### General:

Whilst all possible care is taken to eliminate sharp edges and burrs, care should be taken to avoid skin cuts during installation.

### Handling:

Whilst Air Pressure Stabilisers are generally light in weight, normal safe handling and lifting precautions should be adopted.

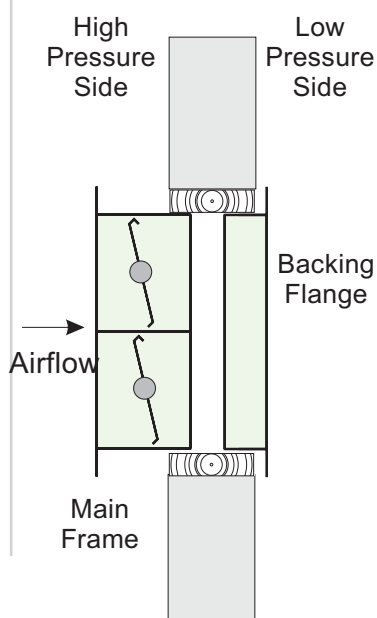
## Location

Air Pressure Stabilisers can be fitted at any level although at high level the units are generally safe from accidental damage and are less easily blocked by items of equipment.

Low level locations are sometimes preferred (particularly in anaesthetic rooms) where the air which normally flows through the unit helps to prevent a build up of anaesthetic gases at low level, however this is usually at the discretion of the designer.

Avoid locating units near to air supply grilles where the draught might affect the operation of the unit.

### **Which bit goes where?**



### Wall/Ceiling Mount:

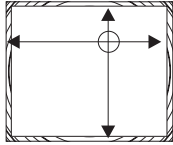
Air Pressure Stabilisers are generally built to be fitted into walls. Occasionally they are supplied to be fitted into the ceiling. Please note that ceiling and wall fitting units are **NOT** interchangeable.

In order to avoid confusion it is advised that the main frames are always fitted into the wall on the side that will be the high pressure side with the loose backing flange on the low pressure side (exhaust).

Please note: All Air Pressure Stabilisers must be fitted with the rotational axis of the air control blade horizontal.

## Section 3.0 Installation

### Preparation of walls & fixing of Standard Wall-mounted Air Pressure Stabilisers



**Please note that the Stabilisers are non-load bearing and provisions for lintels should be made if required.**

#### Step 1

Form timber lining (generally from 19mm timber).

External dimensions:

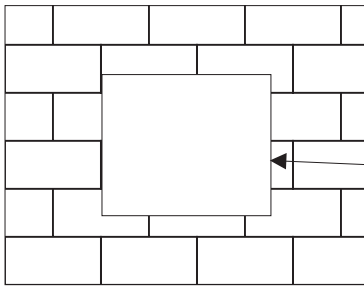
= Over-flange dimensions less 5mm

Internal dimensions:

= Greater than Wall Aperture dimensions

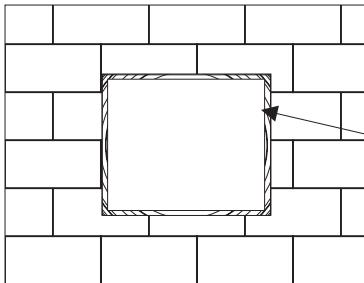
Note:

For Stud Partition walls it may be possible to use a cavity wall type fixing without the need for a timber frame.



#### Step 2

Form hole in wall large enough to accommodate timber frame.



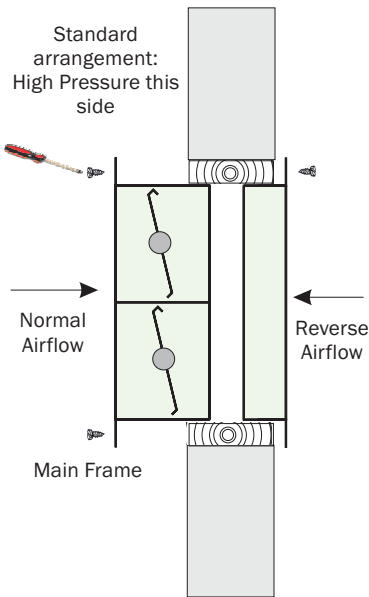
#### Step 3

Fit timber frame to hole in wall, fix in place and finish plaster-work to edge of frame.

#### Step 4

Check which way the Air Pressure Stabiliser should be fitted to the wall. The standard arrangement is for the main frame to be on the higher pressure side (inlet side).

## Standard Wall-mounted



### Step 5

Screw backing ring in place (if supplied).

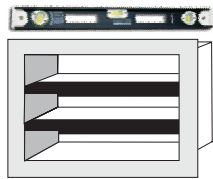
### Step 6

Fit main frame into wall from opposite side of wall and screw in place through pre-drilled fixing holes in flanges.

### Note: VARI-centric Units

Where units are VARI-centric type, the air control blades are removable and can be supplied separately from the frame and backing ring. All air control blades are marked with the serial number of the frame to which they must be fitted.

Use a spirit level to check unit is level.

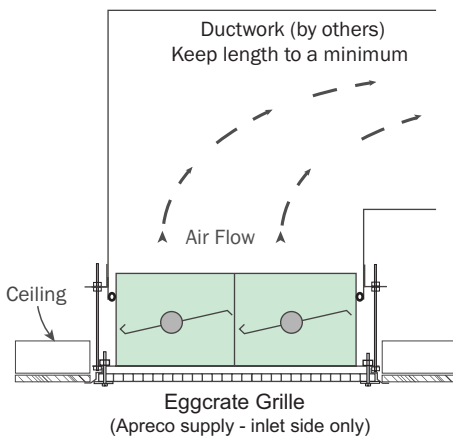


### Warning

Air control blades are finely balanced. Care MUST be taken to make all but the lightest contact.

## Ceiling Mounted Unit

### Ceiling Fixing

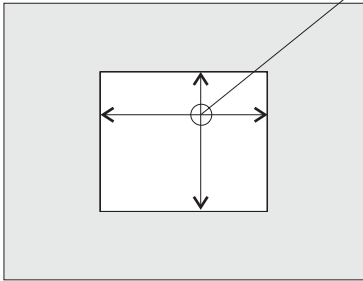


Ceiling fixing is generally used in conjunction with an exhaust duct. The length of the exhaust duct should be kept to a minimum whilst the cross sectional area should be maximised in order to minimise the dynamic air pressure drop. This pressure drop will be added to the pressure drop across the unit (like electrical resistances in series) and will affect its operation.

Note: a PDF file showing fixing in more detail is available. Please ask for details.

# Section 3.0 Installation

## 2 Hour Fire-rated Wall-mounted



### Step 1

Form opening in fire wall. In stud partitions, ensure that stub bracing members form a support frame around the hole

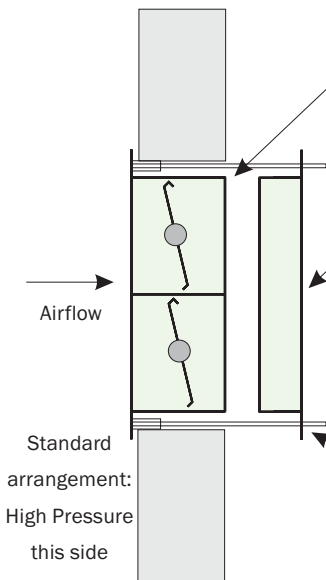
Internal dimensions: = See Selection Schedule

### Step 2

Check which way the air pressure stabiliser should be fitted to the wall. The standard arrangement is for the Main Frame to be on the higher pressure side (inlet side).

### Step 3

Engage main frame into wall opening



### Step 4

Engage backing flange into wall on low pressure side.

### Step 5

Screw in studs provided into welded nuts on rear of main flanges and lead

### Step 6

Screw retaining nuts onto studs and trim off excess length of studs and file off any burrs created.

Note: VARI-centric Units

Where units are VARI-centric type the air control blades are removable and can, on request, be supplied separately from the frame and backing ring. All air control blades are marked with the serial number of the frame to which they should be fitted.

### Warning

Air control blades are finely balanced. Care MUST be taken to make all but the lightest contact.

**Please note that the Stabilisers are non-load bearing and provisions for lintels should be made if required.**

## Health and Safety

The commissioning of Air Pressure Stabilisers is an inherently low risk operation. However it is important that commissioning engineers should make themselves aware of any site-specific health and safety issues and conduct themselves in a manner that will ensure the continuing health and safety of all personnel on site.

It will generally be necessary for air supply and extract systems to be turned ON to carry out the commissioning. Only competent and authorised personnel should operate such equipment.

Where installations include Air Pressure Stabilisers fitted at high level, access to make adjustments to operating pressures should be by appropriate means (e.g. ladder steps, access platform etc.).

When making adjustments to blades there is the possibility for a blade to slip from the grip of the commissioning engineer and to fall to the ground. A suitable area on either side of the Air Pressure Stabiliser should be suitably cordoned off to prevent possible injury to other personnel.

## Commissioning

Whilst the fundamental objective of commissioning the Air Pressure Stabilisers is to ensure that they operate correctly and at the designed pressures, they form a fundamental part of the ventilation and air movement system. Additionally the integrity of the rest of the facility is vital to the overall performance. Commissioning engineers should therefore be aware that deficiencies in the rest of the system may adversely reflect on the operation of the Air Pressure Stabilisers. Commissioning engineers should therefore have a clear overview of the air flow design of the facility.

## Checking Threshold Pressure Setting

1. Ensure that all the air supply is turned at the normal supply rate.
2. Check that all rooms in the facility are sealed to the design level and that all doors are closed.
3. Check that all units are installed properly and that the air control blades move freely.
4. When a steady state situation has been established, note the condition of all relevant air pressure stabilisers in the facility i.e. all units except dual condition units should be fully open. Dual condition units are those which are required to control air flow at two levels and will have been sized to handle the greater flow, thus in the lower flow condition the unit will not be fully open.
5. Use an accurate inclined liquid or electronic manometer to measure the differential pressures either side of each unit. DO NOT pass sensing hoses through the stabilisers. These should be passed under a door or through other convenient point. Ensure that the end of the pressure sensing hose is sensing static pressure and not affected by passing air velocity.
6. Under this condition the room pressures should be at, or close to, design levels.
7. Check the pressures at which the blade closes. Do this by carefully reducing the differential pressure across the unit by opening an appropriate door to lower the high side pressure or by somehow increasing low side pressure.

## Problem Solving - Peripheral Problem Pointers

1. Rooms over-pressurising - doors not leaking to design e.g. fitted with seals or too much air supply or too little extract.
2. Rooms under-pressurising - too much extract or too little supply or door gaps too big.

**Apreco offer a UK mainland on-site commissioning and maintenance service, for further details please contact the main office.**

# Section 5.0 Adjustments

## Blade Adjustments

Apreco VARI-centric Air Pressure stabilisers achieve their characteristic pressure/flow curve by a combination of aerodynamics and positioning of the axis of rotation and the mass and centre of gravity position of the blade. Adjustments to the threshold pressures are achieved by moving the body of the air control blade relative to the axis of rotation. The VARI-centric hub contains a moveable element to which is attached the main bearing. This bearing carrier is held in position by opposing grub screws which pinch the bearing carrier. This requires little force and the grub screws should not be over-tightened.

The pair of grub screws which are positioned horizontally (see picture) provide the means of altering the threshold pressure.

The pair of grub screws which act vertically adjust the sensitivity of the action of the blade and is factory set. It is NOT ADVISED that adjustments be made to the sensitivity setting.

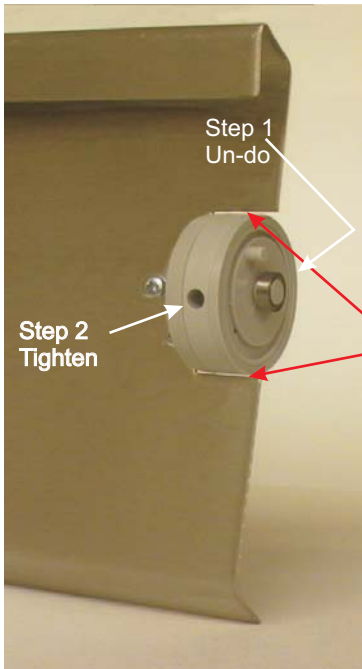
### INCREASE Threshold Pressure (Vertical Mount)

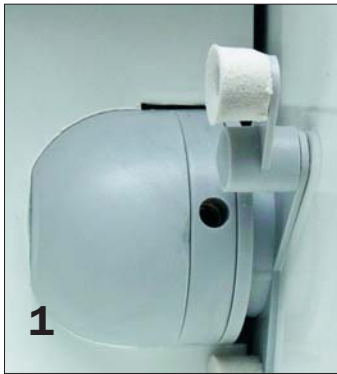
**1.** Remove the blade from the frame and adjust the position of the bearing relative the hub. To increase the threshold pressure, use a 2.0mm allen key to unscrew (anti-clockwise) the grub screw on the high pressure side of the hub. Screw in (clockwise) the grub screw on the low pressure side of the hub by the same amount to gently lock the bearing carrier in position

**DO NOT OVER-TIGHTEN GRUBSCREWS  
(Max Gap width 1mm)**

### DECREASE Threshold Pressure (Vertical Mount)

- 2.** The opposite procedure is adopted to decrease the threshold pressure.
- 3.** As a general rule, a change of threshold pressure of ~5Pa is effected by one complete turn of the grub screws on one hub only. If both hubs are adjusted the same way (i.e. moving bearing towards or away from the high pressure side) by one turn a ~10Pa change is made.
- 4.** For minor adjustments to the pressure setting (up to ~5Pa) it is only necessary to adjust one side and it is acceptable that the blade can be slightly at an angle to the frame - This will not affect the operation of the blade.
- 5.** Should it be necessary to adjust the pressure subsequently, it is generally advised that further adjustments are made such that the offset of each bearing relative to the centre of the hub is broadly equal and thus the position of the blade in the frame is maintained reasonably at right angles to the frame. This aspect is non-critical.
- 6.** To determine the new threshold pressure setting value, open and close a control door to allow the room pressure to rise and fall. Use a manometer to measure the new pressure at which the air control blade closes.
- 7.** Having achieved a satisfactory pressure setting inscribe the commissioning set pressure label (located on the low pressure side of the blade) with the value of threshold pressure for future reference.





### Volume Flowrate Adjustment

Under certain circumstances the air passing through the air pressure stabiliser may be significantly less than the designed level. In this situation the blade will be only partially open and may 'hunt' for a time oscillating between open and closed for a time before settling to a stable position. In order to reduce the hunting it is advisable to reduce the capacity of the stabiliser. This can be done by the following means:-

Allow the stabiliser blade to settle to a stable position. Using adhesive tape make a mark to indicate the open position of the blade.

The opening stop is a press fit onto a splined stub and can be repositioned to prevent the blade opening further than the mark.

Using a blunt knife edge the opening stop can be gently prised from the splined stub taking care not to distort the outrigger too much.

Re-position the stop at an appropriate angle on the splined stub to limit the degree of opening of the blade to the required extent

Press the stop firmly onto the splined stub.

### Routine Maintenance & Cleaning

Air Pressure Stabilisers are precision instruments, factory balanced and preset to operate at designated pressure differentials. No major on-site adjustments should be necessary if the air movement regime is as specified. Air control blades are free of surface mounted balance weights and can be removed and wiped clean for sterilisation purposes. Care should be taken not to bend the air control blade in any way as this will affect its balance and the pressure setting. To alter the threshold pressure please refer to the relevant data sheet.

#### Weekly

The standard Apreco-Ag antimicrobial finish supports a cleaning regime as required by the rooms classification. The blades and frame should be wiped weekly with a disinfectant wipe. The blade can remain in its frame for weekly cleaning with an option to fully remove if desired.

#### Annually

The blade should be removed and the bearings checked for smooth operation, the bearings can be cleaned or replaced without the need to return the unit back to our works. The closed-cell soft foam stops should also be checked for wear and replaced as required. Spares can be ordered online.

Annual Maintenance Contracts are available please contact our office for further details

### Spares

**The requirement for spare parts is unlikely therefore we do not generally recommend users carry stocks of spares. Apreco are usually able to despatch basic replacement components within 48 hrs of unit identification .**

#### Frames and Blades:

All Apreco Air Pressure Stabilisers carry a serial number from which identical copies can be made if necessary.

#### Hubs:

Hub assemblies, once assembled, are visibly very similar, but in fact handed left and right.

#### Bearings:

Bearings for all VARI-centric air pressure stabilisers are common throughout the range. Only bearings supplied by apreco should be used as they are specially lubricated with low viscosity lubricant.

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