

# AIR+PLUS

Air Conditioning Technologies



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## LAMINAR FLOW UNITS INSTALLATION AND USER MANUAL

1200x2400

1400x2400

1600x2400

1800x2400

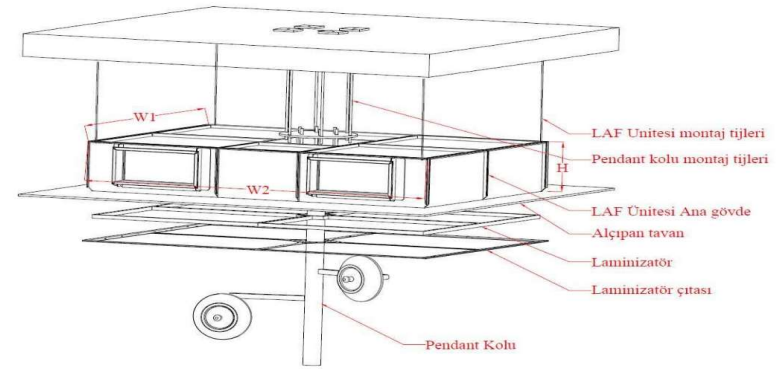
2000x2400

2200x2400

2400x2400

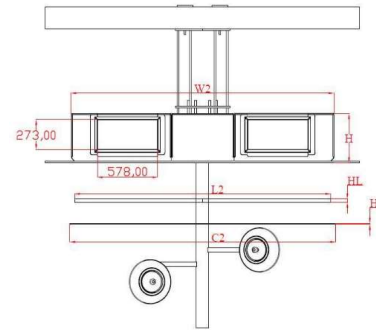
LAMINAR FLOW UNITS WITH SIDE FILTER								
Technical Specifications Table								
Unit Dimensions	Unit	1200x2400	1400x2400	1600x2400	1800x2400	2000x2400	2400x2400	3200x3200
<b>External Dimensions</b>								
Length (W2)		2510	2510	2510	2510	2510	2510	3310
Width (W1)	mm	1310	1510	1710	1910	2110	2510	3310
Height (H)		450	450	450	450	450	450	450
<b>Air Supply Area</b>								
Length	mm	2400	2400	2400	2400	2400	2400	3200
Width		1200	1400	1600	1800	2000	2400	3200
<b>Laminator Dimensions</b>								
Length (W2)	mm	2445	2445	2445	2445	2445	2445	3245
Width (W1)	mm	1245	1445	1645	1845	2045	2445	3245
Height (H)	mm	30	30	30	30	30	30	30
<b>Laminator Trim Dimensions</b>								
Length (W2)	mm	2537	2537	2537	2537	2537	2537	3337
Width (W1)	mm	1337	1537	1737	1937	2137	2537	3337
Height (H)	mm	14	14	14	14	14	14	14
Standard Air Velocity	m/h (0,24-0,27 m/s)	2490-2800	2900-3265	3317-3732	3732-4200	4147-4665	4976-5600	8850-9953
HEPA Filter Type	H13/H14	G30/G40	G30/G40	G30/G40	G30/G40	G30/G40	G30/G40	G30/G40
HEPA Filter Initial Pressure Loss (max.)	Pa	250	250	250	250	250	250	250
Recommended filter change pressure	Pa	550	550	550	550	550	550	550
<b>Hepa Filter Size</b>								
Width		305	305	305	305	305	305	305
Length	mm	610	610	610	610	610	610	610
Height		292	292	292	292	292	292	292
Yield H13		99,95%	99,95%	99,95%	99,95%	99,95%	99,95%	99,95%
H14	@ 0.3µ	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
Number of HEPA Filter (Number of channel entries)		2	2	4	4	4	4	6
Pendant Handle Outlet Clearance	mm	Ø140	Ø140	Ø140	Ø140	Ø140	Ø140	Ø140
Channel Inlet Dimensions (from inside to inside)	mm	2x273x578	4x273x578	4x273x578	4x273x578	4x273x578	4x273x578	6x273x578
Voltage	Volt AC	220-230	220-230	220-230	220-230	220-230	220-230	220-230
Frequency	Hz	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60
Phase	N / A	Tek	Tek	Tek	Tek	Tek	Tek	Tek
Power consumption	kW/h	0,06	0,06	0,06	0,06	0,06	0,06	0,06

OUR COMPANY HAS THE RIGHT TO CHANGE THE TECHNICAL DETAILS OF THE PRODUCTS WITHOUT NOTICE



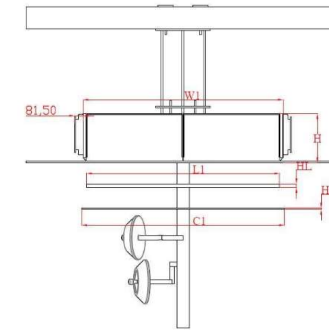
FRONT VIEW

ÖN GÖRÜNÜŞ



SIDE VIEW

YAN GÖRÜNÜŞ



## LEGAL NOTICES

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Our dear customer,

We'd like the product manufactured with high quality and design to offer the best performance in accordance with its purpose.

To do so, read this manual thoroughly before and after installation and retain it as a reference. Follow all instructions and information given in this manual.

Please note that this manual may also apply to other models. The differences between the models are clearly indicated in the manual.

	Important information or useful tips for use.
	Warning of dangerous situations for life and property.
	Warning of electric shock.
	The packaging of the product is made of recyclable materials in accordance with our National Environmental Legislation.

Do not dispose of packaging waste with household or other waste, but at the collection point designated by the local authority.



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## SECTION 1 PRODUCT INFORMATION

### 1.1 General Description

AIRPLUS® LFU is an air distributor plenum to get low turbulence, one-way linear flow unit (laminar flow unit) in areas requiring a sterile environment, providing a linear and homogeneous flow by creating a sweeping effect, to remove particles and microorganisms.

Laminar flow unit is manufactured of 304 or 316 quality stainless steel sheet which is resistant to abrasive effect of disinfectants. There is a mounting space at the center of the unit large enough to hide the operating room lamp, mounting flange and related electronic equipment. The homogenous speed distribution of the air coming from the system provided by the laminator located at the bottom of the unit.

Laminar flow unit; It is used for maximum protection from airborne microorganism contamination. The linear flow provides 100 times more protection compared to the turbulent flow. In the CLASS 10,000 cleaning class provided by turbulent flow, the predicted number of CFUs is around 100 per 1 m<sup>3</sup>, while under the laminar flow, the number of CFUs per 1 m<sup>3</sup> is less than 1 under CLASS 100 (US Federal Standard 209E). (CFU: Colony Forming Unit)

Depending on the size and design characteristics of the laminar flow unit, the required physical installation (by meeting the conditions of generations of heat gain in all seasons in operation rooms, supply air velocity and temperature stabilization, selection of appropriate OP satellite lamp and elimination of disturbing effects) are provided in accordance with European Standard DIN 1946/4 - 1999, DIN 1946 / 4-2008, ISO EN 14644-1 and ISO EN 14644-3 requirements.

The laminar flow unit is designed to eliminate viable and inanimate particles in the environment that must be protected by the sweeping effect. This unit cannot be used for cleaning environments with biological or chemical hazards. Biosafety Cabinets should be used against such hazards.

### 1.2 Quality Assurance

Our laminar flow units are tested for air impermeability in accordance with DIN 1946-4 and DIN 25414 standards during production. The requirements of ISO 9001 Quality Management System are applied before the units are delivered at the factory. The unit will give the desired performance with proper installation and use.

## 1. 3 Installation

The laminar flow unit is a special product with the equipment that requires sensitive transportation, installation and expertise with sensitive filters. It removes particles and microorganism in the areas requiring a sterile environment by creating a sweeping effect thanks to its linear and homogeneous flow.

Reinforced M10 stud mounting holes should be used for laminar flow unit installation.

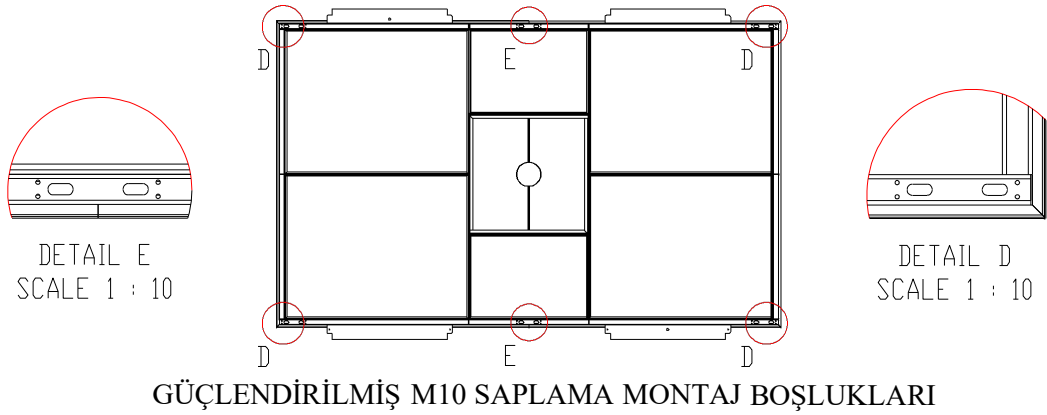


Figure 1: REINFORCED M10 STUD MOUNTING HOLES

During installation be careful of unbalanced or compressed mounting. Make sure there is no any difference on middle and edge dimensions due to compression after suspended ceilings and mounting completed and make the installation with level device to reach the maximum balance.



Technical personnel must use suitable carrier and suitable lifting equipment during the installation. Injury may occur while lifting the unit.

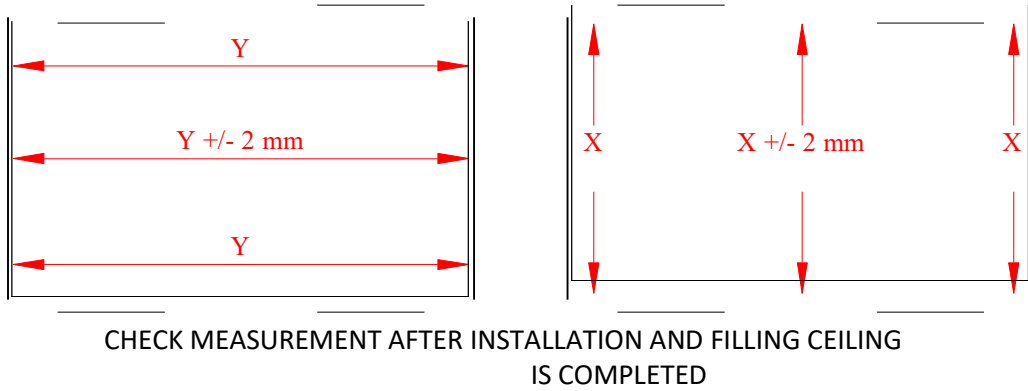


Figure 2 : Check dimensions and balance after installation is complete

The connection detail of the suspended ceiling and the device edge extension must be in accordance with Figure 3. In addition, the joints must be completely sealed. The measurement of the tightness must be carried out without the decorative frame of the laminator. The decorative frame should be free and easily removable with the laminator.

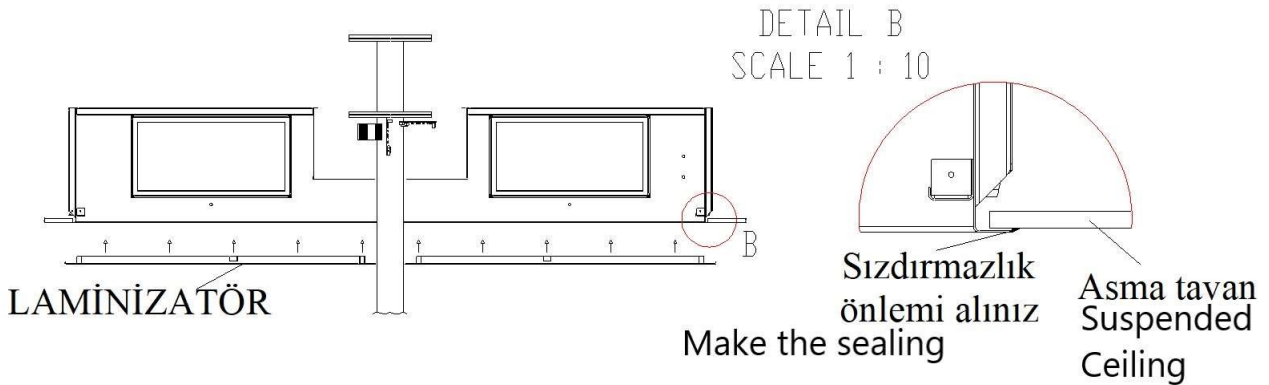


Figure 3

The electrical components of the operation light should be placed in the special chamber inside the laminar flow unit and there should not be any obstructive parts (hiding cups, etc.) that would cause disturbance in the air flow in the laminator area.



Electrical connections must be done by authorized and qualified persons. The laminar flow unit lighting should be operated after the necessary safety conditions are met.



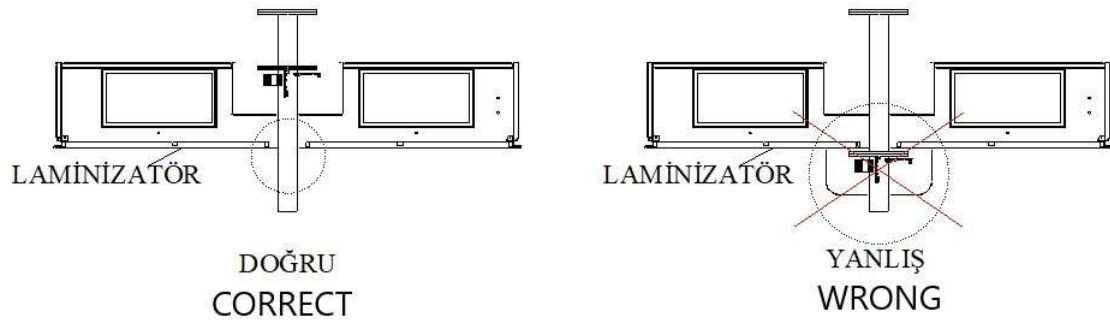
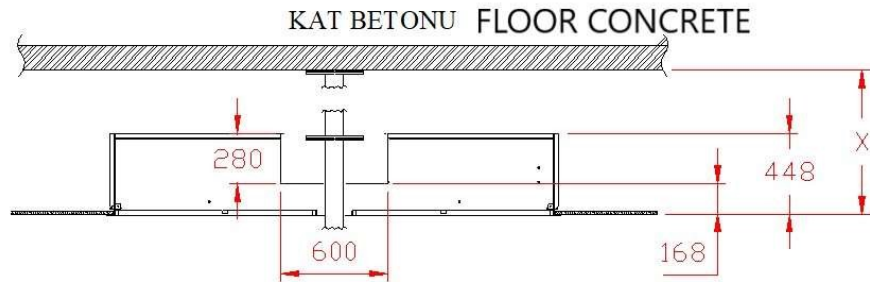


Figure 4

For the proper preparation of the bearing shaft length and flange codes, please inform the operating light supplier or installation team of the following dimensions:



Transformer and electronic components hiding slot.

Dimensions and codes

\*\*The dimensions are given from the lower level of the suspended ceiling.

\*\*Determine X dimensions according to ceiling code

Figure 5

Operating light carrier shaft diameter may vary according to product brand. The gaps in the exit area from the laminator and the cover of the electrical component hiding chamber must be closed in such a way that no air must leak.

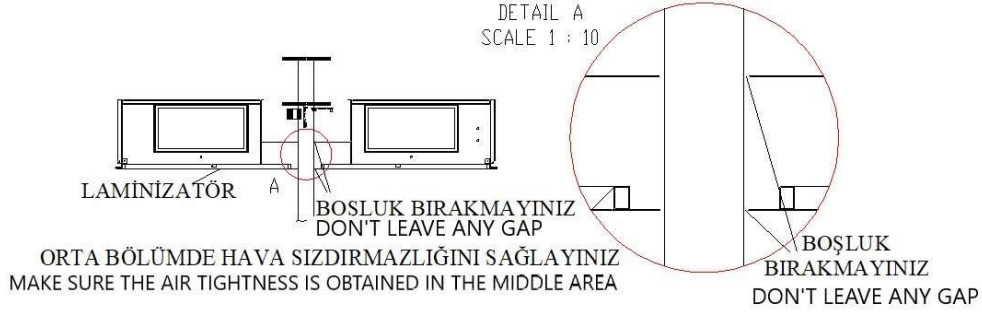
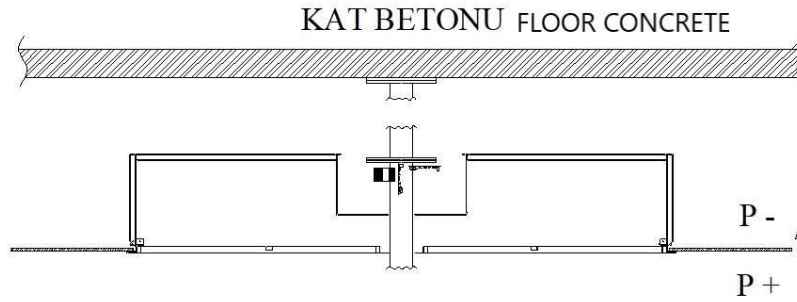


Figure 6

The suspended ceiling in where the laminar flow unit is hidden must be taken to negative pressure to the degree of the operation room (Triple amounts of leaks in air channels that is tested for air tightness according to DIN 1964/4 standard, must be absorbed by the help of air-suction channels)



ASMA TAVAN ARASI OPERASYON ODASINA GÖRE  
MUTLAKA NEGATİF BASINÇTA OLMALIDIR

**The suspended ceiling in where the laminar flow unit is hidden must be taken to negative pressure to the degree of the operation room**

Figure 7

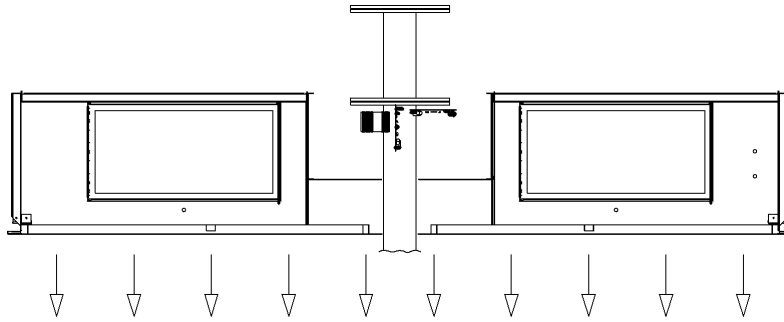
When any unit is installed, it is subjected to a series of tests under the current standard ISO EN 14644 Class 3 to check its operational performance. These tests are mandatory for starting the unit.

These tests include hepa filter tightness tests using aerosol and particle count testing to evaluate the cleanliness of the unit.

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If you have any questions regarding the units allocation, you can ask for support from our technical department

Air flow rate in laminar flow unit must be min. 0.24 m/s. As it may cause neck stiffness to operational team or thermal shock to patient, avoid speeds above 0.27 m/s unless allowed by the operator.



Vort = 0,24 m/s (0,24-0,27m/s) olmalıdır

Figure 8 VORT = 0,24 m/s (0,24 – 0,27 m/s)

When there is no operation, reduce the amount of blowing and air-suction to 1/2 or 1/3. Make sure that the positive pressure in the room is maintained when the amount of air is reduced.



**WARNING:** In terms of airtightness, a poor installation of air channel may cause leaks and due to poor installation the unit may not serve its purpose properly.

In order to ensure the permanence of ventilation hygiene performance and to improve quality standards, the HVAC verification (validation) tests of the laminar flow unit should be done once a year.

- Hepa filter airtightness tes (DOP/PAO Filter integrity test),
- Proper blowing rate,
- Uniform velocity distribution,
- Positive pressure of operation must be obtained at the appropriate level

Meeting the above requirements means that ventilation hygiene is sufficient.

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The tests mentioned above are valid for rooms 3.2 x 3.2 m. smaller than Class 1b rooms, and in addition to DIN 1946-4 Standard, the room area outside of the laminar flow unit is polluted to a concentration of 10,000 Particulates / ft<sup>3</sup> and the room air is tested with a particle counter whether HVAC System can clean the room air to a concentration below 100 Particles / ft<sup>3</sup>.



To maintain optimum performance of the Lamiar flow unit and ensure lifetime operation, regular maintenance is required

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## SECTION 2 USE

### 2.1 Use

This manual is designed to provide basic product knowledge, installation and maintenance training. This application is intended to complete, not to replace existing in-house procedures and application codes. AIRPLUS® is pleased to provide its customers with all necessary solutions when it comes to use or maintenance of this unit.

Once the laminar flow unit is assembled without error, it will provide linear and homogeneous air flow. Cleaning, lighting lamps, Hepa filter and laminator replacement may be required during use of the unit. Replacements must be made with qualified personnel and original AIRPLUS® products.

### 2.2 Cleaning Procedure

In case of cleaning required due to splashes or stains, clean the stained area only with cleaning fluids (mild detergent in warm water). If cleaning products leave stain, they should be wiped with a soft cloth rinsed with clean water. The stains causes blocking of the frequent pores of the laminator, which can impair uniform velocity distribution.



**WARNING:** If hypochlorites are used to clean the unit's stainless steel surface, it will initially cause rusty spots in the steel and may cause further damage over time.

Any contact that could damage the filter media and the laminator should be avoided during maintenance.

### 2.3 Filters

#### 2.3.1 Hepa Filters

H13 class hepa filter is used in laminar flow unit. Hepa filter change is not effected by time, but by contamination pressure. Depending on the nominal air quantity in your unit;

Filter Initial pressure :  $\approx 100 - 185$  Pa,  
Filter final pressure :  $\approx 300 - 400$  Pa civarındadır.

When the Hepa filters are clean (including pre-filters of air conditioning station), measure the initial pressure at the nominal flow rate and determine the contamination / exchange pressure at approximately twice the initial pressure, but not less than 300 Pa.

## 2.3.2 Filter Change Procedure

If the hepa filter impurity pressure does not reach the contamination / change pressure value, it is recommended to replace the hepa filter after 2 to 5 years of use.

Conscious filter replacement is important for time saving and economy to the management. For the selection of hepa filters, choose H13-H14 class, high capacity hepa filter. Always inform the filter provider about the amount of air that has to pass through the hepa filter and the hepa filter dimensions.

If your hepa filters have been shipped by the shipping company after purchase, carefully inspect the filters for damage at the time of delivery. Distortion of filter integrity, damage, burst, crack, etc. In the event of damage, arrange a damage assessment report between you and the transport company. Never install damaged filters on your unit.

Do not use any cutting or damaging tools during Hepa filter replacement. Hold the Hepa filter by its frame, never touch the very sensitive filter media.

When compressing the Hepa filter assembly, tighten the 4 (four) clamping devices in a balanced and gradual manner. (Cross clamping method)

Make sure that the two sheet sections that enable the tightness test and contains test channels do not damage the hepa filter gasket.

For this reason, we prefer HEPA filters with large surface EPDM seals which do not have brittle structure.

Do not reuse damaged gasket of the hepa filters

During hepa filter replacement, clean the hepa filter housings and the interior of the laminar flow unit with disinfectant liquid.

For each hepa filter change and periodically once a year, have the hepa filter tightness test performed within the scope of validation tests. (DOP / PAO Filter Integrity Test)

Do not clean the laminator frequently unless it is dirty.



**WARNING:** Before opening the panel of the unit, make sure that the main electricity power is off.

## 2.4 General Notes



For further information on laminar flow units, we recommend the following publications.

DIN 1946-4 Ventilation and air conditioning;. Ventilation in hospitals.

## PART 3 TROUBLESHOOTING AND SUPPORT SERVICE

### 3.1 Terms of the Service

When technical support is required regarding to AIRPLUS® Laminar flow units, you can use below contact details to reach our technical team.

**Airplus İklimlendirme Teknolojileri San. Tic. Ltd. Şti.**

**Adres** : Sırapınar Mah.Beykoz Cad.Çanakçı Dere Mevki No:99-3 Çekmeköy - İstanbul

**Tel** : [+90 \(216\) 420 65 58](tel:+902164206558)

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### 3.2 Frequently Encountered Problems

1	Laminar Flow Unit is not blowing desired amount of air.	<ul style="list-style-type: none"><li>- Air conditioning station, station filters and heating-cooling coil, pollution resistance should be checked.</li><li>- Contamination of laminar flow hepa filters should be checked.</li><li>- It should be determined whether duct leak tests are performed during installation and whether there is leak in the air channels</li></ul>
2	Laminar Flow Unit lights not working	<ul style="list-style-type: none"><li>- Check if there is electricity power coming to the unit</li><li>- Check the lights.</li><li>- Change damaged lights immediately.</li></ul>
3	Laminizator silk is damaged	<ul style="list-style-type: none"><li>- Laminizator should be changed with new one.</li><li>- Laminizator change should be carried out by technical or qualified person.</li><li>- Use AIRPLUS® brand laminizator.</li></ul>



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## Airplus İklimlendirme Teknolojileri San. Tic. Ltd. Şti

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