



Air purifier SkySafe Cassette

TECHNICAL MANUAL





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INTRODUCTION

The Cassette SkySafe air purifier has a big heart: the Crystall electronic filter.

Produced in Sabiana's Italian factories, the Crystall electronic filter has been applied to air conditioning equipment for many years, adding the now indispensable function of efficient filtration of small and very small organic and inorganic particulate matter to the functions for controlling air temperature and humidity.

In all situations in which it is not possible to integrate the Crystall filter into the air conditioning system, the SkySafe is the ideal solution to effectively filter the ambient air, with limited sound levels, high efficiency and very low maintenance costs.

The filtration efficiency on inorganic microscopic particles such as fine particles PM10, PM2.5 and PM1, and organic particles such as bacteria, fungi, moulds, viruses, up to 0.1 µm diameter, is certified by an independent laboratory according to the international standard UNI EN ISO 16890, with filtration efficiencies up to 96% with reference to 0.1 µm particles (MPPS).

The Sabiana SkySafe air purifier can be installed exposed, with the ABS casing, or in false ceilings.

It can also be coated on the side with plasterboard, wood or whatever finish is preferred by the client or architect. The air diffuser, made from ABS, has an highly attractive aesthetical appearance, very innovative, and is also able to offer the best air distribution performance thanks to long computer studies and laboratory tests.

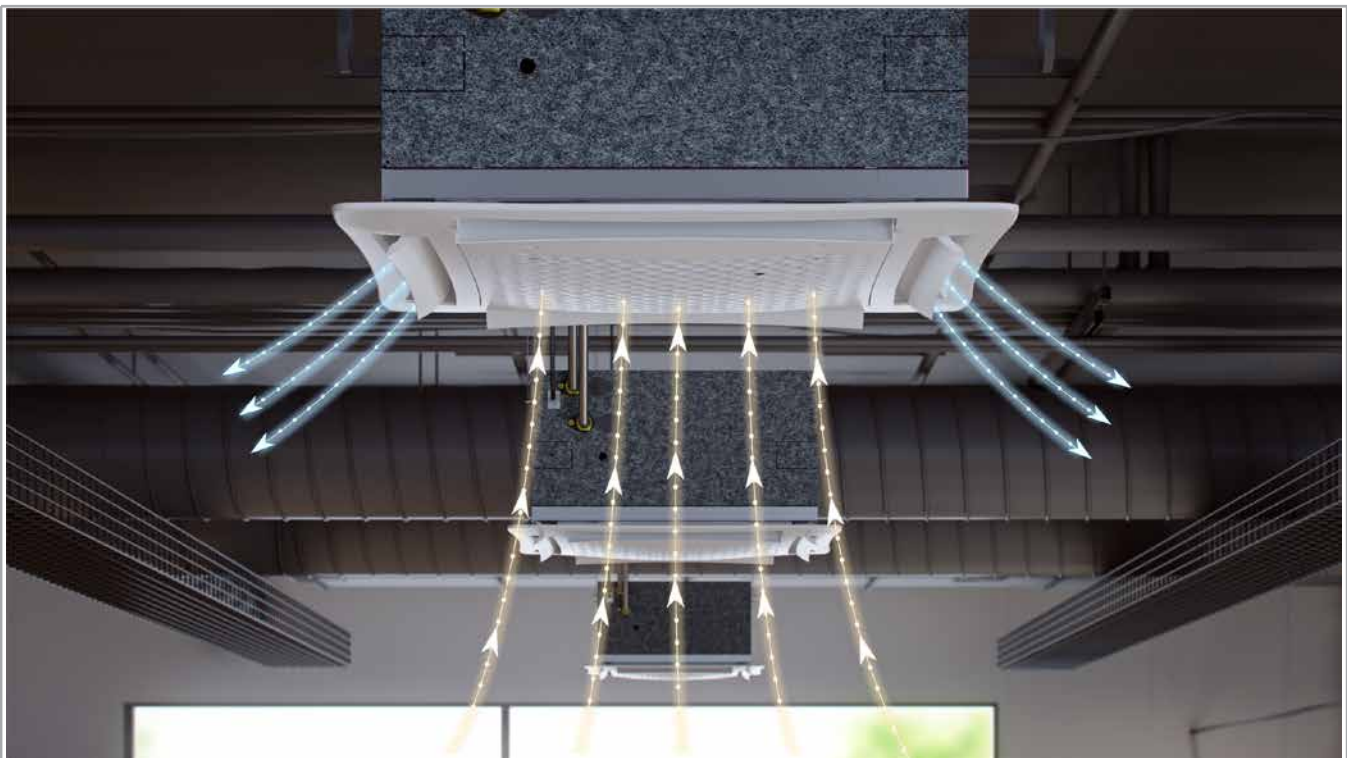
The standard colour is RAL 9003, other colours available on request. As an alternative a metal grid is available.

It finds its simple and ideal application in offices, shops, beauty centres, schools, exhibition areas: in fact, it is sufficient to power the unit electrically, the absorption is limited to a few watts.

A simple wall control allows switching on and off, with the possibility of manually varying the three operating speeds.

A led indicates the operating status and the need for cleaning. The filter is infinitely washable and regenerable and is therefore environment-friendly: it must not be disposed of.

Thanks to the Sabiana patent, the dust collection surface has no electrical components and can be cleaned by anyone without any particular risk of damage.



MAIN COMPONENTS

600 x 600 version



Air diffuser

- Intake grids, frame and adjustable air distribution louvers on each side made from ABS, RAL 9003 HTA version.
- MD-600 version metal diffuser, painted in RAL 9003 white colour, with 600x600 dimension, to perfectly fit into the false ceiling standard modules without overlapping parts.

Casing

It is made of galvanized steel with internal thermal insulation with polyolefin (PO) foam (class M1) and external anti-condensate lining.

Control panel

Made of an external box with the control electronic board with an easily accessible terminal board.

Fan assembly

The fan assembly, which is mounted on anti-vibrating supports, is extremely silent.

The radial fan has been designed to optimise performance, using wing profile blades with a shape that reduces turbulence, increasing efficiency and reducing noise.

The fan is connected to a single phase electric motor with winding features designed to optimize the performances and guarantee low energy consumption.

The motor is single phase 230 V / 50 Hz supply, class B insulation and integrated Klaxon thermal contact for motor protection.

The units are supplied with 3 standard speeds connected and it is possible to change them on site if necessary.

Low efficiency pre-filter

Synthetic washable mechanical filter, easily removable.

High efficiency Crystall filter

The Crystall electrostatic filtering system consists of two parts: the first is a plate type electronic active filter and is fitted in the return air section of the cassette, while the second is an electronic control and regulation board, fixed on the structure.

All electrical connections are made during production. The installation of the Cassette SkySafe Sabiana incorporating the Crystall electronic filter is therefore similar to that of a normal Cassette fan coil unit: the only difference is the installation height, for which the filter dimensions must be taken into account (30 mm).

Active plate type electronic filter

The filtering element consists of two sections: the first consists of electrodes and insulating elements, forming a self-supporting ionising frame, while the second consists of special light aluminium fins (collector).

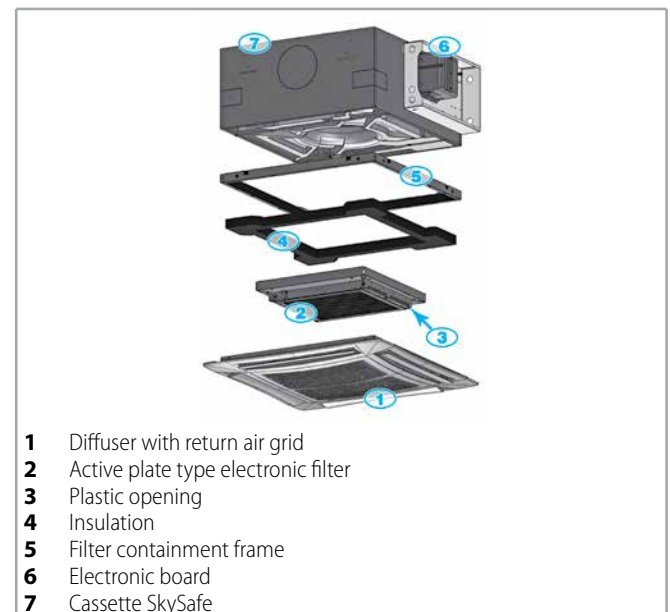
The two sections are installed above the return air grille to make the extraction and maintenance of the filter easier.

Accessibility to sections to be cleaned is ensured by easy-open plastic closures.

The collector can be cleaned by washing with water and ordinary detergents or steam jets (please consult the maintenance manual for further details).

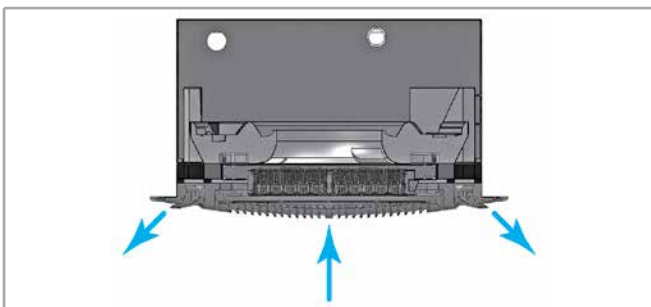
Electronic board

Controls and regulates all functions of the electrostatic filter. It is appropriately protected against any operating defects of the electrostatic filter. It supplies a constant voltage to the electrodes when the mains supply voltage varies ($\pm 15\%$). The supply transformer is constructed with its primary and secondary coils physically separated and wound onto separate cores.



CRYSTALL

The electronic filter is patented and certified according to Standard UNI EN ISO 16890 Class A+ (Eurovent).



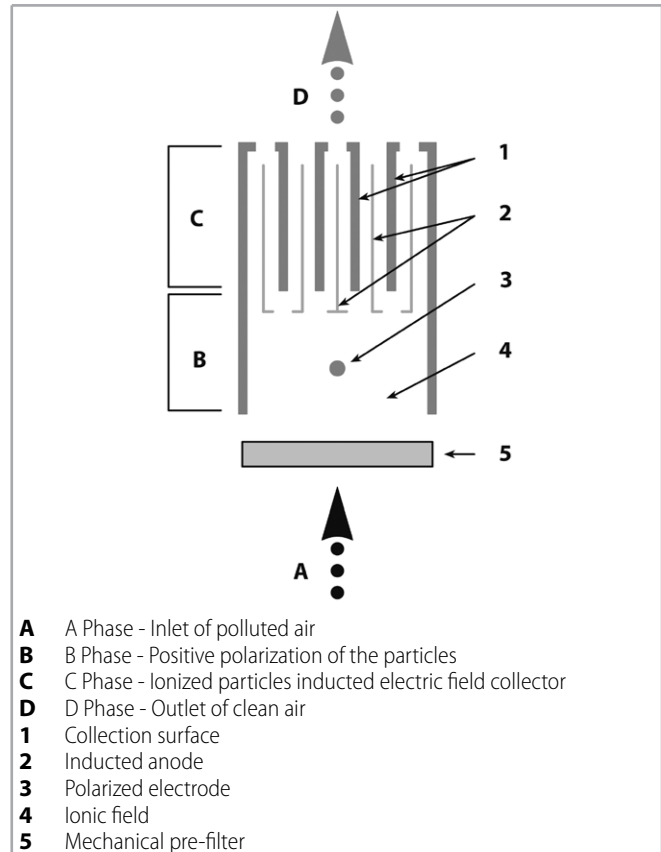
Operating principle

When the polluted air goes through the mechanical pre-filter the particles $> 50 \mu\text{m}$ are eliminated (powder, insects, etc).

Then the smallest particles ($50 \div 0.01 \mu\text{m}$) are exposed to an intensive ionizing field and are polarized (B - B Phase).

The charged particles passing through the second filter section, are pushed back by the anode and attracted to the collection surfaces by a strong, induced magnetic field (C - C Phase).

The air which leaves the unit is free from polluting particles.



Indoor air quality (IAQ)

The expression Indoor Air Quality (IAQ) covers all the procedures and methodologies used to improve the quality of the air we breathe in the places where we live and work, from all points of view, from temperature to cleanliness, to relative humidity, etc. (UNI EN 16798-1 / 3).

Thanks to its new patented electronic filter, the Crystall electrostatic filter totally eliminates the pollutants present in the air, including tobacco smoke, dust (PM10, PM2.5, PM1), fibres, microbiological substances such as bacteria, fungi, etc., which are harmful to human health (source: OMS 2009).

Purifying the air means not only greater well-being, but also energy saving, as the fresh air changes are significantly reduced (indeed it is enough to supply just the quantity of air required to reduce the gaseous pollutants).

Moreover, according to the new EN UNI 16798, the recirculated air of the Crystall unit can be considered as fresh air, because it is filtered with the same efficiency (ePMx), to be added to the minimum requirements (0,5 ls/ m² or 4 lt/pers. in accordance with WHO).

The positioning of the electronic filter allows simple and effective maintenance and, as it is easy to wash, its working life is practically unlimited.

The modularity of the filter components and their ease of mounting make the system extremely competitive in terms of cost and energy consumption (A+ class) if compared with other types of filters present on the market.

Standards and legislation

The ambient condition is acceptable when:

- Microclimatic parameters are normal
- 80% of people are satisfied by the quality of air
- Specific internal contaminants are not in harmful concentrations

"Guidelines for the protection and promotion of health in confined areas O.G. No. 276 dated 27 Nov 01 ordinary supplement no. 252"

The method for obtaining the air quality required in confined areas and thus succeeding in ensuring that the contaminants present are in concentrations less than those considered dangerous to health are:

• **Prescriptive approach:** ventilation of the internal area using only properly filtered fresh air (SUPx), in the quantity and quality needed to dilute the internal contaminants in order to reach the required maximum acceptable concentration values (see WHO limits).

• **Performant approach:** ventilation with fresh air and recirculated air from the same area, both properly filtered, in the quantity and quality needed to dilute the internal contaminants in order to reach the required maximum acceptable concentration values (see WHO limits).

The quantity and quality of recirculated air and fresh air to supply is better specified in the prescriptive approach of UNI EN 16798-1 (annex A national legislative) and UNI EN 16798-3.

The flow rate derives from a binomial equation that joins a proportion per surface (qp.s) (L/sec/m²), that can change according to the internal emission of the contaminants (3 classes: very low polluting, low polluting, non low polluting) and a proportion per person (qp.p) (L/sec/pers).

$$\text{Tot. flow rate} = (\text{qp.s} \times \text{m}^2) + (\text{qp.p} \times \text{N}^{\circ}\text{pers.})$$

The table here below shows partially an example of the values:

Prescriptive Method

Ambients	UNI EN 16798-1 (annex A national legislative)											
	Flow rate per person (l/sec/pers.)			Flow rate per surface (l/sec/m ²) Very low polluting			Flow rate per surface (l/sec/m ²) Low polluting			Flow rate per surface (l/sec/m ²) Non low polluting		
	Category	1	2	3	1	2	3	1	2	3	1	2
Offices	8,50	7,50	5,50	0,25	0,20	0,15	0,50	0,40	0,30	1,00	0,80	0,60
Hospital room	11,50	10,00	8,70	0,25	0,20	0,15	0,50	0,40	0,30	1,00	0,80	0,60
Restaurants	8,75	7,00	5,25	0,63	0,50	0,38	1,25	1,00	0,75	3,00	2,00	1,50
Shops	8,75	7,00	5,25	0,50	0,40	0,30	1,00	0,80	0,60	2,00	1,60	1,20
Schools	7,50	6,00	4,50	0,32	0,25	0,19	0,63	0,50	0,38	1,26	1,00	0,76

Performant Method

UNI EN 16798-1		
Identification and quantification of the reference pollutant (PM or gas)		
Concentration Limit	Minimum fresh air l.s. person	Quantity of recirculated air provided that it is filtered like fresh air
WHO publicized values and legislative acts expressed in μg/m ³ , PPM, ecc.	5 - 6	The volume of air to be considered is based on the internal production and the imposed concentration limits in the confined area

Identification and quantification of the reference pollutant (PMx)		
Concentration Limit	Minimum fresh air l.s. person	Quantity of recirculated air provided that it is filtered like fresh air
WHO publicized values and legislative acts expressed in $\mu\text{g}/\text{m}^3$, PPM, ecc.	The minimum volume of air input varies based on the intended use of the confined area	The volume of air to be considered is based on the internal production and the imposed concentration limits in the confined area

Fresh air flow rates according to the performant approach

UNI EN 16798-1 and UNI EN 16798-3 Standards

The example reproduced at the bottom of the page shows how, with adequate air filtering, it is possible to decrease considerably the quantity of fresh air to be brought into the environment (up to 3-4 times less):

the thermal energy dissipated due to ventilation is in fact in direct proportion to the number of air changes, as indicated in the following equation:

$$Q_v = \Delta T \cdot (R / 3600) \cdot D \cdot C \cdot \text{Vol.}$$

Q_v = Thermal energy lost for ventilation - Watt

ΔT = Indoor-Outdoor difference (T) - °C

R = A.C.H.

D = Air density - Kg/m^3

C = Specific air heat - $\text{J}/\text{Kg}\cdot^\circ\text{C}$

Vol = Room size - m^3

MAINTENANCE

The maintenance of the SkySafe Cassettes is very easy and the filter pack does not need to be replaced but simply washed; this possibility makes the SkySafe Cassette environment-friendly as there are no parts to dispose of.

Access to the Crystall filter is simple and intuitive.

The first step is to open the intake grille by accessing the Crystall filter (1); at this stage the pre-filter mounted on the intake grille can be easily cleaned with a vacuum cleaner.



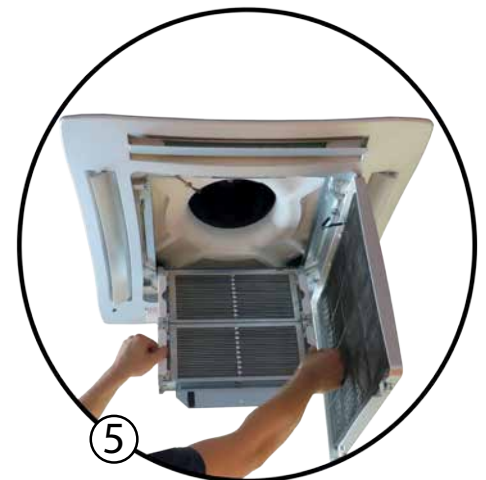
Then, use a screwdriver to remove the screws securing the Crystall pre-filter (2) and clean it by washing.



The Crystall filter is now easily accessible (3). Removing the fixing screw releases the filter holder frame which can be opened to pull the Crystall aluminium filters (4) out.



The Crystall filters are easy to remove thanks to the special handles that allow a secure grip (5).



The aluminium filter can then be cleaned and washed in a domestic or industrial dishwasher or by immersion; The Crystall filter and the grille can then be repositioned and the SkySafe unit returns to 100% operation.

PERFORMANCES, TECHNICAL DATA AND OPERATION LIMITS

Cassette SkySafe performances

MODEL		SkySafe		
Speed		1	2	3
Flow rate	m ³ /h	245	400	575
Flow rate	m ³ /s	0,068	0,111	0,160
Filter length	mm	356	356	356
Filter depth	mm	292	292	292
Filtering section	m ²	0,104	0,104	0,104
Speed	m/s	0,65	1,07	1,54
MPPS	%	MPPS > 96,99%	82,25% < MPPS < 96,99%	69,71% < MPPS < 85,25%
Efficiency measured on PM1	%	Eff. M. PM1 > 98%	92% < Eff. M. PM1 < 98%	84% < Eff. M. PM1 < 92%
ISO ePM1	%	ISO ePM1 [95%]	ISO ePM1 [90%]	ISO ePM1 [80%]
Efficiency measured on PM2,5	%	Eff. M. PM2,5 > 98%	93% < Eff. M. PM2,5 < 98%	88% < Eff. M. PM2,5 < 93%
ISO ePM2,5	%	ISO ePM2,5 [95%]	ISO ePM2,5 [90%]	ISO ePM2,5 [85%]
Efficiency measured on PM10	%	Eff. M. PM10 > 95%	92% < Eff. M. PM10 < 95%	89% < Eff. M. PM10 < 92%
ISO ePM10	%	ISO ePM10 [95%]	ISO ePM10 [90%]	ISO ePM10 [85%]

Filtering Efficiency **ISO ePM1-2,5-10** certified in compliance with Standard UNI EN ISO 16890:2016

Cassette SkySafe technical data

MODEL		SkySafe		
Speed		1	2	3
Air flow	m ³ /h	245	400	575
Sound power (Lw)	dB(A)	35	47	55
Sound pressure (Lp) ⁽¹⁾	dB(A)	26	38	46
Total power absorption	W	37	53	70
Total current absorbed	A	0,17	0,24	0,32

(1) The sound pressure levels are 9 dB (A) lower than the sound power levels, apply to the reverberant field of a 100 m³ room and a reverberation time of 0.5 sec.

Operating limits

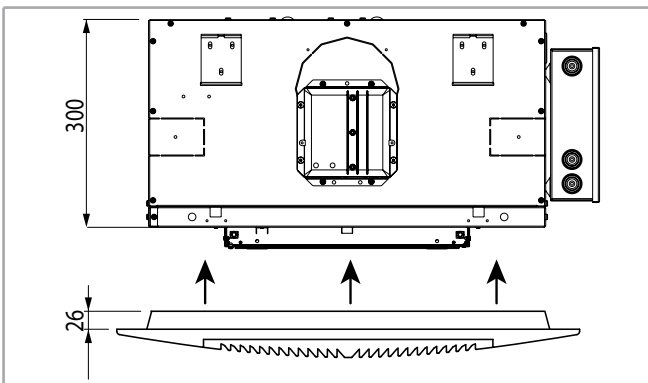
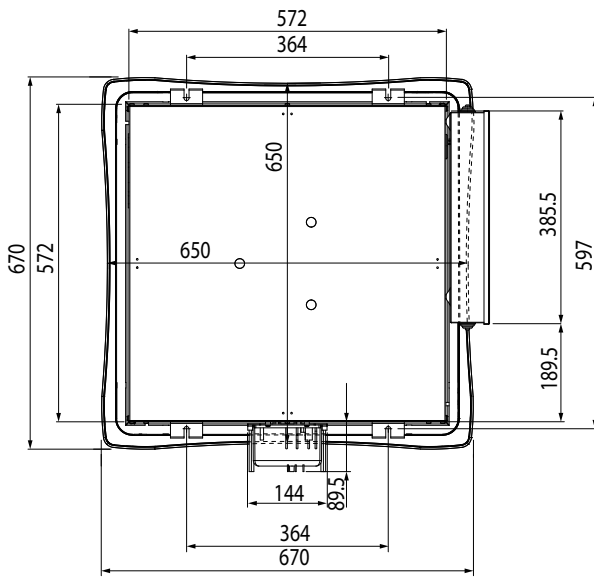
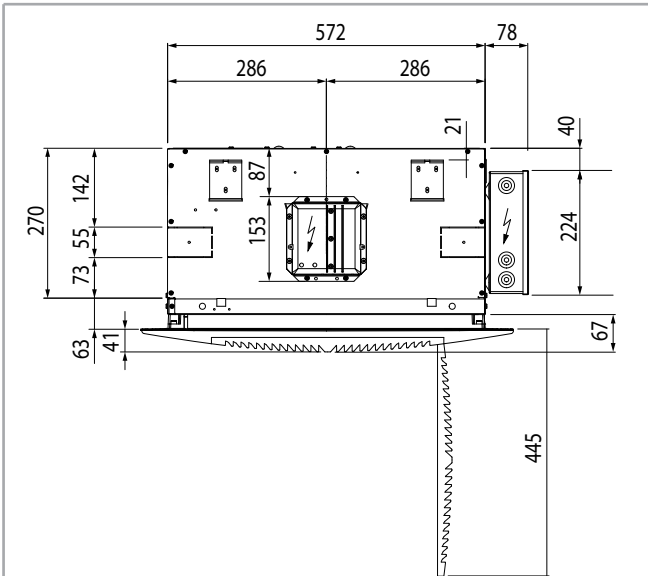
Description		UoM	Value
Ambient air	Maximum temperature	°C	+40
Power supply	Single-phase rated operating voltage	V/Hz	230/50

For the installation height, see p. 12.

For a quick assessment of the number of appliances to be installed, considering 6 volumes / hour, for a room of 60 m³ (5 x 4 x 3 m) one appliance operating at medium speed is sufficient; for a room of about 300 m³ (12 x 8 x 3 m) 4 appliances, always at medium speed, are required.

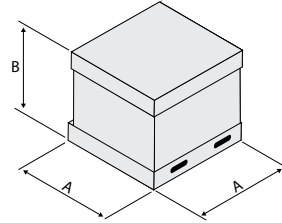
DIMENSION AND WEIGHT

SkySafe dimensions



Packed unit

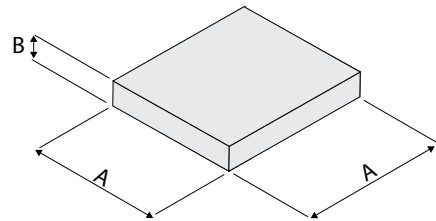
Unit



A = 790 mm
B = 410 mm

Model		SkySafe
Weight with packaging	kg	30,0
Weight without packaging	kg	24,0

Diffuser



A = 750 mm
B = 150 mm

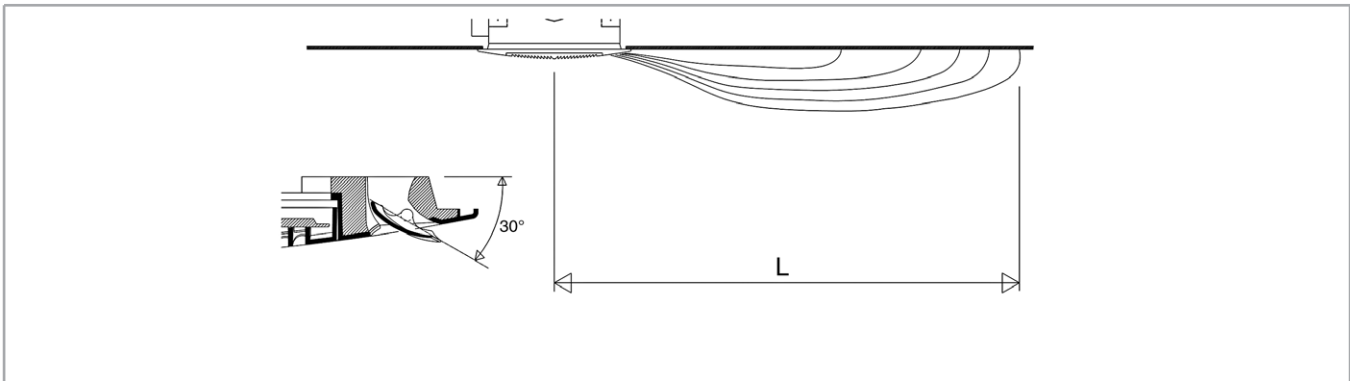
Model		SkySafe
Weight with packaging	kg	6,0
Weight without packaging	kg	3,0

AIR THROW

The air throw indicated in the tables must only be considered the maximum value, as it may change significantly in relation to the dimensions of the room in which the appliance is installed and the positioning of the furniture in the room.

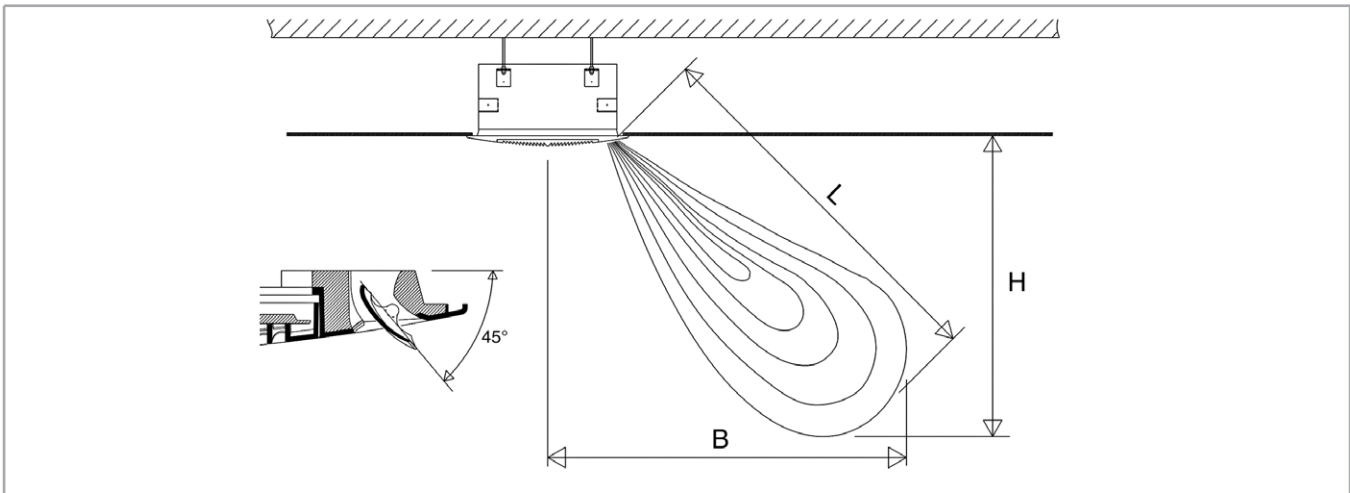
The useful throw L refers to the distance between the unit and the point where the air speed is 0.2 m/sec; see the air throws with louvers with inclination at 30° and 45° here below.

With adjustable air diffusion louvers at 30°



Model		SkySafe		
Speed		1	2	3
L	m	3,0	3,8	4,5

With adjustable air diffusion louvers at 45°

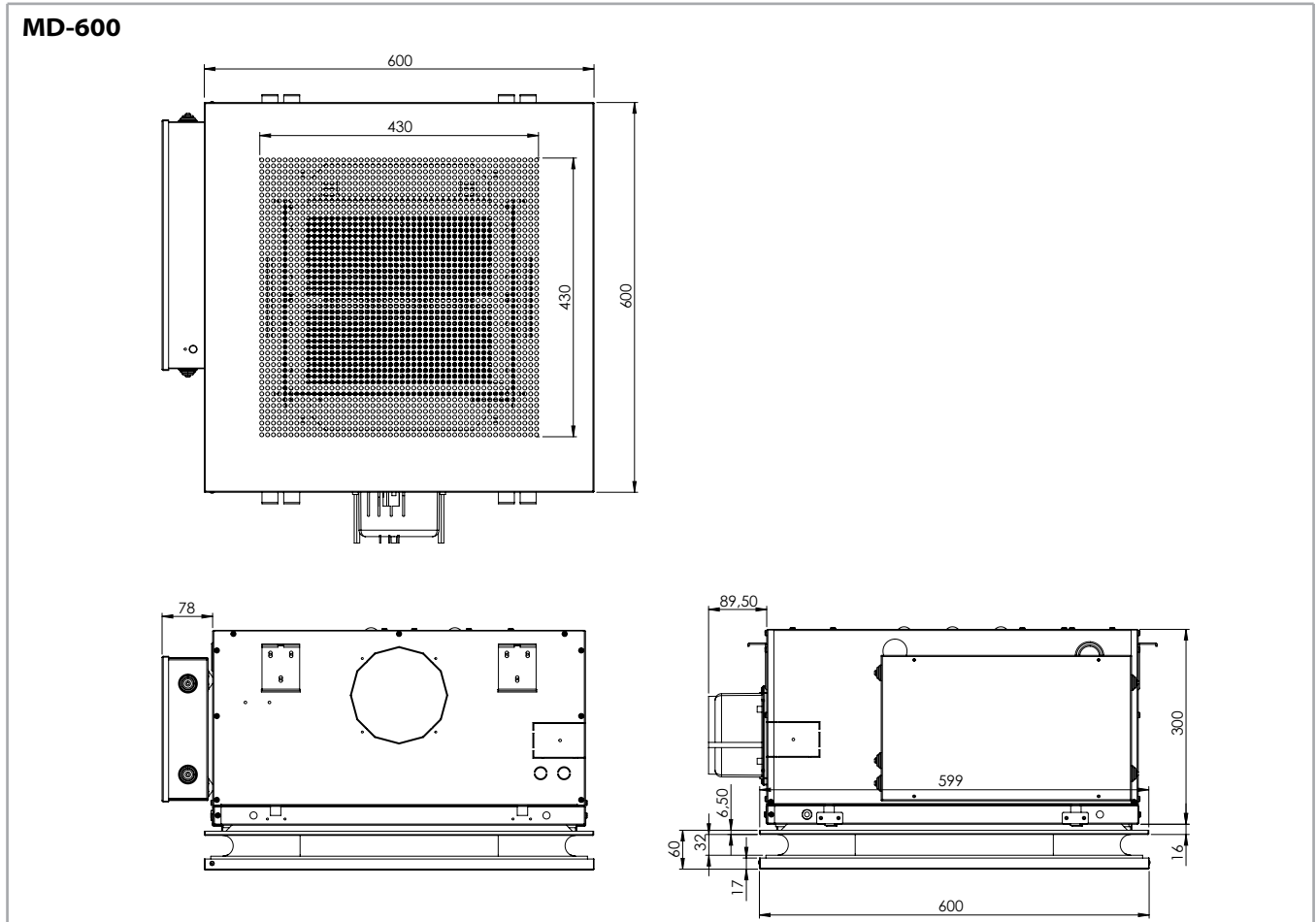


Model		SkySafe		
Speed		1	2	3
L	m	3,3	4,2	4,8
H	m	2,2	2,8	3,2
B	m	2,5	3,1	3,6

METAL AIR INLET GRID MD 600

(not suitable with MCT-SKSF outer casing)

Model	Code
MD-600	9079420



CONTROLS

The Cassette **SkySafe** can be supplied with the **WM-3V** control that allows managing one single unit or several units (with the use of SEL2M speed switches).

Note: all the controls are described in detail in the "Fan Coil Control Range literature".

ID	Code
WM-3V	9066642

WM-3V control



230V 50Hz

ID	Code
SEL2M	9079109

SEL2M speed switch



ACCESSORIES

MCT-SKSF casing

(not suitable with MD-600 metal air inlet grid)

Model	ID	Code
SkySafe	MCT-SKSF	9079241

The MCT-SKSF version has been designed for all environments where false ceilings are not featured or cannot be constructed.

The casing fits perfectly to the air intake and outlet diffuser, maintaining the appealing design that defines the SkySafe Cassette.

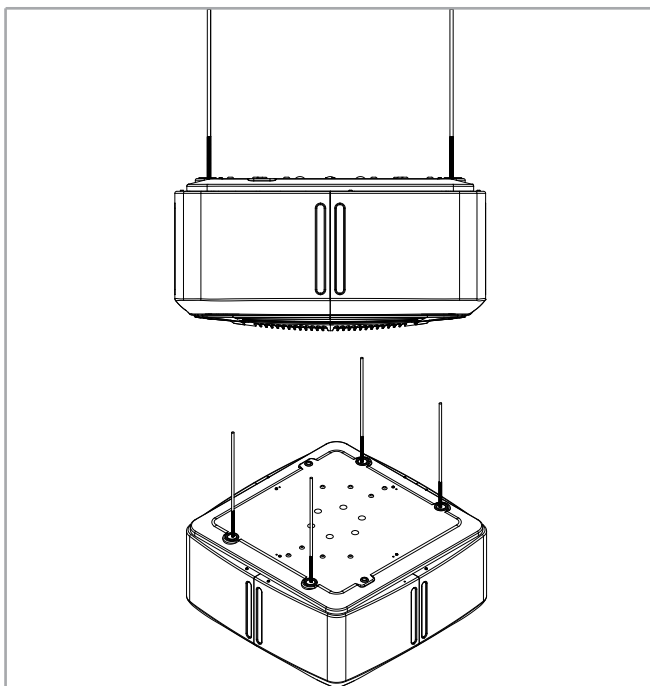
The version MCT-SKSF allows an installation height of up to 4 m thanks to the great versatility of adjustment of the air diffusion fins.

All the technical characteristics described in the previous pages still apply, bearing in mind that treatment with primary air is not possible.

The MCT-SKSF version features a special casing, in COOL GREY 1C colour, delivered in separate packaging; this must only be fitted after having installed the SkySafe unit and completed the electrical connections.

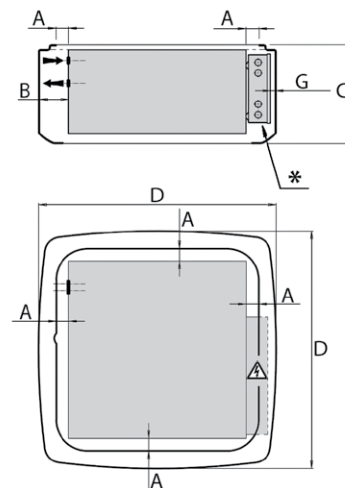
Warning:

- the electrical connections must enter the unit from above and must not interfere with the casing
- a clearance of at least 100 mm must be left between the top cover and the ceiling



Dimension and weight

MCT-SKSF



* = Cables output

Model		MCT-SKSF
A	mm	40
B	mm	93
C	mm	320
D	mm	768
F	mm	-
G	mm	15 max
Weight with packaging		kg 5
Weight without packaging		kg 7,5



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