

LAMSYSTEMS

SAVVY^{SL*}

MICROBIOLOGICAL SAFETY CABINETS Class II Type A2

**Sliding sash*



CE

SUSTAINABILITY

DESIGN

SAFETY

CONTROL

DISINFECTION

TESTING

It is SAVVY, quite savvy

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ENERGY EFFICIENCY



ADVANTAGES OF EC FANS:

- Monitoring and accurate adjustment of operating modes with the microprocessor control system
- Low energy consumption
- Low heat emission
- Low noise level
- No vibration
- Extended operating life

EC FANS

Class II microbiological safety cabinets SAVVY^{SL} are equipped with centrifugal, energy-efficient and low-noise EC FANS that significantly decrease operating costs as well as reduce the level of acoustic noise and vibration ensuring comfortable work of the personnel.

LOW POWER CONSUMPTION OF THE CABINET **0.112 kW**

COMPARISON



	Input Power kW	Power Consumption per Year kWh ^[2]	CO ₂ Emissions t/year ^[3]	SAVING	CO ₂ REDUCTION
SAVVY ^{SL}	0,112 ^[1]	233,0	0,123	30%	30%
Alternative*	0,160**	332,8	0,175		

* Equipment with equivalent technical characteristics produced by a known manufacturer was taken for comparison.

** Information was taken from the official advertising materials of the manufacturer.



[1] – The measurements are taken at operating mode whereat the fans and the work chamber lighting are on; the load on the built-in electric sockets is excluded.

[2] – 8 hours per day, 5 days, 52 weeks.

[3] – Each kWh of energy produced corresponds to 0.527 kg of CO₂ emission (source: <https://www.carbonindependent.org/15.html>)

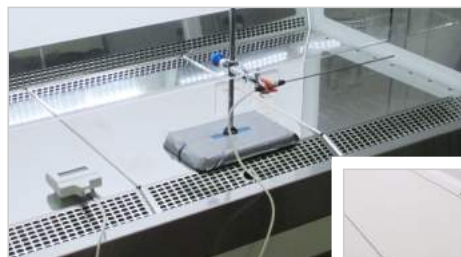
LOW ENERGY CONSUMPTION PROVIDES FOR LOW HEAT EMISSION REDUCING NECESSITY IN ROOM AIR CONDITIONING AND, THEREFORE, ITS COST.



HEAT EMISSION READINGS&CALCULATIONS

Microbiological safety cabinets generate heat that may cause room temperature increase and air humidity decrease leading to operator's discomfort, loss of efficiency, fatigue, skin irritation and itching.

Low energy consumption provides for low heat emission reducing necessity in room air conditioning and, therefore, its cost.

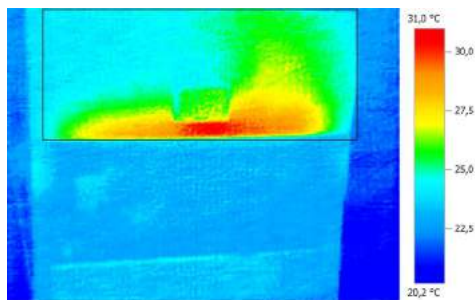
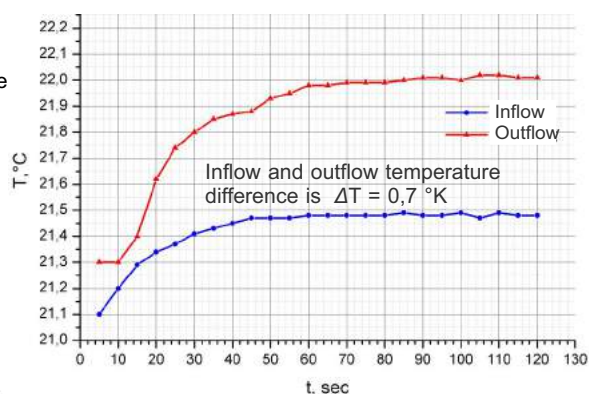


Measuring the Temperature of the Air Inflow

Measuring the Temperature of the Air Outflow



Airflow Temperature Diagram

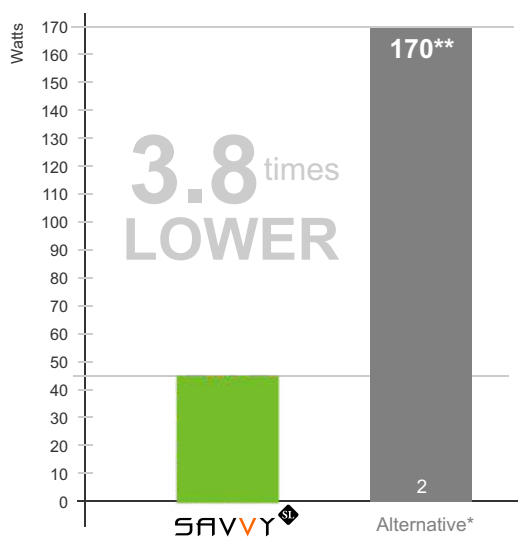


Measuring the Temperature of the Front Panel Heated Area

HEAT EMISSION OF THE CABINET:

with fans and lighting on **45W**
 with fans on and lighting off **25 W**
 with lighting on and fans off **20 W**

COMPARISON



* Equipment with equivalent technical characteristics produced by a known manufacturer was taken for comparison.

** Information was taken from the official advertising materials of the manufacturer.

	Operating desktop laser printer.....	215 W
	Working person	180 W
	Resting person	100 W
	Operating monitor (19")	80 W
	SAVVY SL IN THE OPERATING MODE*	45 W

* The measurements are taken at operating mode whereat the fans and the work chamber lighting are on; the load on the built-in electric sockets is excluded.

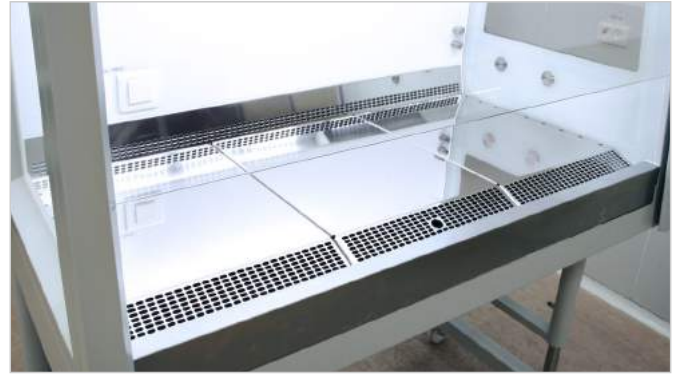


MATERIALS

The body is made of metal with corrosion-resistant, non-flammable and non-absorbing powder coating. The tabletop is made of anti-corrosion, scratch and chemical resistant stainless steel AISI 304.

The front sash is made of laminated tempered glass, the side windows are made of tempered glass. All of the materials are resistant to cleaning and disinfecting agents as well as to formaldehyde or H_2O_2 .

NB: When using chlorinated agents, keep in mind their corrosive effect including the impact on the stainless steel.



TOUCHSCREEN



Touchscreen ensures clear visualization of operating modes and simple control of the cabinet as well as provides the user with more service and maintenance information.

The screen allows for work in gloves and disinfection with liquids, i.e. hydrogen peroxide.

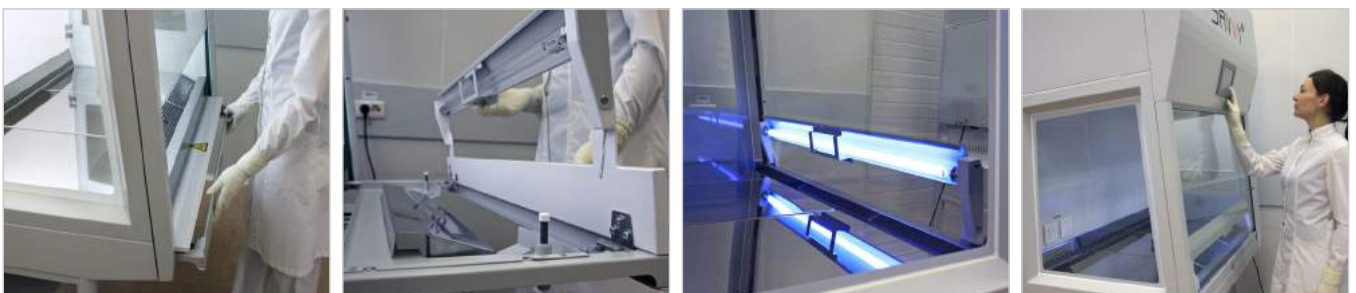
PULLOUT UV UNIT



The cabinet has a pullout UV unit which is placed at the bottom of the cabinet (outside contamination zone).

Key features of a pullout UV unit:

- passed TÜV NORD certification
- highly reliable in operation
- well-adapted for disinfection
- does not disturb the laminar flow
- does not require any additional space for storage
- controlled with optical position sensor
- equipped with dampers for smooth closing





POWER DRIVEN FRONT SASH

Five preset positions of the front sash:

1. OPERATING POSITION in Main Operation mode.
2. UP POSITION for work chamber loading/unloading.
3. STOP BEFORE CLOSING for safety (see page 6).
4. CLOSED POSITION in Standby mode or for work chamber UV irradiation.
5. DOWN POSITION for disinfection of the upper part of the front sash.



HEPA FILTERS

The cabinet is equipped with H14 HEPA filter ensuring air cleaning efficiency of 99.995% for MPPS.

The HEPA filter is installed upstream of the work chamber at the angle of 7° and, thus, at the right angle to the front sash. Such positioning significantly enhances the airflow distribution in the chamber.

The filter is fixed with springs that ensure leak-tight sealing of the filter for the entire operating life.



Each HEPA filter is tested and packed in accordance with ISO 14644-3.

SIMPLE AND SAFE FILTER REPLACEMENT

thanks to their arrangement and a new hold-down system minimizing the risk of filter damage during installation.

«VOLTAGE FREE OUTPUT»



The cabinet is equipped with two voltage free outputs for connecting external devices for the purpose of transmitting information about the current and operation status of the cabinet.

For example, using the voltage free output, it is possible to control the operating modes of the cabinet remotely, to start the supply and exhaust ventilation system when the cabinet is being switched on, etc.

EXTENDED STANDARD CONFIGURATION

unique UV unit, audible and visible alarm system, optical UV unit and front sash position sensors, UV unit dampers, two electrical sockets in the work chamber, LED lighting of the work chamber, two voltage free outputs, removable armrest, frame stand with a footrest.



MICROPROCESSOR CONTROL SYSTEM —



The cabinet is featured with a microprocessor control system that immediately informs an operator on the reduction of the level of the cabinet protection via alarm messages displayed on the touchscreen and via an audible and visible alert.

The fan motor control system minimizes the power consumption of the operating cabinet as well as reduces the level of acoustic and electromagnetic noise.

The system of air consumption static regulation AIS LS automatically maintains the air balance in the working chamber and in the front opening changing the number of fan revolutions according to the level of filter contamination. When the threshold value of contamination is reached, the system activates the warning system.

AUDIBLE AND VISIBLE ALARM SYSTEM —



Alarms are automatically activated in case the airflow parameters deviate from the preset values.

In the process of warming-up and switching to **Main Operation** mode, the sound alarm can be manually turned off.

ALARM MESSAGES DISPLAYED ON THE SCREEN:



LAMINAR FLOW FAILURE!

FRONT SASH IN INOPERATIVE MODE!

LOW INFLOW VELOCITY!

HIGH INFLOW VELOCITY!

LOW DOWNFLOW VELOCITY!

HIGH DOWNFLOW VELOCITY!

NO CONNECTION TO SYSTEM BOARD





HIGH-PRECISION SENSORS

Position of moving parts and structural components which influence the protective efficiency of the cabinet is controlled by optical sensors:

- **the optical sensor** of the front sash position precisely ensures the height of the work opening and compensates for possible stretching of the belts over the operating life of the cabinet;
- **the UV unit position sensor** does not allow to switch on the UV lamp in its inoperative position.

The UV unit position sensor immediately deactivates the operating UV lamp at the attempt to open the front sash, thus, preventing accidental irradiation of the personnel.

Pressure sensors ensure control of the airflows and are superior to the hot-wire sensors that are usually installed in this type of equipment. Pressure sensors are resistant to dust, humidity, and temperature drop. Therefore, they ensure accurate maintenance of preset parameters over the whole operating life of the cabinet. The sensors detect even slight changes of velocity, direction or balance of the airflows that reduce the protection efficiency of the biosafety cabinet and immediately activate the alarm.



FRONT SASH STOP

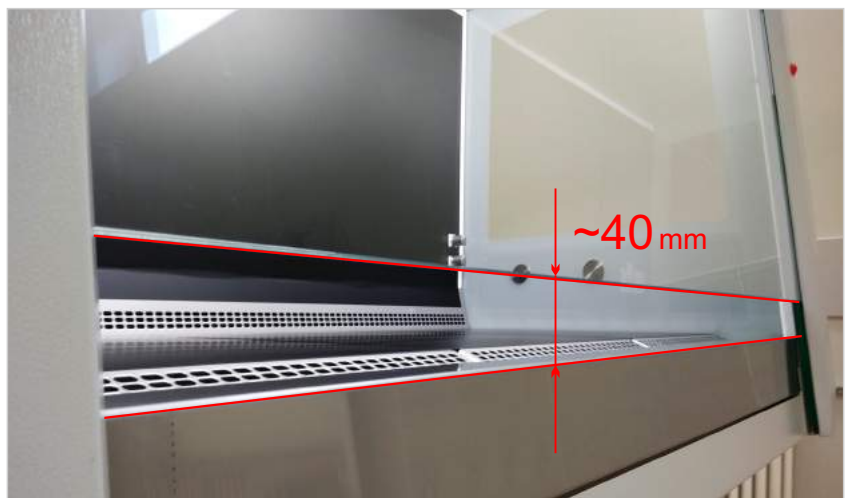
To ensure maximum safety, the sliding front sash automatically stops in two cases:

BEFORE CLOSING

Automatic stop of the front sash at 40 mm height from the surface prior to complete closing of the front opening prevents any injury of the operator's hands.

AHEAD OF OBSTACLE

The moving front sash automatically stops in case of contact with an object or a hand of the operator.



UNAUTHORIZED ACCESS PROTECTION

The automatic locking of the touchscreen prevents unauthorized access to the control system. The control panel can be unlocked by entering the password.





OPERATING MODES

Mode control and cabinet operation control is carried out via touchscreen control panel.

MAIN OPERATION MODE is designed for work with PBA. In this mode, the system automatically maintains the airflows independent of the level of the HEPA filter clogging.

STANDBY MODE is designed for maintaining the cleanliness inside the work chamber with closed front sash (work opening). Thereat, the fans maintain the minimum velocities of the airflows.

DECONTAMINATION MODE is designed for formaldehyde vapor disinfection.

CLEANING MODE is designed for disinfection of the work chamber when fans are on and alarm is off.

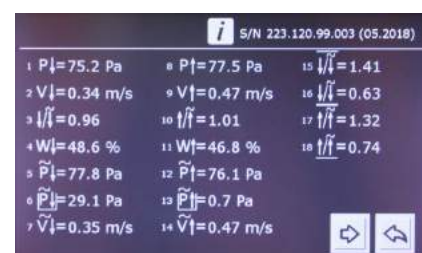


Visualization of Laminar Downflow at Standby Mode

SIMPLE AND CONVENIENT SETTING OF AIRFLOW VELOCITY

The system ensures separate control of the inflow and downflow velocities as well as automatically maintains the air balance. There is no need to adjust the air balance manually and, therefore, the maintenance time in case of qualification, filter replacement or periodic verifications is significantly reduced.

HIGHLY ACCURATE MAINTENANCE OF PRESET AIRFLOW VELOCITY at any level of filter clogging and in case of changing ambient conditions (humidity, temperature, pressure).



LOW NOISE LEVEL 47dBA

The level of noise in real operating environment depends on the dimensions of the operating site, on the cabinet's location as well as on the total background noise and may vary by 3-4 dB(A).



REMOVABLE ARMREST

A removable armrest ensures reliable elbow support of the operator providing additional comfort at work.

The armrest allows for thorough disinfection and autoclave sterilization. It is stored in a special compartment of the pullout UV unit.





ADDITIONAL OPTIONS •

- ULPA filters
- Exhaust hood for connecting the cabinet to the external exhaust system
- Adjustable stand
- Additional electric sockets
- Technical gas tap with electromagnetic valve*
- Inflammable gas tap with electromagnetic valve*
- Vacuum tap with electromagnetic valve*

A gas tap or a vacuum tap can be installed into an operational cabinet without any additional qualification required.

* The electromagnetic valve automatically locks gas and vacuum supply in case of power cutoff, the cabinet switching-off or alarm activation.



DISINFECTION SAVVY

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SIMPLE CLEANING AND DISINFECTION •

The configuration of the cabinet ensures simple access to all contaminated surfaces for their disinfection. The armrest and each section of the removable tabletop can be autoclaved. The corners of the tray are rounded to simplify its thorough cleaning.



The sash lifting configuration was designed in accordance with EN 12469.



ACCEPTANCE TESTING



The acceptance testing site is designed as a Class 7 clean room and is fitted with qualified equipment for testing each item released. The acceptance test of SAVVY SL consists of 23 obligatory checks the results of which are registered in a corresponding report. A copy of the acceptance test report can be enclosed to the Manual as per customer's request.



SETTING THE AUDIBLE AND VISIBLE ALARM PARAMETERS

Thresholds are adjusted for the audible and visible alarm system.



ELECTRICAL SAFETY

Testing the integrity of the protective ground circuit, the leakage current, the high voltage.



AIR INFLOW AND DOWNFLOW PARAMETERS

The following velocities are set: 0.47 mps for velocity of the inflow through the work opening, 0.35 mps for velocity of the downflow in the work chamber (in accordance with EN 12469).



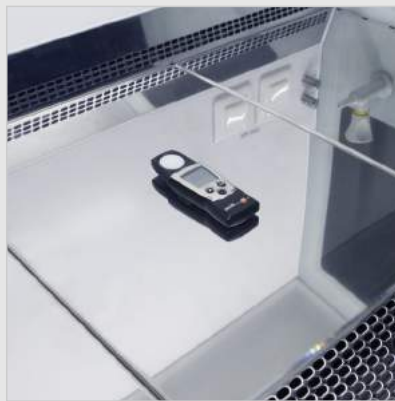
HEPA FILTER INTEGRITY

The supply and exhaust filters as well as their sealings are scanned.



LEAK TIGHTNESS OF THE BODY

is tested by observing the overpressure created inside of the cabinet.



LIGHTING* corresponds to the requirements of safe operation in the work zone. The illumination of the work zone surface is 2000 lx while the recommended one is 750 lx.

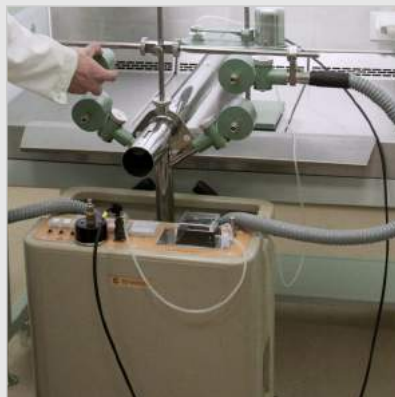


VIBRATION* The root-mean-square displacement caused by vibration at the tabletop centre of the operating cabinet does not exceed 0.005 mm.



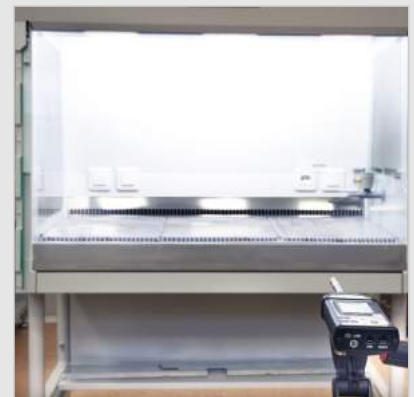
AIRFLOW VISUALIZATION

demonstrates the accuracy of airflow distribution and direction.



KI DISCUS TEST*

Testing of efficiency of pathogen and microorganism retention in the front opening.



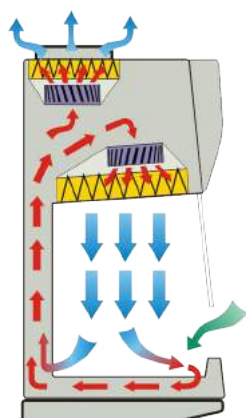
NOISE*

The level of noise meets the requirements of the standard.

* Tests are performed at the stage of development of the new models for the purpose of confirming the compliance with EN 12469

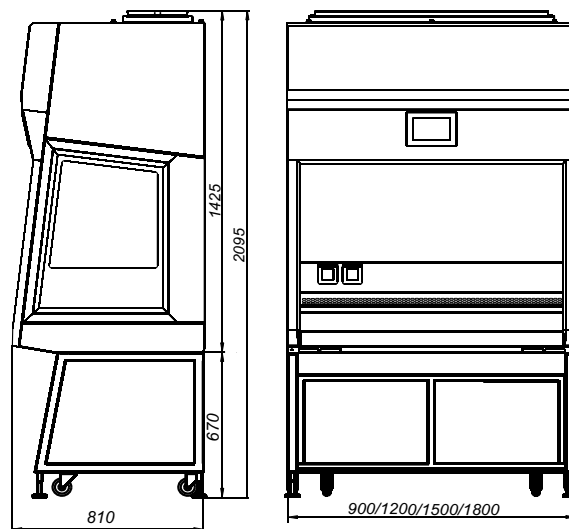
APPLICATION

- Physical isolation (containment and controlled removal from the work zone) of pathogenic biological agents (PBA) and microorganisms to prevent airborne infection of the staff and contamination of the air in the work room and laboratory environment.
- Minimization of risk of contamination and cross-contamination of the product.
- Possibility to work with small amount of toxic chemicals and radionuclides as well as to remove work agent odors in case of mandatory connection to an active exhaust system using an exhaust hood.
- The cabinet is used to equip individual work places in medical, pharmaceutical and other institutions working with pathogenic biological agents and microorganisms.



AIRFLOW
LAYOUT

- room air
- contaminated air
- clean (filtered) air



MAIN CHARACTERISTICS

Installation work chamber air cleanliness class for suspended particle (aerosol) concentration as per ISO 14644-1

– for particles of 0.5µm and more.....	ISO 5
– for particles of 5.0µm and more.....	ISO M (20; ≥5µm); LSAPC*
Cabinet class according to EN 12469:2000, NSF/ANSI 49	II
Cabinet type according to EN 12469, NSF/ANSI 49.....	A2
Class of the installed HEPA-filters according to EN 1822-1.....	H14
Average velocity of the inflow through the work opening, m/s	0,47±0,03
Average downflow velocity in the working chamber, m/s	0,35±0,01
Air recirculation rate in the cabinet, %	≈ 70

MAIN PARAMETERS AND DIMENSIONS

Article.....	1E-B.008-09.0**.....	1E-B.008-12.0	1E-B.008-15.0**.....	1E-B.008-18.0
Dimensions of the cabinet assembled with stand (WxDxH), mm.....	1000x810x2095.....	1200x810x2095	1500x810x2095	1800x810x2095
Dimensions of the cabinet with stand and completely opened front sash /WxDxH/, mm.....	1000x810x2185	1200x810x2185	1500x810x2185	1800x810x2185
Dimensions of the work chamber (WxDxH), mm.....	905x610x700	1105x610x700	1405x610x700.....	1705x610x700
Clean air inflow capacity, m³/h.....	656-674.....	795-817.....	-.....	1210-1245
Exhaust air capacity, m³/h.....	282-328	354-402	-	548-623
Maximum input power without built-in electric sockets, W, not more than.....	220***.....	220***.....	220***.....	300***
Maximum allowed load on the built-in electric sockets, W	1000	1000.....	1000.....	1000
Minimum illumination of the work zone (integral value determined along the whole area of the work zone), lx, not less than	2000.....	2000	2000.....	2000
Weight of the cabinet assembled with the stand (net), kg, not more than.....	215.....	245	-	320
Maximum noise level at 1 m distance from the cabinet, dBA	47****.....	47****.....	-	55****

*4.8 ISO according to ISO 14644-1.

**Articles 1E-B.008-09.0 and 1E-B.008-15.0 are in the process of development. Some of the parameters may change.

***The power consumption with newly installed uncontaminated HEPA filters.

****Level of noise in free sound field over the sound-reflecting surface (noise level in real operating environment depends on the dimensions of the operating site as well as on the total background noise and may vary by 3-4 dB(A)).

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the course of its further
development.