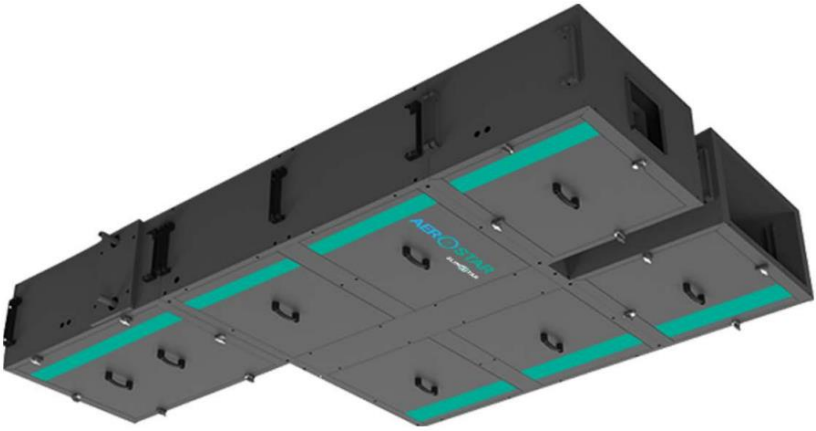
Suspended Ventilation Unit SkyStar
Installation and Operation Manual



2023

Номер замовлення	
Установка	
Серійний номер	
Дата	

Ventservice

Content:

1. Preface

This manual serves as a standard operational, installation, and maintenance guide for the ventilation units of the SkyStar models with the corresponding certification model names listed in the declaration:

UA.TR.YT.D.062303-22

With the corresponding name SkyStar (1, 2, 4, 2(450), 4(450))

The company "Vent-Service" LLC continuously works on improving equipment, expanding the range, and optimizing operations. Therefore, the company reserves the right to make changes and adjustments to the effective manual, guidelines, and technical passport for this product.

"Vent-Service" LLC is not obligated to notify third parties or clients about such changes. The most up-to-date information about the equipment can be obtained by the client on the official website: https://aerostar.ua/ua/catalogue

2. Safety Instructions

2.1 Instruction and General Provisions

Connection, startup, adjustment, and operations related to the operational maintenance and repair should be carried out in the presence of a work permit by qualified personnel, in conditions compliant with the norms of the current legislation of the country.

Qualified personnel refer to individuals familiar with the necessary standards, rules, instructions, and documentation for the installation, connection, startup, and operation of ventilation equipment. Their qualifications should enable them to identify, prevent, and avoid potential malfunctions and hazards to life, health, and property.

During the preparation of the installation for operation and its operation, safety requirements outlined in "DSTU B A.3.2-12:2009 Occupational Safety Standard System. Ventilation Systems. General Requirements," "NPAOP 40.1-1.21-98 Rules for the Safe Operation of Consumer Electrical Installations," and "Rules for the Technical Operation of Consumer Electrical Installations" should be adhered to. The installation should be assembled in accordance with the requirements of DSTU B A.3.2-12:2009, project documentation, and this passport.

The installation should provide free access to service areas during operation.

Maintenance and repair of equipment should only be performed after disconnecting it from the power network and the complete stoppage of moving parts of the installation and associated equipment.

Grounding the installation is carried out in accordance with the "Rules for the Arrangement of Electrical Installations" (RAEI).

Maintenance and repair of equipment should only be carried out after disconnecting it from the power grid and ensuring the complete cessation of moving parts of the installation and associated equipment.

The grounding of the unit is performed in accordance with the "Rules for the Arrangement of Electrical Installations" (RAEI). The grounding resistance must comply with the RAEI requirements. The resistance value between the grounding bolt and every metallic part of the unit that may become energized should not exceed 0.1 Om.

During testing, adjustment, and operation, the suction and pressurizing openings must be protected to prevent injury to individuals from the air flow and rotating parts.

During tests, adjustments, and operations, suction and discharge openings must be protected to eliminate the risk of injury to people from air flow and rotating parts.

Power outage should occur only in emergency situations.

Equipment maintenance should be performed exclusively by qualified personnel with the relevant authorization for work, including authorization for work at heights.

The servicing personnel should be instructed and provided with the appropriate equipment.

Work on unit in a state of altered consciousness is prohibited.

All servicing personnel should be of a legal age.

Strictly prohibited is the access of children to playing with equipment.

2.2 STRICTLY PROHIBITED:

- Starting the equipment before connecting fuses;
- Starting the equipment with open inspection doors or panels;
- Opening inspection doors or panels before the fan comes to a complete stop;
- Performing equipment repair without prior disconnection of electrical devices from the power supply;
- Servicing heaters until their surfaces cool to a safe temperature;
- Using equipment outside the ranges specified in its technical documentation and for purposes other than intended;
- Operating malfunctioning equipment.

2.3 UNACCEPTABLE USAGE

It is prohibited to use the equipment:

- In an extremely dusty environment;
- By untrained personnel;
- When not adhering to current standards;
- With incorrect installation;
- In case of electrical power defects;
- In complete or partial non-compliance with instructions;

• Without proper maintenance;
• With modifications and other interventions not allowed by the manufacturer;
• In a workspace cluttered with tools and other objects;
• In the presence of abnormal vibrations in the working area.

2.4 DEFINITION OF HAZARDOUS ZONES

Only qualified and trained personnel should have access to the equipment.
• The external hazardous zone is defined as the space approximately 2 m around the unit and equipment.
• Access to the internal hazardous zone can be gained from the inside of the unit.

2.5 WORK WITH PRESSURIZED EQUIPMENT

All units specified in this manual comply with the requirements of Directive 2014/68/EU (Pressure Equipment).

2.6 WORK WITH THE UNIT:

• The unit should be disconnected from the power supply by switching off and locking the main switch.
• Servicing personnel should use appropriate personal protective equipment in accordance with commonly accepted safety rules (helmet, gloves, goggles, etc.).

2.7 WORK WITH THE REFRIGERATION CIRCUIT:

• Pressure checking, system venting, and charging under pressure should be carried out using appropriate equipment and tools.

• To prevent risks, before disconnecting or brazing parts, the pressure in the refrigeration circuit should be reduced to zero pressure.

• There is a risk of residual pressure due to oil degassing or heating of the heat exchanger after the circuit has been depressurized. Zero pressure should be maintained by opening the relief valve on the low-pressure side.

• Brazing should be performed by a qualified welder.

CAUTION! In case of fire, there may be a refrigeration circuit leak!

2.8SAFETY RULES

Do not activate the ventilation system without grounding.

Before turning on the unit, ensure that all doors are closed, and covers are in place and secured.

Before conducting an internal inspection of the unit, make sure it is disconnected from the power supply and has no rotating parts and components.

Before switching on the unit, its sections should be connected according to the installation instructions.

Before opening the doors, turn off the unit and the input switch, and wait (1-2 minutes) for the fans to stop.

Exercise caution when performing installation or repair work on the water heater - the temperature of the heat carrier can reach 130°C.

If the ventilation system is operated with an automation system not coordinated with the manufacturer, the functionality, reliability, and safety protection of the device are the responsibility of the company that installed the automation.

Protection zones for moving parts:

Protection zones for moving parts: Moving parts in the unit include fan blades, belt drive of the rotary recuperator (if any), and parts of the shut-off and bypass valves of the plate recuperator (if any). Inspection doors are closed and protected from direct contact with moving elements.

The air handling unit may be switched on and off only in the manner specified in the device passport

Before switching on the unit, its sections must be connected together in accordance with the installation instructions.

3. General Information

- The suspended inlet-exhaust units are manufactured in accordance with current Ukrainian and European technical norms and regulations.
- The SkyStar units must be installed and used strictly according to the provided documentation. The manufacturer does not assume responsibility for damages resulting from improper use; the equipment purchaser bears all associated risks.
- The installation and operational documentation should be readily available to the servicing personnel and service organization. It is recommended to place it near the ventilation and air conditioning system.
- During operation, installation, electrical connection, commissioning, repair, and servicing, strict adherence to safety rules, norms, and accepted technical standards is essential. Personal protective equipment (gloves) must be used as the installation contains sharp edges and corners. All connected equipment must adhere to current safety norms and rules.
- Strictly prohibited are the replacement and repair of individual components of the SkyStar unit that could affect safety and proper equipment operation.
- Before installation and operation, thorough familiarization and strict adherence to the instructions and recommendations provided in the subsequent sections are necessary.
- Only specialized personnel with approval from the manufacturer's factory, in accordance with current norms and rules, can conduct the installation and commissioning of the equipment.
- A well-designed and installed ventilation system will only be effective with proper care. After installation, the ventilation system should be checked, adjusted according to the project, and handed over to the servicing personnel in a working and ready-to-operate condition.
- During the check, verify whether the actual performance of the fans and the thermal power of the heaters match the values specified in the project.

Note: Changes that do not degrade consumer properties may be made to the unit's design and are not include in this manual.

Note: The automation system's installation and operation instructions are provided by the automation supplier.

Picture 1
Principle of implementation

3.1 Application and Operating Conditions

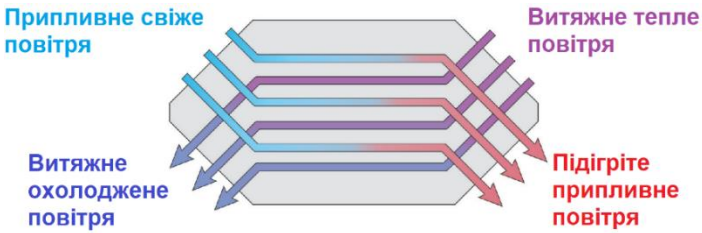
SkyStar units are designed for air movement without solid, fibrous, adhesive, aggressive, or explosive impurities. The air should not contain substances that contribute to the corrosion or decomposition of zinc, steel, or aluminum. The operating temperature range in standard configuration is from -30°C to +40°C.

3.2 Operating Principle

Fresh air enters into the unit by being drawn by the supply fan. The air undergoes filtration through pocket and cassette filters. In some cases, the unit can be equipped with HEPA filters. Then, the air passes through the heater, where it is heated to a specified temperature. Depending on the configuration, the unit may be equipped with an electric (electric heater) or water heater.

After the heater, the air is directed to a direct evaporator, where it is dried, and residual moisture is removed. After this, the air flows to the unit's outlet, by used the propelling force provided by the fan installed in the unit.

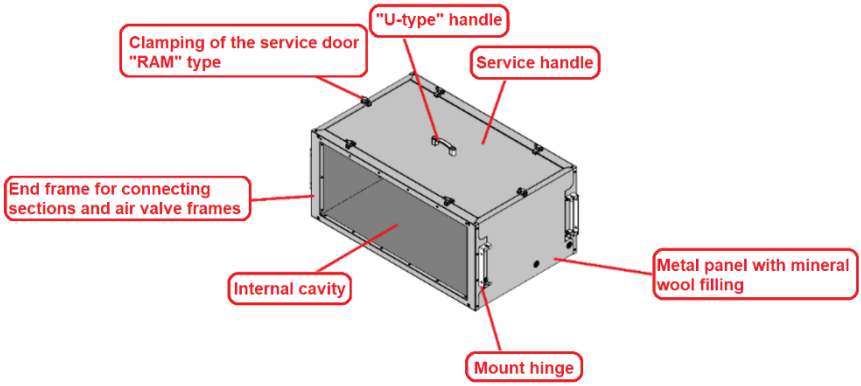
In some units, place a plate heat exchanger, which reduces the need for heating the air by an electric or water heater using the heat from the exhaust air.



Picture 2
Principle of operation of plate heat exchanger

The louvers of the plate heat exchanger are arranged and designed in such a way that air streams do not intersect, but heat from the exhaust air is transferred to the supply air.

3.3 Construction of the Installation



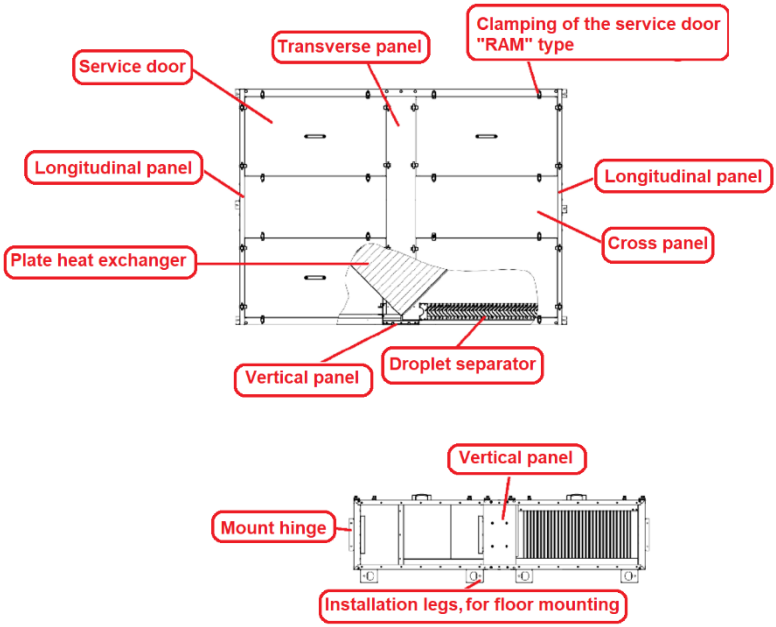
Picture 3
Assembled section

The installation consists of independent sections that are connected during assembly. Sections are selected based on the purpose and application of the unit. Sections of horizontal orientation are mounted to the ceiling using anchor bolts, by using connecting brackets and hangers. Sections are connected to each other through hangers, tightened with M8x70mm screws and locking nuts. The suspension is fixed to the section body with M6x20mm screws with a set of washers, including a spring washer and a flat washer, and fixed to the section with a riveting nut.

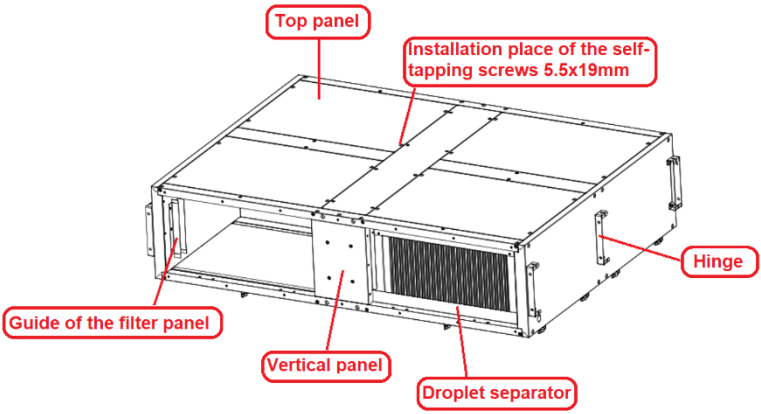
All sections, except for the noise absorber section and those specified by the customer, are equipped with service panels fixed with swivel handles (RAM) with M8 threading, securing the handle position in the body with a riveting nut. All doors are equipped with "U"-shaped handles, fixed by M6x25mm DIN912 screws and covering the holes for the screws with KNK plugs. In the end faces, there are openings in the extreme sections for connecting to valve elements (grilles), where riveting nuts M8 are installed under M8x30mm screws. The thickness

of the upper and lower panels is 30mm, and the thickness of the side walls reaches 50mm. The filler for the cavity between the outer and inner walls is mineral wool. The gaps in the unit body are insulated with silicone sealant.

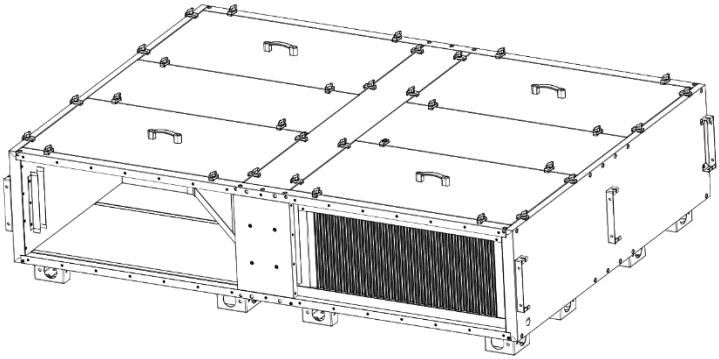
In the heat exchanger section, there is a central beam (vertical panel) made of galvanized profile, with holes in this construction item serve for fixing the connected sections through a threaded connection (Screw - riveting nut M8). The upper panels of the heat exchanger section are fastened with a self-tapping screws 5.5x19mm in the landing places.



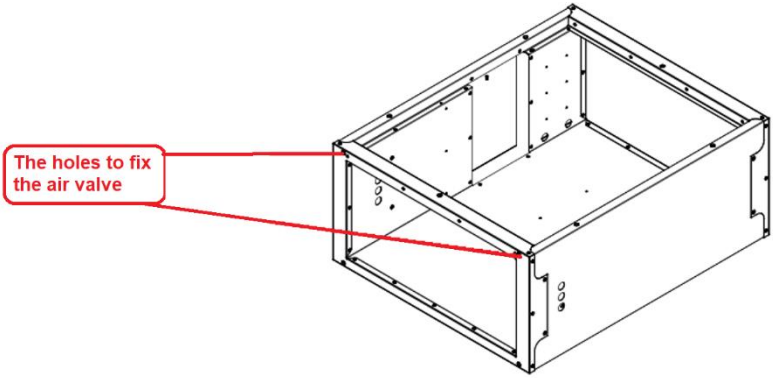
Picture 4 (a)
Heat exchanger section



Picture 4 (b)
Heat exchanger section



Picture 4 (c)
Heat exchanger section top view (for floor mounting)



Picture 5
Section box

Possible assembly configurations of SkyStar with the following sections and elements:

1.(a) Fan section (asynchronous motor)
2.(b) Fan section (motor-wheel based on EC motor)
2.(a) Section: filter, water heater, fan (AC motor)
2.(b) Section: filter, water heater, fan (motor-wheel based on EC motor)
3.(a) Section: filter, electric heater, fan (AC motor)
3.(b) Section: filter, electric heater, fan (motor-wheel based on EC motor)
4. Section: filter, water heater, water cooler, droplet separator
5. Section: filter, water heater, direct cooler, droplet separator
6. Section: filter, electric heater, water cooler, droplet separator
7. Section: filter, electric heater, direct cooler, droplet separator
8. Section: 930 mm length sound absorber
9. Section: 1240 mm length sound absorber
10. Plate heat exchanger, droplet separator
11. Air valve
12. Flexible insert
13. Pocket filter (cleanliness class F5, F7)
14. Empty section with a length of 310 mm
15. Cassette filter filtration class G4 (EU4)

Note!
Sections 4, 5, 6, 7, 10 can only be used with horizontal installation of the unit.

3.4 Execution Side

The SkyStar design allows for the selection of the connection side to external power sources and service accesses. The side is determined in terms of the direction of the airflow, right or left.

3.5 Information and Safety

The SkyStar unit and individual sections are equipped with identification labels indicating the equipment function, connection schemes, and the supply and discharge of energy carriers (Picture 6 and Table 1). Warning of the danger of contact with rotating parts is located on the external side of removable service panels of the unit, which are labeled with a cautionary "Dangerous" designation. Individual terminal boxes and service panels covering electrical equipment are labeled with a cautionary "Dangerous - electricity" designation. Information about the inlet:

- Heat carriers in the heat exchanger;
- Refrigerant in the evaporator. Information about the outlet:
- Heat carriers from the heat exchanger;
- Refrigerant from the evaporator.

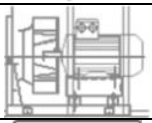
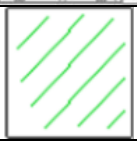
3.6 Supply Kit

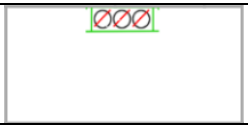
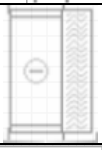
Each SkyStar unit is supplied with:

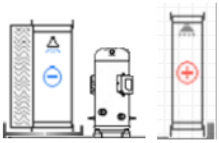
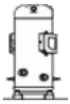
- This manual.
- Technical passport.
- Elements of HVAC and automation (optional).
- Accessories according to the invoice.
- Connecting kit (in case of sectional transportation).
- Technical specifications file.

3.7 Section Identification

Identification of unit parts Each section is equipped with a label and an identification symbol (located on the external part of the section's service panel).

P.n. №	Name	Conventional symbols.	Stickers	Purpose
1.	Flexible insert			Connection of the unit to the ventilation system, vibration minimization
2.	Air valve			Airflow regulation to the unit
3.	Pocket-type filter			Air filtration for incoming air to the unit and ventilation duct.
4.	Cassette-type filter			Air filtration for incoming air to the unit and ventilation duct
5.	Fan			"Supplies air to the ventilation system
6.	Sound absorber			Disperses and reduces the amount of noise produced by the unit
7.	Empty section			Serves as an intermediate element between sections. It is used to equalize the airflow and increase the length of the supporting, first level of the unit

8.	Mixing chamber			Mixes airflow from the supply and exhaust.
9.	Direct cooler			Using refrigerant, extracts heat from the air and dehumidifies it.
10.	Water-based heater.			Transfers heat from circulating water to the air
11.	Electric heater			Heats the supply air by using electrical power
12.	Water cooler			Removes heat from the air using cooler water
13.	Plate heat exchanger			Use heat from the exhaust air and transfers it to the supply air without mixing the streams
14.	Droplet separator			Prevents or minimizes the formation of droplets in the ventilation system.
15.	Glycol-based heat exchanger			Transfers heat from the heat transfer fluid circulating in the circuit to the air

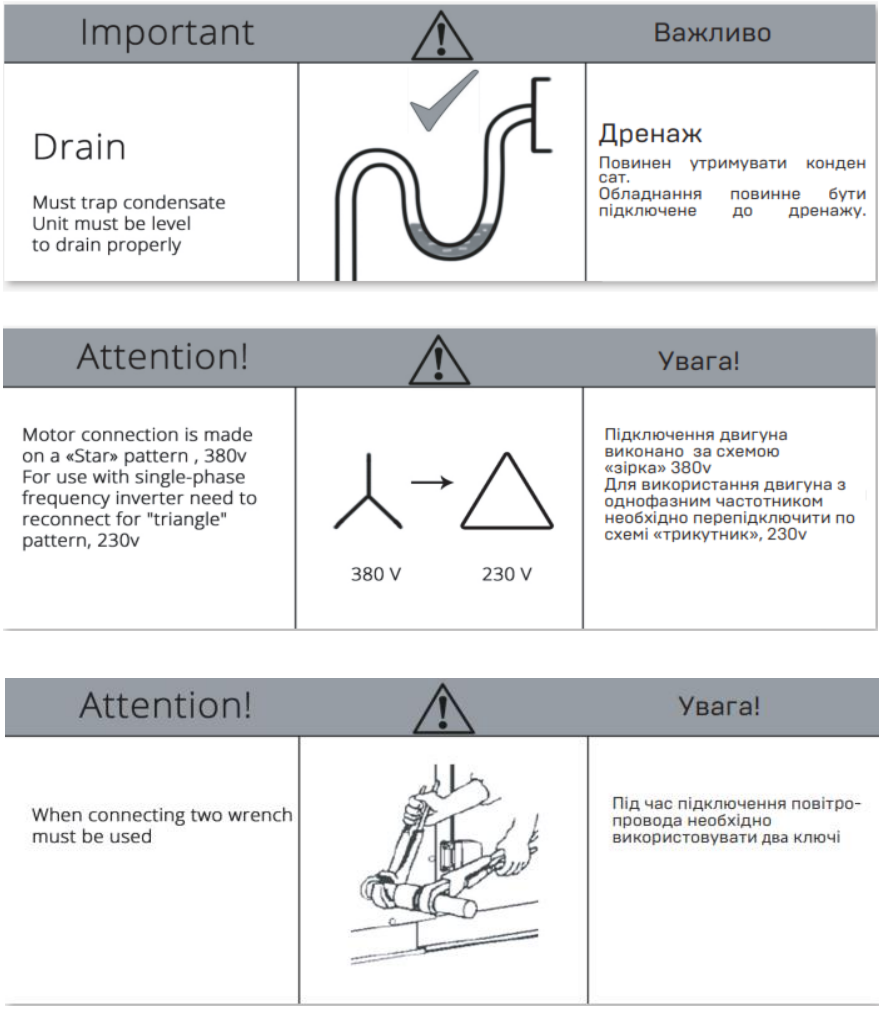
16.	Rotary heat exchanger.			Receives and use heat from the exhaust air, transferring it to the supply air
17.	Heat pump			The heat pump transfers heat from the surrounding environment and directs it into the ventilation system, dehumidifies, and maintains the air temperature within a specified range.
18.	Compressor			The heat transfer fluid is fed into the heat exchanger system
19.	Steam condensation			Saturates the air with steam
20.	Gas heater			Heats the air using a gas burner for this purpose.

21.	Automation			The box of automatization where located all control devices of the unit

Picture 6

Service panels of electrical heating sections, individual junction boxes, and service panels covering electrical equipment are equipped with a warning label marked "danger - electricity."

A caution about the danger of contact with rotating parts is located on the external side of the service doors of the unit with a precautionary marking "danger."



Picture 7

4 Lifting and Transport Operations

SkyStar unit are delivered to the customer or the installation site in assembled form or as individual blocks (sections and sectional modules).

The unit/blocks are placed on transport pallets. When transporting the equipment, it is essential to adhere to the requirements outlined in the ventilation unit passport.

During transportation and handling, pay attention to protruding elements of the unit (energy carrier supply and discharge, electrical installation elements, sensors, shafts of servo drives). Be cautious and careful during lifting and placement.

4.1 Storage

Unit are packed in PE film and have protective foam inserts. Storage is allowed in premises:

- with a maximum relative air humidity not exceeding 85% without moisture condensation,

- with ambient air temperature ranging from -30°C to +40°C,

- where the equipment is not exposed to dust, gases, vapors of corrosive substances, or other chemicals that contribute to the corrosion of structural parts and equipment fittings.

5. Installation

At the floor placement of the unit, use of spring-type vibration isolators, which may transfer the load to the connections of the unit, such as the heat exchanger connection, is prohibited for the installation. The only exception is the use of "Vibrofix" type vibration mounts; in all other cases are recommended, regular vibration mounts.

5.1 Connecting Installation Sections

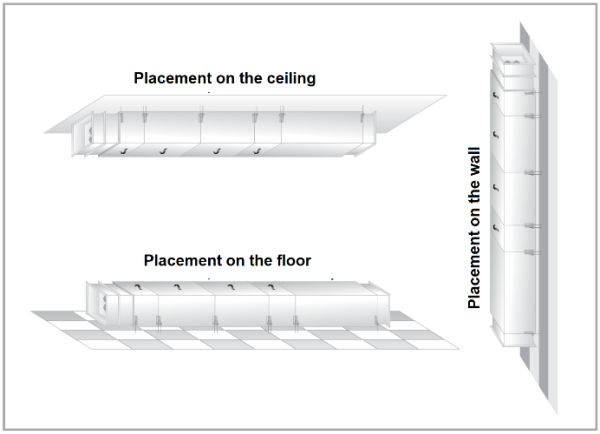
The gasket is adhered to the contact surface of the connecting partitions. Sections are connected to each other by using suspension mounting and connecting them with M8x70mm screws .

When installing and fix the sections together, the gaps at the joints of sections should be filled and secure to ensure a hermeticity of the unit. To perform this operation use a silicone gel sealant.

SkyStar unit can operate in a horizontal and vertical (suspended) position (Picture 8).

When changing the position from suspended to wall/ceiling to floor, the service side of the unit changes. Special brackets (Hangers) with holes for M8 screws or studs are provided on the side panels of the unit for fastening in any position. When the unit operates in a vertical position, the use of coolers, droplet catchers, and plate heat exchanger is not possible.

Access to the service panels should be ensured from the service side.



Picture 8
Installation Placement Options

Note!

It is unacceptable to install the unit suspended horizontally from the ceiling with the narrow part of the side wall.

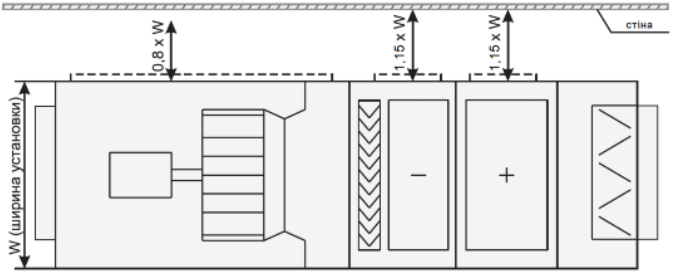
5.2 Providing Service Access

When placing the unit, it is necessary to provide sufficient space for servicing. This space depends on the configuration of the unit, i.e., the selected functional sections (Picture 9).

To ensure service access, it is necessary to provide the following distances from the wall:

1) 0.8 x width of the installation (W) = distance between the wall and the installation 0.8 - for such elements: fan, filter, rotary heat exchanger.

2) 1.15 x width of the installation (W) = distance between the wall and the installation 1.15 - for such elements: heater, cooler, droplet separator, plate heat exchanger.



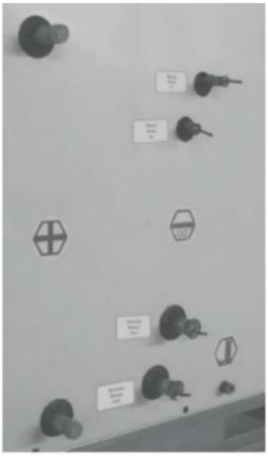
Picture 9
Ensuring service access

6. Connection of Energy Carriers

When connecting heat transfer lines, make sure the loads from the lines are not transferred to the unit

Be cautious during the installation or repair of the water heater – the temperature of the heat carrier can reach 130 °C! When connecting energy carriers, the force generated by voltage and mass should not be transferred to the unit. Connection points on the section are marked with stickers (inlet - cold agent supply, outlet, cold agent discharge, condensate discharge) (Picture 10). To achieve maximum system efficiency, heat exchangers should be connected in a counterflow arrangement.

To prevent twisting of the heat exchange manifold, it is necessary to use two wrenches (Picture 7).



Picture 10
Heat Exchanger Connection

Attention: After connecting water heat exchangers (heaters and coolers, including mixing units) to the pipeline, it is necessary to conduct a pressure test:

- Filling with water and deaeration of the circuit, including heat exchangers.
- Checking the tightness of pipe connections and the heat exchanger, including inspecting the internal part of the unit section with water heating.
- The manufacturer of ventilation equipment is not responsible for damage caused by leaks due to non-sealing of connections or damage to the heat exchanger.

Caution!
It is forbidden to hold or support the heat exchanger by the copper collector during installation or dismantling. This can lead to the destruction of the soldered connection and/or render the heat exchanger unusable.

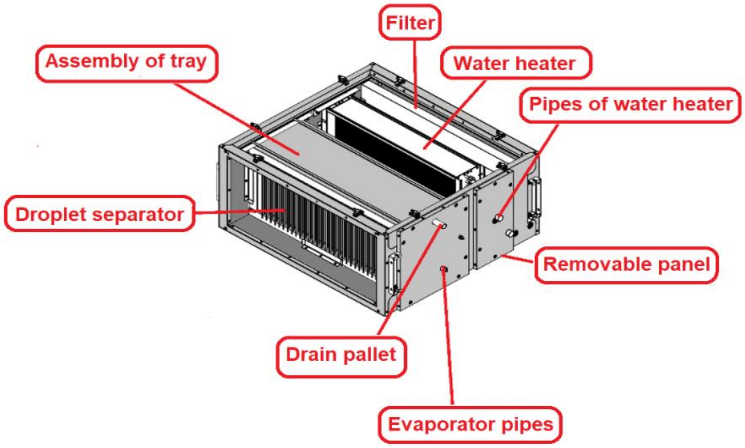
6.1 Connection of Water Heat Exchangers

Connection via water in all coolers/heaters is made using an external G1 thread.

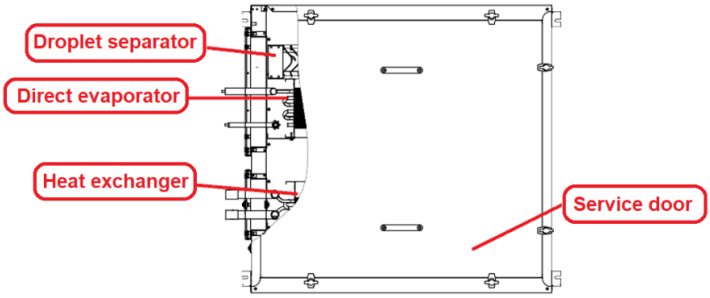
The maximum allowable pressure is 1.5 MPa.

The cooler is tested by the manufacturer for air tightness under a pressure of 2 MPa for 5 minutes underwater.

Pay attention that frequent changes of water in the water heating system lead to accelerated corrosion of pipelines due to oxygen oxidation in the fresh tap water; moreover, the same air that has entered the heating system can interrupt water circulation in certain parts.



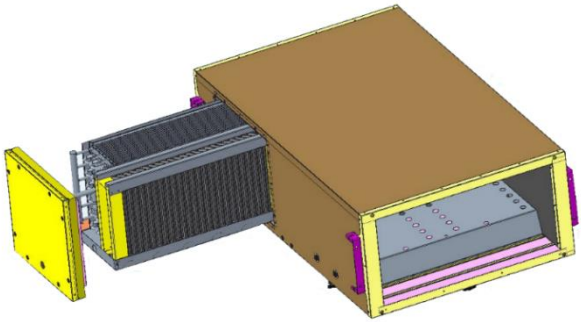
Picture 11
Filter section arrangement, heater (bottom view)



Picture 12
Scheme and order of arrangement of elements of the filter section, heater

6.2 Connection of Direct Evaporators (Refrigerant Evaporators)

The connection of direct evaporators should be carried out by a company specializing in refrigeration technology. Direct evaporators are filled with nitrogen and soldered during production. In the disconnected state, evaporators are under pressure.



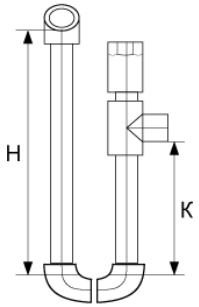
Picture 13
The heat exchanger installation

7 Condensate Drainage

In the cooling sections, plate heat exchanger, and steam humidification sections, a condensate pan is installed. Each section is equipped with its own drainage system. The height of the siphon depends on the total fan pressure and ensures its proper operation. The siphon should be selected according to the fan pressure. When the siphon height is higher than the frame height, it is recommended to provide 150 mm high legs under the frame. Legs can be ordered from the manufacturer as a separate element. To prevent unpleasant condensate odors from entering the unit, a trap is installed in the system.

Before startup and after prolonged equipment shutdown, it is necessary to fill the trap with water.

The trap can be equipped with an odor trap valve and a ball valve (in case of negative pressure). Such a trap is not filled before starting operation.



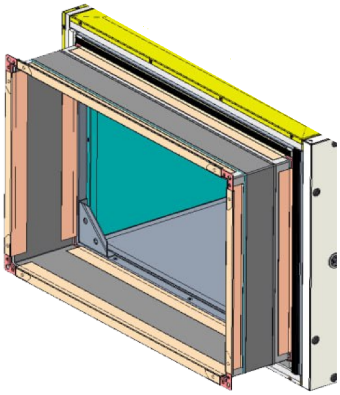
Connection D=25; H=Kx1.875
K=P/10

H - high of siphone
K - siphone outlet height
P - total fan pressure

Picture 14
Siphon

8 Connection to the Air Duct

The connection to the air duct should be carried out by using a flexible insert (Picture 15), which protects against vibration transfer and restricts the misalignment of the air duct and the outlet of the unit. This connection should be made in such a way that the air duct does not load or deform the housing of the installation. The necessary accessories are installed in accordance with the current installation requirements of the equipment manufacturer. All connections and structures should not obstruct the opening of service panels, servicing, and maintenance of the unit.



Picture15
Flexible insert

9. Electrical Connection

The connection of electrical equipment located inside the installation is carried out through electrical junction boxes located on its housing (service sides are selected during design), and their terminals are wired for electrical equipment. Electrical installation and connection of control and automation elements should be carried out by qualified personnel with a license for the installation of such equipment. The connection should be made in accordance with applicable standards and rules. An initial inspection of the electrical equipment should be performed before commissioning.

Before connecting, it is necessary to check:

- Compliance with the voltage, frequency, and protection specified on the section panel being connected;
- The cross-section of the connecting cables.

9.1 Requirements for Electrical Connections

Electrical connections of installations should be carried out following these recommendations:

- Grounding of installations should be done in accordance with the "Rules for the Arrangement of Electrical Installations" (RAEI).
- The resistance value between the grounding output and each touchable metal and conductive part that may be under voltage should not exceed 0.1 Om.
- Use the necessary protective measures during electrical installation.
- Personnel conducting electrical installation should have the necessary authorization to work with electricity.
- When connecting installations, always check the direction of rotation of the impeller in the fan section, access to which is provided through a quick-release service panel. The direction of rotation should coincide with the arrow on the housing. Failure to comply with the direction of rotation will lead to motor overheating. Changing the direction of rotation is achieved by switching the phases of the fan motor.
- In fans with motor wheels based on an EC motor, smooth speed control is carried out by an external control signal of 0-10 V from a corresponding device (sensor). The 0-10 V signal is applied to the appropriate motor contacts according to the connection diagram.

9.2 Motor Connection

The motor is connected according to the scheme provided in the terminal box. To protect the motor, a motor protection circuit breaker or thermal relay is installed. The motor should not be connected to the system if there is a phase imbalance exceeding 5%.

The main characteristics of the motor are always on the nameplate. Use the following formula: phase imbalance (%) = (maximum voltage deviation) / (average voltage) * 100%

9.2.1 Instructions for Asynchronous Motors:

For small modifications of installations, before installation and startup, make sure that the motor is connected according to the required scheme (delta or wye). Ensure that if the motor is connected to a single-phase frequency converter, the connection scheme of the motor is set to delta.

9.2.2 Instructions for Synchronous Motors:

- Direct connection
- Connection through variable reactive current
- Control of the motor with direct current is carried out using a control board that accepts a 0…10V signal.

Ventservice

AC-MOTOR

Is placed on a vibration-resistant frame separated from the body of the unit. Perfectly adjusted to the aerodynamics of the ventilation network, it is possible to adjust the parameters if necessary.

> Energy efficiency classes: IE1, IE2, IE3.
> Protection class: IP 55

Equipped with a frequency converter that enables quick reach of the set point.

EC-MOTOR

Brushless synchronous motor with electronic control highly reduces noise level.

> High working pressure: up to 2500 Pa.
> Wide range of nominal voltage: 200-277V and 380-480 V ±15%.
> Long service life: more than 80000 of continuous work.

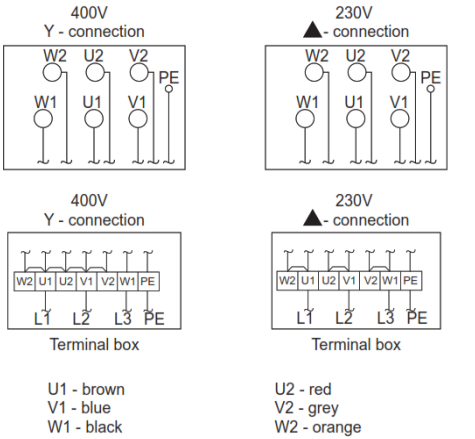
EC-ELECTRIC MOTOR WITH EFFICIENCY HIGHER 90%

- Saves at least 30% more electricity than an AC motor. Complies with the ErP 2015 directive.
- Built-in EMC filter protects against phase loss and low voltage in the network.
- Protection against overheating of the motor and electronics, and protection against rotor lock.
- No starting currents.

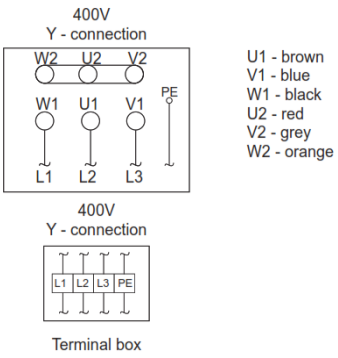
Picture 16

9.3 Electrical connection scheme

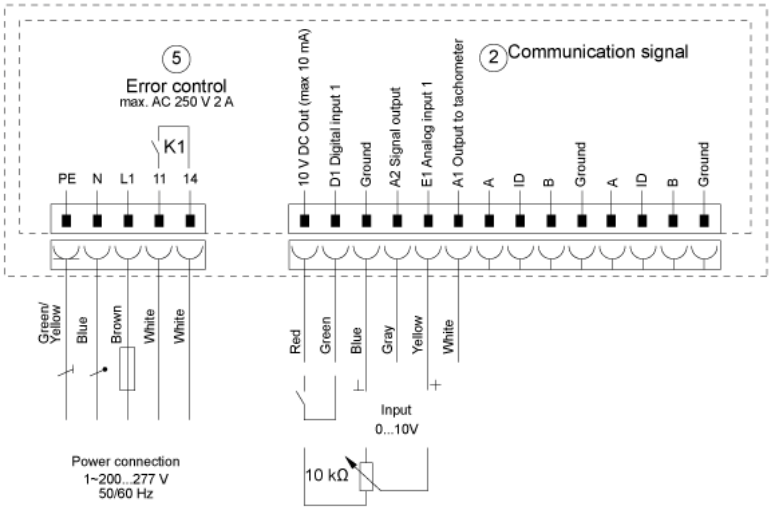
Rated voltage and wiring for motors up to 3 kW



Rated voltage and wiring for motors 3 kW

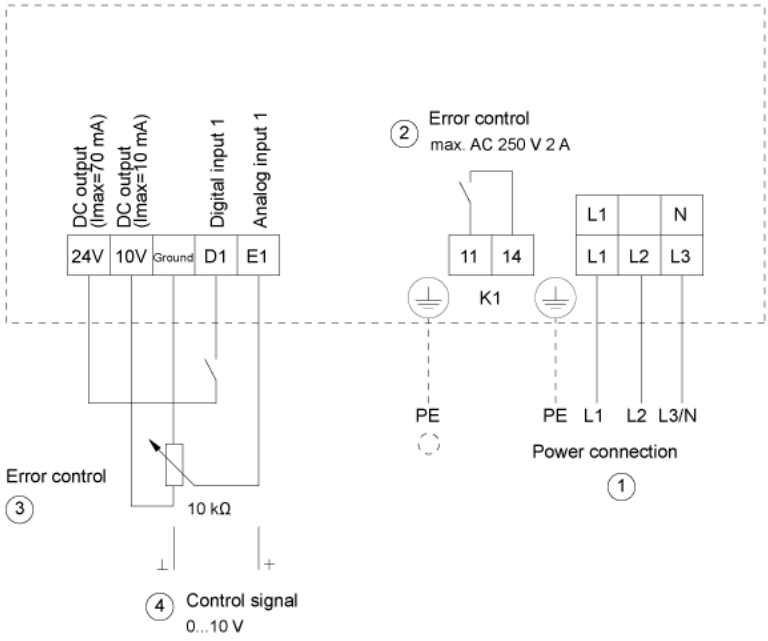


Picture17



Picture 18

Fan motor connection diagrams



Picture 19
Схема підключення електродвигунів вентиляторів

It's important: If the network voltage has a phase imbalance of more than 5%, contact the electricity supplier. Claims for warranty are not accepted if the phase imbalance exceeds 5%.

9.4 Motor Protection

To protect the motor, install the motor protection circuit breakers or thermal relays. Fans with motor wheels based on an EC motor are equipped with internal comprehensive protection, which disconnects the motor in case of a malfunction without the need for additional switching devices.

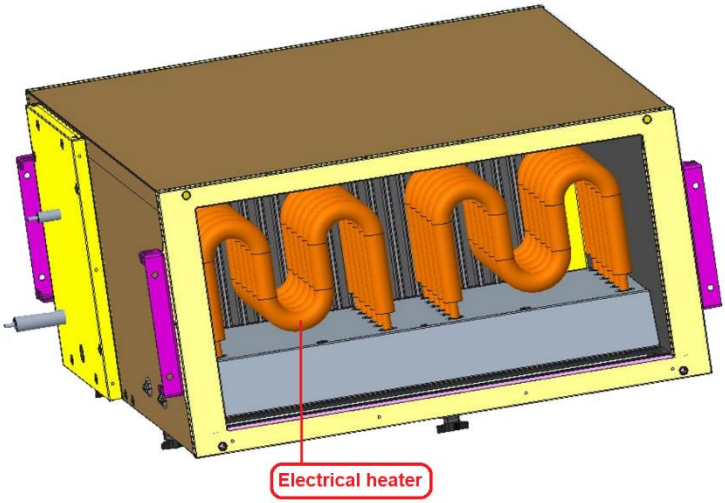
Attention! Claims will not be accepted if the motor was operated without connecting motor protection.

9.5 Connection of Electric Heaters

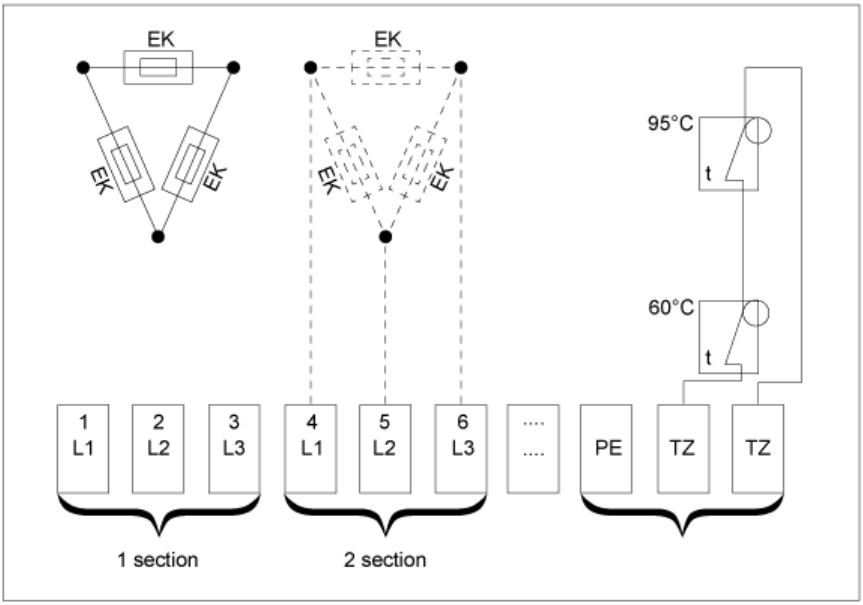
The electrical installation of electric heaters should be carried out according to the electrical diagram. Before startup, a thorough check of the quality and correctness of the connection should be performed. Before putting it into operation, it is necessary to check the proper operation of the protective and emergency thermostat circuits connected to the control

panel. When the circuit of emergency thermostats is open, the control panel should disconnect the power to the power part of the heater and signal an overheat malfunction. Check the reliability of cable fastening in the terminal box and fastening clamps. Check the reliability of grounding. It is prohibited to use the zero wire for grounding.

When put into operation, combustion of oil from the surface of the heating elements (TENs) occurs within 20 minutes, accompanied by smoke and a characteristic odor. When putting it into operation, it is also necessary to activate the air flow impeller to remove smoke and combustion products of the oil from the electric heater TENs.



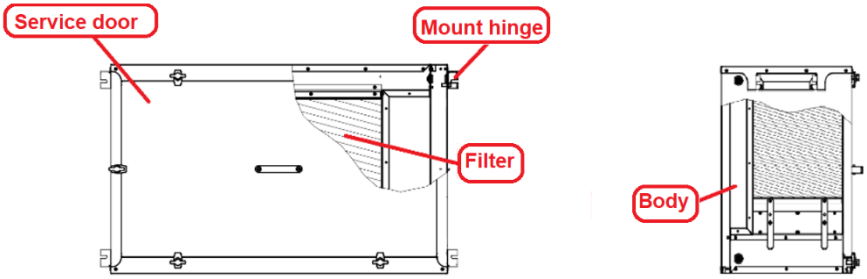
Picture 20
Electric heater section



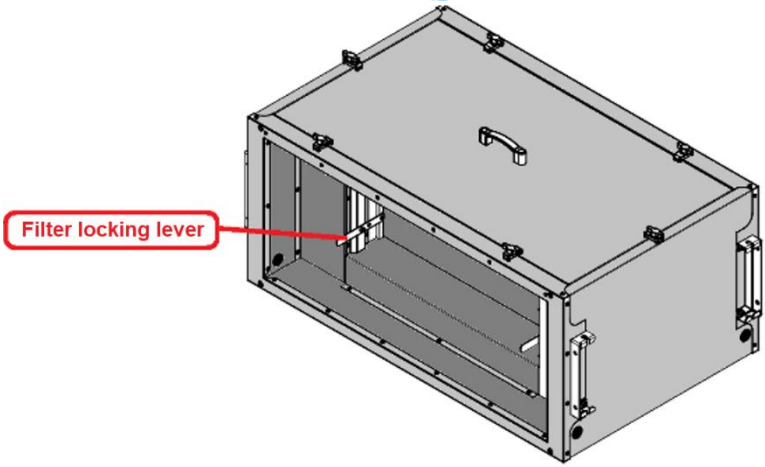
Picture 21
Scheme of the electric heater connection.

10 Filter Replacement

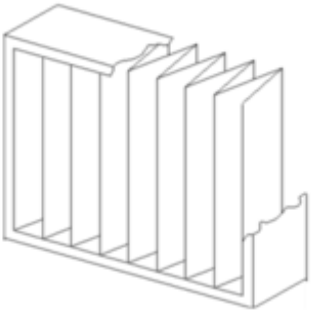
During each replacement of filtration inserts, it is necessary to monitor the condition of the seal, and damaged areas should be replaced with a new seal. The insert is removed along the guides. It is recommended to contact the installation organization or the manufacturer's plant for filter replacement.



Picture 22 (a)
Filter section arrangement diagram

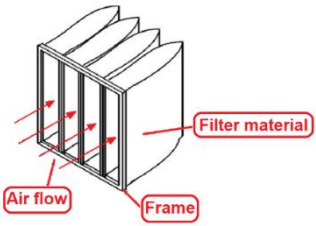


Picture 22 (b)
General view of filter section



Picture 22 (c)
Scheme of cassette filters structure.

Picture 22 (d)
General view of a cassette filter in a section



Picture 22 (e)

Picture 22 (f)

Scheme of a pocket filter device

11 Preparation for Operation, Start-up

11.1 Start-up

Qualified specialists with the appropriate authorization should carry out the start-up. Before the initial start-up, an expert should perform an initial inspection of the electrical equipment of all installation components.

11.2 Safety Rules

Be cautious during the installation and service of the fan section with an EC motor; the fan has considerable weight and is mounted on a service panel.

- Starting and operating fans with open panels is prohibited. A warning sticker on the service doors of the installation alerts about the danger of touching rotating parts. Service panels should be closed during operation.

- Always turn off the main switch before starting work on fan components and take measures to prevent accidental activation of the electric motor during service operations.

- During draining of the heat carriers, the water temperature should be below +60°C. Connecting pipes should be insulated in such a way that the surface temperature does not exceed +60°C.

- It is prohibited to remove service panels of the electric heater that are under voltage and adjust the settings of the protective thermostat.

- Do not operate the electric heater without controlling the air temperature at the outlet and ensuring the stability of the airflow.

11.3 Inspection before the Initial Start-up

Main actions during the inspection:

a) Stop all work on the installation and air ducts, remove any foreign objects from them;

b) Check the reliability of connection the power cable to the clamps of the outlet box and the grounding conductor to the grounding clamps.

11.3.1 Check:

- All parts of the ventilation equipment are mechanically secured and connected to the air duct.

- All cooling and heating circuits are connected and filled with a heat carrier.

- All electrical equipment is connected.

- A system for condensate drainage is installed.

- All components of the control and automation system (if included in the supply package) are installed and connected.

11.3.2 Electrical Installation:

- According to electrical diagrams, verify the correct connection of individual electrical elements of the installation.

11.3.3 Filtration Section

- Condition of the filters.

- Fastening of the filters.

- Adjustment of differential pressure sensors.

11.3.4 Water Heater Section

- Condition of the heat exchange surface.

- Condition of the inlet and outlet pipelines.

- Condition and connection of mixing units.

- Condition, connection, and correct installation of freeze protection elements.

11.3.5 Electric Heater Section

- Condition of the heating rods.

- Connection of the heating rods.

- Connection of emergency and working thermostats.

11.3.6 Water Coolers and Direct Evaporators Section

- Condition of the heat exchanger surface.

- Condition of the inlet and outlet pipelines.

- Connection of the condensate drainage system.

- Elements and connections of the refrigeration circuit.

- Condition of the droplet separators.

11.3.7 Plate Heat Exchanger Section

- Condition of the heat exchanger plates.

- Operation of the bypass damper.

- Condition of the droplet separators.

- Connection of the condensate drainage system.

11.4 Trial Run:

- Close the air valve.

- Close the service panels of the fan.

- Turn on the fan.

- Check the rotation direction (it should match the arrow on the casing; if not, change the phases on the motor).

- Measure currents in each phase; their values should be less than nominal.

- Open the air valve.

Measure currents in each phase again and compare them with the nominal values indicated on the factory motor plate.

11.4.1 Conduct testing of safety and protection elements:

- Phase loss.

- Motor overheating.

- Exceeding motor current.

- Freezing protection of the water heater.

- Risk of freezing the recuperator.

- Exceeding the temperature of the electric heater, etc.

During the trial operation, there should be no unusual sounds or vibrations from the installation. The trial operation should last at least 15 minutes. After completion, inspect the installation. Adjust the system if necessary. Before starting in continuous mode, regenerate or replace the filtration inserts.

12 Operational Control, Operating Rules

12.1 Current Operational Control:

- Monitor the system's performance, tightness of connections, doors, service panels, and the temperature of heat carriers and air sensors to detect filter blockages.

- Assess the condition and operation of components related to the ventilation system, focusing on:

- Electrical equipment.

- Control and automation systems.

- Pump operation, water filters.

- Cooling systems.

- Condensate drainage systems.

12.2 Regular Inspection:

According to usage conditions, users should set the interval between inspections, but it should be done at least once a month. The inspection includes:

12.3 General Condition Control:

- Clean all parts of the unit.

12.4 Filter Control:

- Filters of pocket and cassette types that are used in units. Install filters in the filtration section along guide grooves. Replace a clogged or damaged inserts along with the frame gasket. Dispose of used inserts considering environmental protection.
- Check the installation of differential pressure sensors.

12.5 Fan Control:

- Check the cleanliness of the impeller.

12.6 Heat Exchanger Control:

- Clean the heat exchange surface by using compressed air or flushing with warm water.
- Clean carefully to avoid damaging the heat exchanger plates.
- Remove air from the heat exchanger regularly.
- Regularly inspect condensate drainage (for coolers).

Note: When disconnecting the heat exchanger in winter, drain water carefully using compressed air or fill the heat exchanger with a water-glycol mixture. Residual water can freeze and damage copper pipes of the heat exchanger.

12.7 Electric Heater Control:

- Check for contamination on heating rods (remove contamination using compressed air).
- Verify the operation of safety thermostats.

12.8 Recuperator Control:

- Inspect contamination of plate heat exchangers.
- Check the condensate drainage system.
- Check contamination of the heat exchanger.

12.9 Valve Control:

- Inspect valve cleanliness.
- Check the rotation of valve plates.
- Verify valve closure.

12.10 Spare Parts:

If necessary, spare parts can be ordered from the regional representative of "VENTSERVIS" LLC. When placing an order, provide the factory number of the installation or the order number and attach the specifications for the required spare parts. Spare filtration inserts can also be ordered, specifying the filter type (pocket, cassette), installation type and filter class.

13: Possible Malfunctions and Their Remedies

Faults	Probable cause	Ways to eliminate	Notes
Insufficient unit performance.	**1. The network resistance is higher than the design value. 2. The fan wheel turns in the opposite direction. 3. Air leakage due to insufficient density.**	**1. Reduce network resistance. 2. Switch phases on the engine terminals. 3. Tighten screw connections. 4. Eliminate insufficient density.**	
Increased unit performance.	**The resistance of the network is lower than the calculated one.**	**1. Throttle the network. 2. Decrease the speed.**	
Increased vibration of the unit.	**1. Violation of motor-wheel balancing. 2. Dirty motor-wheel**	**1. Clean the motor-wheel.**	
Strong noise during unit operation.	**1. There are no flexible inserts between the unit and the ducts. 2. Poorly tightened screw connections.**	**1. Equip the system with flexible inserts. 2. Tighten screw connections**	
The installation fan is independently excluded.	**1. Engine overheating - winding thermal contacts worked. 2. The fan is out of order.**	**1. After cooling the thermal contacts, you need to restart the fan. 2. Replace the fan motor.**	

14: Mandatory scheduled maintenance Recommended by the Service Department of "VENT-SERVICE"

Regulatory works are carried out regardless of the technical condition and location conditions of the ventilation system. Timely and high-quality performance of regulatory works prevents malfunctions and equipment failures during its operation, ensuring a high level of reliability of the ventilation system.

In accordance with the operating conditions, the user sets the interval between inspections but should be carried out at least once a month. Regulatory works include:

14.1 Monthly:

1) Equipment external inspection, verification of fastenings, enclosures, and structures of the inflow installation;
2) Power supply check by phases (voltage imbalance check, current imbalance check);
3) Monitoring and cleaning (replacement) of air filters;
4) Verification of electric drives regulating shut-off valves;
5) Control and recording of the automation system and process control system indicators;
6) Maintenance of the water pump;
7) Inspection of the operation of the equipment drainage system and, if necessary, performing drainage cleaning;
8) Examination of the heat exchanger condition.

14.2 Quarterly:

9) Inspection of the condition of power chains and equipment control chains, tightening threaded connections if necessary;
10) Control and adjustment of the three-way valve of the water air heater;
11) Control and adjustment of the three-way valve of the water air cooler;
12) Inspection and alignment of the impeller on the shaft;
13) Removal of scurf from the impeller;
14) Tensioning of shock absorber springs at the base of the fan motor;
15) Checking the flexibility and strength of fastenings.

14.3 Every six months:

16) Chemical cleaning of condensate drainage;
17) Monitoring the condition of contamination in water filters with steel mesh.

14.4 Annually:

18) Cleaning of louvered grilles;
19) Inspection of air ducts for airtightness;
20) Chemical cleaning of the heat exchanger;
21) Washing and cleaning the internal cavity of the inflow ventilation unit;
22) Planned sealing of the air duct;

23) Inspection of the bearings of fan motors;
24) Verification of compliance of instrumentation and control devices;
25) Inspection of the unit's impeller;
26) Verification of electric drives regulating shut-off valves;
27) Maintenance of drainage traps;
28) Maintenance of the water pump.

The buyer undertakes to properly fill out the "Journal of Regulatory Works" after performing such works. Without the mandatory technical regulatory works, the warranty is lifted the next day after such works were supposed to be performed. At the request of the manufacturer's service department, the buyer undertakes to provide the Journal of Regulatory Works for review. Confirmation of the proper operation and maintenance of the Equipment is not only a completed Journal of Regulatory Works but also the results of the Equipment diagnostics, carried out by the manufacturer's service department, if necessary, to confirm the entries in the Journal of Regulatory Works.

15 Touchscreen Control Panel IQPro4"

Picture 23
The controller

The wall-mounted touchscreen control panel is designed for managing industrial and domestic supply and exhaust ventilation units and other air processing units. The panel is intended for displaying measured parameters from sensors, settings, and other configurations for ventilation units with electric and water heating types.

"Vent-Service" LLC continually expands the lineup of control units and automation systems. For more detailed information about automation, refer to the automation manual, contact the service department, or consult your manager.

16. WARRANTY CONDITIONS

16.1 WARRANTY PERIOD

The warranty period for the equipment is 36 calendar months from the moment of equipment shipment.

16.2 Warranty does not cover:

• Parts of the equipment and operational materials subject to natural, physical wear and tear (filters, gaskets, V-belts, light bulbs, fuses, etc.).

• Equipment defects arising from causes not determined by the properties and characteristics of the unit.

• Damage to the equipment caused by environmental influences, transportation, and improper storage by the buyer, all mechanical damages and breakdowns resulting from poor equipment operation and maintenance or non-compliance with recommendations and requirements of the technical and operational documentation (hereinafter referred to as TOD).

• All modifications, changes in operating parameters, alterations, repairs, and replacement of equipment parts not agreed upon with the supplier.

• Current routine work, equipment inspections, configuration, and controller programming carried out in accordance with the TOD requirements within the normal operation of the equipment.

• Loss caused by equipment downtime during the period of absence of warranty service and any damage to the buyer's property, except for the equipment under warranty.

• Compensation is not provided for damage caused by downtimes during the wait for warranty service and any damage to the customer's property, except for the manufacturer's installation.

16.3 Warranty Works

The works under this warranty are carried out within 14 days from the date of submitting the complaint. In some cases, this period may be extended, especially when time is needed for the delivery of parts or in case of the service's inability to work on-site.

Parts that service personnel dismantle from the unit as part of warranty repair and replace with new ones are the property of the manufacturer.

Costs arising from unjustified complaints or due to a break in service work at the request of the complainant are the responsibility of the complainant. Repair work is priced according to the price list for service services set by the distributor or manufacturer.

The manufacturer has the right to refuse warranty work or service if the customer delays payment for the equipment or for previous service work.

The customer should assist service personnel in carrying out repair work at the location of the equipment, namely: a) Prepare access to the unit and documentation at the appropriate time. b) Provide security for the service department and its property, as well as comply with all occupational safety and health requirements at the work site. c) Create conditions for a quick start of work immediately after the arrival of service personnel and their execution without any obstacles. d) Provide necessary assistance for work, such as providing lifts, free sources of electrical power.

The customer is obliged to accept the completed warranty work immediately after its completion.

17. Information about Complaints

The acceptance of the products is carried out by the consumer in accordance with the "Procedure for Acceptance of Products of Industrial and Technical Purpose and Consumer Goods for Quality."

In case of quality non-compliance, the consumer is obliged to submit a complaint to the distributor, which serves as the basis for resolving the legitimacy of the claimant's claim. The list of distributors and their contact information is provided on the https://aerostar.ua/ua/page/kontakty

Distributor complaints should be submitted in writing. Complaints can be submitted by fax or email.

The complaint should include: ORDER NUMBER! If possible: type, serial number, and date of transfer of the unit, installation address, phone numbers, and full name of the responsible person.

The complaint should also include a description of the unit problems and, if possible, the names of the damaged parts.

Claims regarding quality will not be accepted if the customer violates the rules of transportation, acceptance, storage, installation, and operation.

Ventservice

Appendix A

ДЕКЛАРАЦІЯ ПРО ВІДПОВІДНІСТЬ

1. Модель апаратури/виріб

Установки вентиляційного типу: GlobalStar (GS3-100), GreenSTR (3-25), SkyStar (1, 2, 4, 2(450), 4(450)), CrossStar (CS1-4), CrossStar mini X (500, 750, 1000), CrossStar mini XV (500, 750, 1000), EcoStar mini X (500, 750, 1000), EcoStar mini XV (500, 750, 1000), SlimStar (250, 500, 750, 1000, 1500, 2000, 2500, 3000), SlimStar PAP (500,1000), SkyStar mini (250, 500, 750, 1000), PoolStar (3-63), PoolStar compact, DryStar, TopStar, RoofStar, з функцією вентиляції, код ДКПП 28.25.12-50.00, код УКТЗЕД 8415

(номер виробу, тип, номер партії чи серійний номер літерами та/або цифрами)

2. Найменування та адреса виробника або його уповноваженого представника

ТОВ «ВЕНТ – СЕРВІС» код ЄДРПОУ 35851853, Україна, 03061, м. Київ, проспект Відрадний, 95 (літ.Б2).

3. Ця декларація видана під відповідальність виробника

4. Об'єкт декларації:

Установки вентиляційного типу: GlobalStar (GS3-100), GreenSTR (3-25), SkyStar (1, 2, 4, 2(450), 4(450)), CrossStar (CS1-4), CrossStar mini X (500, 750, 1000), CrossStar mini XV (500, 750, 1000), EcoStar mini X (500, 750, 1000), EcoStar mini XV (500, 750, 1000), SlimStar (250, 500, 750, 1000, 1500, 2000, 2500, 3000), SlimStar PAP (500,1000), SkyStar mini (250, 500, 750, 1000), PoolStar (3-63), PoolStar compact, DryStar, TopStar, RoofStar, з функцією вентиляції, код ДКПП 28.25.12-50.00, код УКТЗЕД 8415
Виробник: ТОВ «ВЕНТ – СЕРВІС» код ЄДРПОУ 35851853, Україна, 03061, м. Київ, проспект Відрадний, буд. 95 (літ.А2), офіс 230

(ідентифікація апаратури, яка дає змогу забезпечити її простежуваність; може включати кольорове чітке зображення у разі потреби для ідентифікації зазначеної апаратури)

5. Об'єкт декларації відповідає вимогам відповідних технічних регламентів:

- **Технічного регламенту низьковольтного електричного обладнання (ПКМУ № 1067 від 16.12.2015 р.)**
- **Технічного регламенту з електромагнітної сумісності обладнання (ПКМУ № 1077 від 16.12.2015 р.)**

6. Посилання на відповідні стандарти, включені до переліку національних стандартів, що були застосовані (із зазначенням дат видання стандартів), або посилання на інші технічні специфікації (із зазначенням дат видання специфікації), стосовно яких декларується відповідність:

ДСТУ EN 60335-2-80:2015, ДСТУ EN 55014-1:2019, ДСТУ EN 55014-2:2017, ДСТУ EN 61000-3-2:2016, ДСТУ EN 61000-3-3:2017, ДСТУ EN 60204-1:2019

7. Додаткова інформація:

Технічна документація виробника, протокол випробувань № Т062304/22 від 23.06.2022р.

Підписано від імені та за дорученням:

ТОВ «ВЕНТ – СЕРВІС» код ЄДРПОУ 35851853, Україна, 03061, м. Київ, проспект Відрадний, буд. 95 (літ.А2), офіс 230.

Директор		**23.06.2022 р.**	**Сергій АНЦУПОВ**
(найменування посади)	(підпис)	(дата)	(прізвище, ім'я та по батькові)

М.П.

Декларація про відповідність видана згідно з добровільному порядку ООВ ТОВ «ВСЦ «ПВДЕНТЕСТ» під номером. Декларація дійсна за умови нанесення знаку відповідності на продукцію, чи упаковку.

UA.TR.YT.D.062303-22	**23.06.2022 р.**	**22.06.2024 р.**
(обліковий №)	(дата взяття на облік)	(термін дії обліку)

Завідувач сектору сертифікації/ оцінки відповідності продукції
М.П.

Анна КУРОЧКІНА

Чинність декларації можна перевірити за тел +3 8 056 744 30 14 +3 8 050 486 22 92

Ventservice

Certificate – Сертификат – 證明書 – Certificat – 증명서 – شهادة

Form QAT_10-M05, version 00, effective since March 25th, 2020

Certificate of Compliance

No. 0D220131.VS0Q45

Certificate's Holder:	«Vent-Service» LLC Office 230, 95 (A2) Vidradnyi avenue Kyiv, 03061, Ukraine
Certification ECM Mark:	European Conformity Type Approved
Product:	Air Handling Units
Model(s):	*(see the following annex)*
Verification to:	Standard: EN 60335-1:2012/A13:2017, EN 60335-2-80:2003/A2:2009, EN 60204-1:2018, EN 55014-1:2017/A11:2020, EN 55014-2:1997/AC:1997, EN 61000-3-2:2014, EN 61000-3-3:2013 related to CE Directive(s): 2006/42/EC (Machinery) 2014/35/EU (Low Voltage) 2014/30/EU (Electromagnetic Compatibility)

Remark: This document has been issued on a voluntary basis and upon request of the manufacturer. It is our opinion that the technical documentation received from the manufacturer is satisfactory for the requirements of the ECM Certification Mark. The conformity mark above can be affixed on the products accordingly to the ECM regulation about its release and its use.

Additional information and clarification about the Marking:

CE

The manufacturer is responsible for the CE Marking process, and if necessary, must refer to a Notified Body. This document has been issued on the basis of the regulation on ECM Voluntary Mark for the certification of products. RG01_ECM rev.3 available at: www.entecerma.it

Issuance date: 31 January 2022

Expiry date: 30 January 2027

Reviewer
Technical expert
Amanda Payne

Approver
ECM Service Director
Luca Bedonni

Ente Certificazione Macchine Srl
Via Ca' Bella, 243 – Loc. Castello di Serravalle – 40053 Valsamoggia (BO) - ITALY
☎ +39 051 6705141 🖷 +39 051 6705156 ✉ info@entecerma.it 🌐 www.entecerma.it

ACCEPTANCE CERTIFICATE

The SkyStar ventilation unit

manufactured according to the Order,

has passed acceptance tests, complies with the requirements of

TU U 28.2-35851853-006:2020

and is recognized as suitable for operation.

Date of issue "_." _____ 20___ year

Controller

Signature _____M.P.

"VENT-SERVICE" LLC
03061, Kyiv,
95 A2 Vydradny Avenue
Tel.: (044) 594 71 08
www.aerostar.ua

Ventservice

START-UP PROTOCOL

type of installation		object	
factory number		address	
manufacturer		Date	
Customer			

EQUIPMENT OPERATION PARAMETERS

	by passport	actually
supply voltage, V		
supply fan motor current, A		
current strength of the exhaust fan motor, A		
air flow rate of the supply system, m3/h		
exhaust air flow, m3/h		
Compressor current (s), A (* optional)		

AUTOMATION TESTING

shutdown in case of fire		supply air temperature sensor	
phase control relay		outside air temperature sensor	
threat of calorifer freezing		exhaust air temperature sensor	
threat of exchanger freezing		room air temperature sensor	
overheating of electric heater		servo drive of supply flap	
humidity converter		coolant temperature sensor	
Gigrostat		servo drive of exhaust flap	
circulation pump		servo drive of recirculation damper	
remote control		servo drive of recuperator flap	
refrigeration unit accident		pressure drop sensors on fans	
servo drive of heater valve		pressure drop sensors on filters	
servo drive of cooler valve		rotation of the rotary recuperator	
switching on the refrigeration unit		accident of the rotary recuperator	

CHECK OF AIR PREPARATION PROCESSES

heating		utilization	
cooling		hydration	
recirculation		draining	

THE PROTOCOL WAS DONE

Full name		Full name	
position		position	
firm		firm	
signature		signature	

Ventservice

Routine maintenance.

№ Order	Name of the person performing scheduled maintenance	Date	Type of work	Signature or seal

Routine maintenance.

№ Order	Name of the person performing scheduled maintenance	Date	Type of work	Signature or seal

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Ventservice

Complaint form

Company name	
Contact (responsible) person	
Product name (type)	
Serial (factory) number	
Date of shipment and invoice number	
Place and address of the product application	
Date of the malfunction	
Circumstances under which the malfunction was detected	
Faulty component	
Description of the problem (nature of the fault, events that preceded the fault – natural phenomena, power voltage drops, etc.). Type, connection diagram, currents on the phases, mains voltage. Rotation direction. Temperature, pressure and composition of the heat-and-cooling agent. Air temperature that is transferred. Place of installation and location in the system	
Measures taken (your actions to identify and solve the problem)	
Note	

Responsible person /_____/

Attention:

If the complaint is found to be unreasonable (the product has no defects, or it is found that the defects resulted of circumstances for which the Distributor/ Manufacturer is not responsible) the Customer/Buyer shall compensate the Distributor/Manufacturer the costs incurred during the consideration of the complaint, including the costs of expert examination.

The cost of claim works is calculated by the following formula:

X= S*Y + Q*Z+M, where

S – cost per man-hour of the Employee for the type of work performed;

Y – the number of man-hours as a measure of the labor intensity of the work performed;

Q – rate per kilometer;

Z – actual number of kilometers;

M – cost of materials used to perform the work.

The cost per man-hour for the work performed is $7.5.

Guarantee obligations do not apply to:

- Equipment parts and operating materials which are subject to natural physical wear and tear (filters, seals, belts, light bulbs, fuses, etc.).
- Damages to the Equipment resulting from:

a) foreign objects or liquids entering the Equipment,

b) natural phenomena,

c) environmental impact,

d) animal activity,

h) unauthorized access to the units and parts of the Equipment by persons not authorized to perform the abovementioned actions,

h) all mechanical damages and breakdowns that occurred as a result of non-compliance with the recommendations and requirements of the documentation, including the "Installation and Operation Manual", passport, norms, standards and rules of works conductions.

- Various modifications, adjustments in operating parameters, alterations, repairs and replacement of parts of the Equipment, carried out without the consent of the Manufacturer or his representative.
- Current routine works, inspections of equipment, configuration and programming of controllers, which are carried out in accordance with the requirements of the "Installation and Operation Manual" within the normal functioning of the Equipment.
- Damages caused by downtime of the Equipment during the waiting period of guarantee service and any damage caused to the client's property, except for the Manufacturer's Equipment, are not subject to compensation.

For note

For note

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Виробничі потужності:
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Сервісна підтримка:
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https://aerostar.ua