

USER MANUAL

Filtering unit
RAK

EN



This operating manual applies to the following device models:

Part no	Type
900O42	RAK-1000-R
900O44	RAK-2000-R

User manual – title: "RAK-1000 and RAK-2000 filtering Unit"

The structure and format of this user manual incorporate the principles outlined in: EN 82079-1, EN ISO 20607, EN ISO 7010, the Machinery Directive 2006/42/EC, and other harmonised standards.



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INTRODUCTION

1.1 INITIAL INFORMATION

These operating instructions are intended for the user of RAK type devices. The purpose of these instructions is to provide the user with guidance on the intended use, assembly, installation, start-up and use of the device, as well as hazards, possible operating disturbances, and also disassembly, decommissioning and scrapping.

INFORMATION



Due to the continuous improvement of its products, the manufacturer reserves the right to make design changes whose purpose is to improve functional values and safety of use.

! CAUTION



The user is obliged to comply with the provisions written in these instructions and in the related instructions, i.e. the operating instructions for the electric motor. These instructions DO NOT contain the operating instructions for the electric motor.

IMPORTANT!
READ THE INSTRUCTIONS BEFORE USE!
KEEP FOR FUTURE USE!

1.2 STRUCTURE AND INFORMATION PRINCIPLES OF THE INSTRUCTIONS

These instructions contain **4 types** of articulated messages containing an information signal combining **a word and a symbol** in a graphic form dependent on the level and probability of the hazard, i.e.:

INFORMATION



Hazard level: very low or none

Content, note, explanation presenting a typical condition and appearance, typical action and behaviour. The content describes important information of general significance that must be implemented by those who read the operating instructions.

! CAUTION



Hazard level: low

Warning content indicating an increased level of attention by the user. The explanation included in the content presents a risk that may cause damage to the device, but not of a nature causing destruction or immobilisation, or has a minor effect on the user.

! WARNING



Hazard level: high

Warning content indicating a high level of attention by the user. The explanation in the content presents a risk that may cause damage or destruction of the device or may cause bodily injury to the user.

! DANGER



Hazard level: very high

Warning content indicating a very high level of attention by the user. The explanation in the content presents a risk that may cause destruction of the device or other nearby devices or may cause serious bodily injury or death. Corrective actions must be taken immediately after the risk is noticed. All activities leading to an increase in the hazard are prohibited!

1.3 MANUFACTURER DATA AND ADDRESS

All requests for information or repair work or inquiries concerning the technical aspects of this document should be addressed to:

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2. MANUFACTURER DECLARATION



DEKLARACJA ZGODNOŚCI WE UE EC&EU DECLARATION OF CONFORMITY

1. **Producent / Manufacturer:** KLIMAWENT S.A. 81-571 Gdynia, ul. Chwaszczyńska 194, Polska
2. **Opis produktu / Product name:** Urządzenie filtracyjne
Filter unit
3. **Model / Model:**
- | | |
|------------|------------|
| RAK-1000-R | RAK-2000-R |
| 900042 | 900044 |
4. **Nr produktu / Product number:**
5. **Nr seryjny / Serial number:** XXXX
6. **Rok produkcji / Year of production:** XXXX
7. **Niniejsza deklaracja zgodności wydana zostaje na wyłączną odpowiedzialność producenta.**
This declaration of conformity is issued under the sole responsibility of the manufacturer.
8. **Wymieniony powyżej wyrób spełnia wymagania następujących dyrektyw europejskich:**
The product mentioned above meets the requirements of the following European directives:
- | | |
|-----------------|-------------|
| MD 2006/42/WE | 2006/42/EC |
| LVD 2014/35/UE | 2014/35/EU |
| ERP 2009/125/WE | 2009/125/EC |
9. **Odniesienia do norm zharmonizowanych oraz norm krajowych (lub ich fragmentów), które zastosowano, w stosunku do których deklarowana jest zgodność:**
References to the harmonized standards and the national standards (or parts thereof) that have been applied and against which conformity is declared:
- | | |
|--------------------------------------|--------------------------------|
| PN-EN ISO 12100:2012 | EN ISO 12100:2010 |
| PN-EN ISO 13857:2020-03 | EN ISO 13857:2019 |
| PN-EN 60204-1:2018-12 | EN 60204-1:2018 |
| PN-EN IEC 60947-1:2021-07 | EN IEC 60947-1:2021 |
| PN-EN IEC 60947-1:2021-07/AC:2023-03 | EN IEC 60947-1:2021/AC:2023-01 |
| PN-EN 61310-1:2009 | EN 61310-1:2008 |
| PN-EN 61310-2:2010 | EN 61310-2:2008 |
| PN-EN IEC 61439-1:2021-10 | EN IEC 61439-1:2021 |
10. **Osoba upoważniona do przechowywania i przygotowania dokumentacji technicznej:** Teodor Świrbutowicz, KLIMAWENT S.A.
A person authorized to store and prepare technical documentation:
11. **Niniejsza deklaracja zgodności jest podstawą do oznakowania wyrobu znakiem:**
This declaration of conformity is the basis for marking the product with the mark:



Deklaracja zgodności wystawiona została w oparciu o przeprowadzony proces oceny zgodności. Deklaracja ta odnosi się wyłącznie do maszyny w stanie, w jakim została wprowadzona do obrotu i nie obejmuje części składowych dodanych przez użytkownika końcowego lub przeprowadzonych przez niego późniejszych działań.

The declaration of conformity was issued based on the conformity assessment process. This declaration relates only to the machine in the state in which it was placed on the market and does not cover components added by the end user or subsequent actions performed by the end user.



Gdynia, 2025-02-24
W imieniu producenta podpisali / **Signed on behalf of the manufacturer by:**

Michał Kulczyński

CZŁONEK ZARZĄDU /
MEMBER OF THE BOARD

9001:2015

Joanna Kopiaręk

PREZES ZARZĄDU /
CEO

3. DEVICE DESCRIPTION

3.1 INTENDED USE

RAK type devices are basic filter-ventilation devices used to clean air from welding fumes generated at mobile or stationary workplaces. These devices are intended for occasional use at welding stations emitting small amounts of welding dust.

RAK type devices effectively retain dry dusts and sticky dusts released during welding of oiled sheets or when using large amounts of anti-spatter preparations. Each device has a four-stage filtration system: pre-filter, filter mat, compact filter and carbon filter absorbing part of gaseous contaminants. After the limit value of filter contamination is reached, the filters must be replaced with new ones, because they are not suitable for regeneration.

The device is intended for cooperation with **ERGO** type extraction arms of all variants manufactured by **KLIMAWENT S.A.**, with lengths up to 3 m.

3.2 STRUCTURE

The **RAK** device consists of:

- housing made of steel sheet,
- centrifugal fan,
- mesh pre-filter,
- G3 class filter mat,
- F9 class compact filter,
- filter made of nonwoven fabric impregnated with activated carbon,
- electrical unit,
- working time counter,
- control pressure switch,
- running wheels for the mobile version or wall hangers for the stationary version (additional equipment),
- 5 m power cable with plug.

The construction of **RAK** devices is shown in the figures below – see Figure 1 and Figure 2.

Contaminated air is sucked in through the extraction arm/arms, flows through a set of filters where it is cleaned, and is then discharged outside into the room through the outlet located in the perforated bottom plate of the device housing.

RAK devices are adapted for fixing running wheels (**mobile version**) or wall hangers (**stationary version**) – see 3.2.1 – ADDITIONAL EQUIPMENT on page 12.

The devices have been designed in two options:

- **RAK-1000** – adapted for mounting one extraction arm – see Figure 1,
- **RAK-2000** – adapted for mounting two extraction arms – see Figure 2.

The devices are started by means of an electrical unit from the control panel built into the device. In addition, each device is equipped with a time counter and a pressure switch which signals the need to replace the compact filter (indicator lamp lights up).

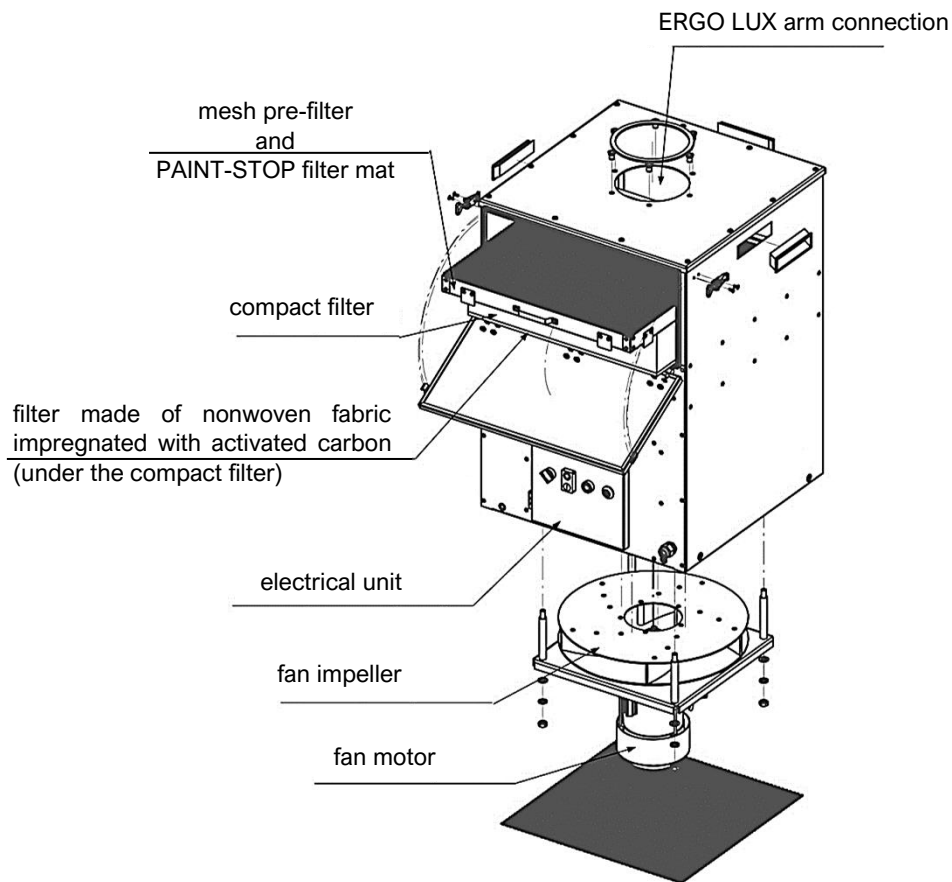


Figure 1 Construction of the RAK-1000 device

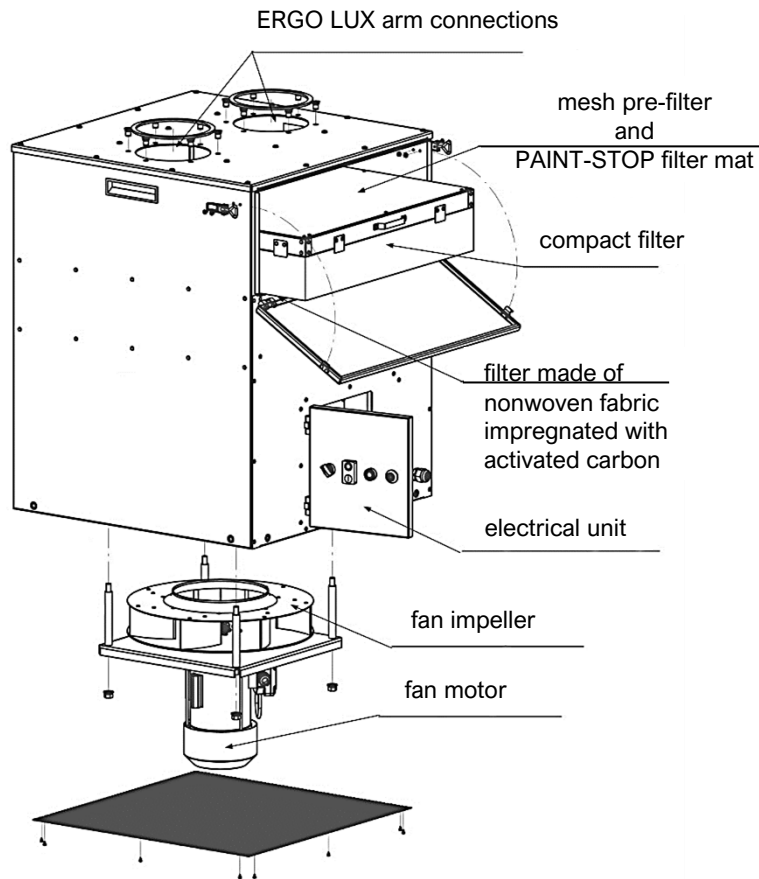


Figure 2 Construction of the RAK-2000 device

! DANGER

Possibility of destruction of the device, damage to property, injury or serious bodily injury.



It is **PROHIBITED** to position the mobile device on an incline **greater than 3%**! Failure to meet this condition **may lead to the device tipping over** when manoeuvring the extraction arm installed on the device. The device is stable in cooperation with a **2 or 3 m ERGO arm provided that the above requirement is met.**



The device is adapted for cooperation with **ERGO** type extraction arms with a maximum length of 3 m. It is **PROHIBITED** to use the device with extraction arms longer than **3 m!**

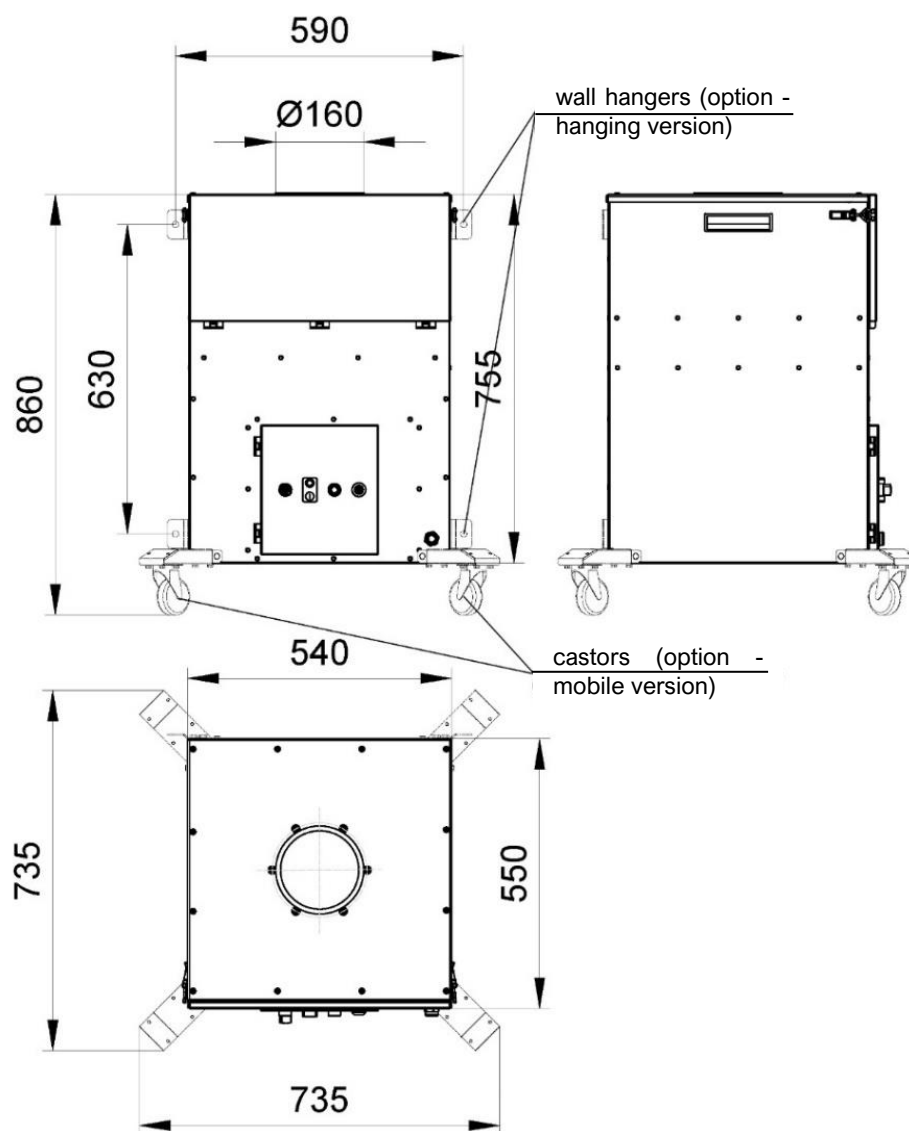


Figure 3 Dimensions of the RAK-1000 device

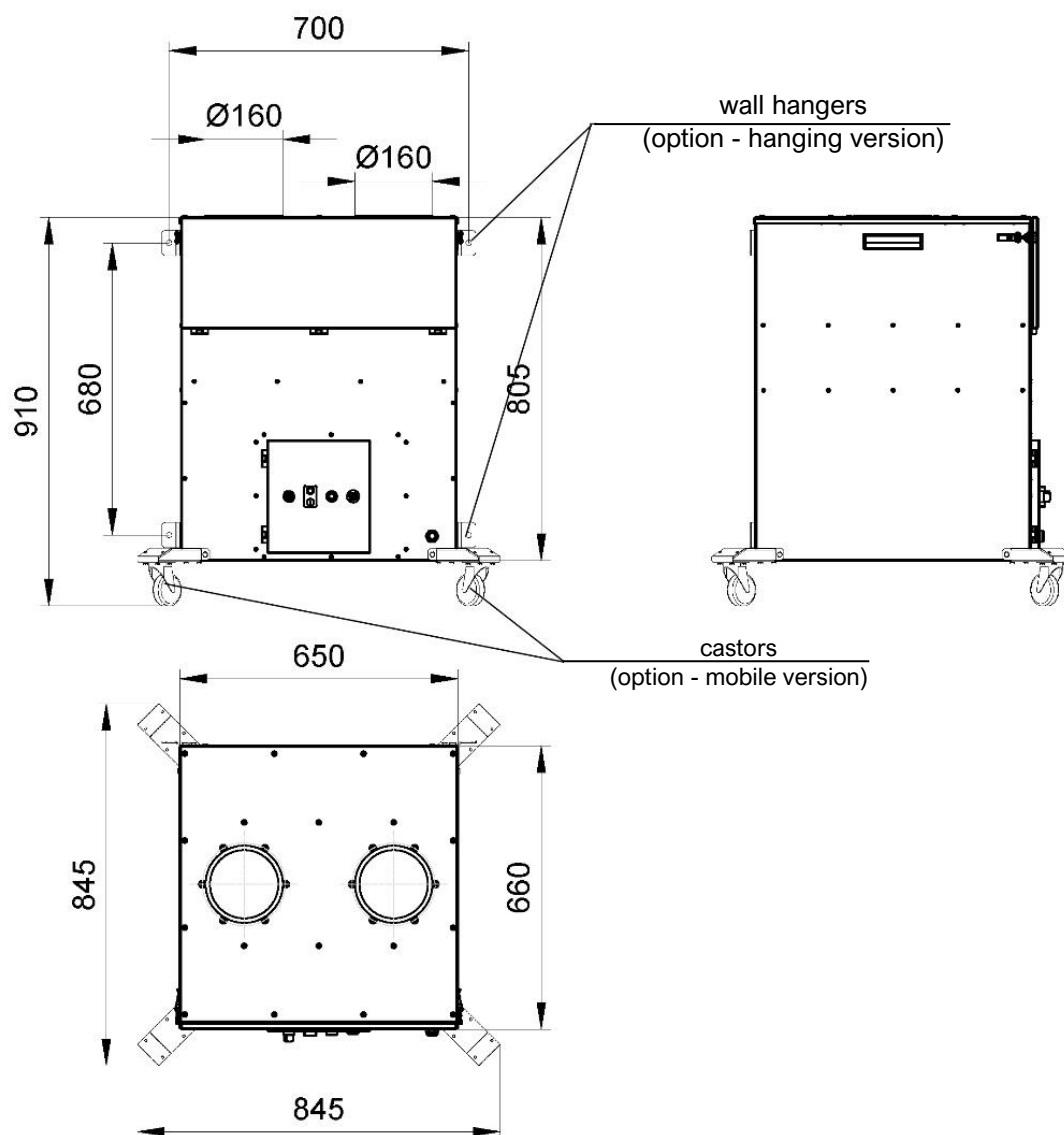


Figure 4 Dimensions of the RAK-2000 device

3.2.1 ADDITIONAL EQUIPMENT

Table 1

Type	Code	Notes
Wheel set	928K00	The set includes 4 running wheels with brackets
Hanger set	928W00	The set includes 4 wall brackets
ERGO LUX-L/2-R	910R84	Standing extraction arm, length 2 m
ERGO LUX-L/3-R	910R85	Standing extraction arm, length 3 m
ERGO LUX LL/2-R	909R08	Standing extraction arm, length 2 m, with lighting
ERGO LUX-LL/3-R	909R09	Standing extraction arm, length 3 m, with lighting

3.2.2 REPLACEABLE PARTS

A. Filter mat

Table 2

Type	Code	Mass [kg]	Dimensions A×B×H[mm]	Class	Filtration efficiency [%]	Notes
FWR-1000	938W78	~ 0.01	490×490×50	G3	88	Each device contains 1 sheet of mat in a metal cassette
FWR-2000	938W79	~ 0.01	600×600×50			

B. Compact filter

Table 3

Type	Code	Mass [kg]	Dimensions A×B×H[mm]	Class	Filtration efficiency [%]	Notes
FKR-1000	938F47	2.5	490×490×100	E11	95	1 pc.
FKR-2000	938F48	4.0	600×600×100			

C. Nonwoven fabric impregnated with activated carbon

Table 4

Type	Code	Mass [kg]	Dimensions A×B×H[mm]	Notes
FCR-1000	938W96	~ 0.02	450×450×10	Each device contains 1 sheet of nonwoven fabric.
FCR-2000	938W97	~ 0.02	570×700×10	

3.3 TECHNICAL DATA

Table 5

Type	Code	Maximum flow rate ¹ [m ³ /h]	Supply voltage [V]	Motor power [kW]	Sound pressure level [dB(A)] from distance ²		Mass [kg]	Number of connections for ERGO arms ³
					1 m	5 m		
RAK-1000-R	900042	1800	230	1.1	74	60	65	1
RAK-2000-R	900044	2650	230	1.5	77	63	85	2

¹ The flow rate was measured on clean filters.

² Sound pressure level values are given under free-field conditions.

³ The full range of **ERGO** suction arms is available in separate catalogue sheets of **KLIMAWENT S.A.**

! WARNING

Possibility of destruction of the device, damage to property, injury or bodily injury.



The device is adapted for cooperation with **ERGO** type extraction arms with a maximum length of 3 m. It is **PROHIBITED** to use the device with extraction arms longer than **3 m**!

4. SAFE USE

4.1 MANUFACTURER RESERVATIONS

! CAUTION



KLIMAWENT S.A. performed a risk analysis only for the **RAK** device but does not consider the influence of additional risk resulting from use and application at the installation site in a manner not intended by the manufacturer.



Unauthorised modifications of the device and installation of additional elements that are not part of the device or additional equipment and may affect the safety of use of the device are **PROHIBITED!**



KLIMAWENT S.A. declares conformity of the product with directives and harmonised standards based on the performed conformity assessment process. The manufacturer issues a declaration of conformity which refers only to the machine in the condition in which it was placed on the market and does not include components other than those permitted by the manufacturer and added by the end user, or later actions carried out by the end user.

4.2 SAFETY RULES AND LIMITATIONS OF USE

! CAUTION



READ these instructions before starting the device! Keep them for future use in a place accessible to all users.



PROTECT the device against mechanical damage.



PROTECT all markings, descriptions, the rating plate and especially warnings against rubbing off, damage causing illegibility, or detachment.



The device is intended for **PROFESSIONAL** use. Before starting work, become familiar with the procedures and rules for operating the device. Operation may be performed only by **TRAINED** and **QUALIFIED** personnel.

! WARNING

Possibility of damage to the device, injury or significant bodily injury!



The manufacturer is not responsible for bodily injuries resulting from **INCORRECT USE**. During all operations performed on the device (assembly, maintenance, cleaning, etc.), operators must be equipped with appropriate personal protective equipment (PPE) to prevent or minimise injuries that cannot be prevented otherwise.



Before installing the device, check the load-bearing capacity of the structural elements to which it will be attached or on which it will move. **INCORRECT, CARELESS** or **UNSTABLE** fixing of the device may lead to its damage and will also create a real **HAZARD** to people nearby.



After positioning the device at the workplace, **LOCK** the wheels (in the case of the mobile version) to prevent it from moving away from its position or rolling down an uneven surface. After each change of position, **LOCK** the running wheels.

! WARNING	
Possibility of damage to the device, injury or significant bodily injury!	
	The device MUST NOT be started before making sure that the continuity and connection of the PE protective conductor have been checked.
	Unauthorised modifications of the device and installation of additional elements that are not part of the device or additional equipment are PROHIBITED!

! WARNING	
Possibility of damage to the device, operating disturbances.	
	The temperature of the conveyed air MUST NOT exceed +60°C .
	The ambient temperature during operation MUST be within the range from -20°C to +40°C ; otherwise, at a higher temperature, the electric motor of the fan will be exposed to INSUFFICIENT COOLING , which may consequently cause its damage.
	The relative humidity of the environment MUST NOT exceed 95% without condensation . Excessive moisture contained in the air may damage the air filter and adversely affect the electric motor.
	Atmospheric pressure MUST be within the range from 800 hPa to 1100 hPa .
	The limit dust concentration of the filtered air MUST NOT exceed 3 mg/m3 .
	The device MUST NOT operate in an environment that may cause an accelerated rate of corrosion.
	DO NOT PLUG or COVER the air outlet by partially or completely covering the outlet from the device. This will reduce or completely block the air flow through the device, which may damage the electric motor as a result of INSUFFICIENT COOLING .

! WARNING	
Possibility of destruction of the device, damage to property, injury or bodily injury.	
	After each change of position of the mobile device , the user MUST lock the wheels to protect against rolling down unevenness.
	It is PROHIBITED to position the mobile device on an incline greater than 3% ! Failure to meet this condition may lead to the device tipping over when manoeuvring the extraction arm installed on the device. The device is stable in cooperation with a 2 or 3 m ERGO arm provided that the above requirement is met .
	The device is adapted for cooperation with ERGO type extraction arms with a maximum length of 3 m. It is PROHIBITED to use the device with extraction arms longer than 3 m!

! DANGER

Possibility of severe health impairment or death as a result of electric shock!



The device **MUST NOT** be started before making sure that the continuity and connection of the **PE protective conductor** have been checked.

! DANGER

Possibility of damage to the device, fire or explosion!



It is **PROHIBITED** to use the device to transport air containing **CORROSIVE** contaminants that may adversely affect the device!



It is **PROHIBITED** to use the device to clean air from **CARCINOGENIC** or **RADIOACTIVE DUST** or air contaminated with **PATHOGENS** and other hazardous substances posing a high danger to human health and life.



It is **PROHIBITED** to use the device to transport a mixture of air with **FLAMMABLE SUBSTANCES** in the form of gases, vapours, mists or dusts that form an **EXPLOSIVE ATMOSPHERE** with air!

4.3 REQUIRED PERSONAL PROTECTIVE EQUIPMENT

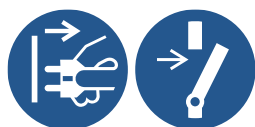
RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT



Mandatory use of a dust mask

The warning indicates the requirement for personnel to use protection.

Protective equipment must always be used during operation and maintenance.



Mandatory disconnection of the device from the electrical network

The warning indicates the requirement to disconnect the device from the power supply when carrying out maintenance, fault detection and similar activities requiring opening of covers and access to dangerous elements, especially to the fan impeller.

4.4 WARNINGS

RECOMMENDED MARKING ON OR NEAR THE DEVICE



ATTENTION: Hazard related to dusty atmosphere!

The device itself is not a source of dust emission and has a tight housing, but due to the intended use of the device for air cleaning, dust from the filtration process accumulates inside, on the filter surfaces and on the chute and in the dust container.

Each opening of the device or emptying of the dust container leads to user contact with potentially harmful technological dust.

4.5 INFORMATION ON RESIDUAL RISK

KLIMAWENT S.A. has performed a **Risk Assessment** carried out in accordance with **EN ISO 12100**. This assessment shows the remaining **residual risk** for the above device (machine) and is illustrated in this chapter. The table below presents information on **residual risk** and rules of conduct during use in each phase of the device life.

ATTENTION: THE DEVICE IS SAFE PROVIDED THAT THE PROVISIONS PRESENTED IN THE TABLE BELOW ARE OBSERVED.

Table 6 Safety rules and information on residual risk

SAFETY RULES AND INFORMATION ON RESIDUAL RISK			
No.	Phase	Hazard	Procedure
A.	Unpacking	Impact, abrasion, tipping over	Use personal protective equipment protecting against accidental abrasion, cuts and injuries, especially anti-cut gloves, protective clothing and work shoes. When passing and working next to the device, pay attention to protruding elements.
B.	Transporting, lifting load	Impact, abrasion, overturning of the load, slipping of the load	During moving of the device, handle it in a way that prevents uncontrolled rolling or movement which may cause running over, impact or crushing by pressing. Always secure the device during movement! Lock the wheels after each change of position.
C.	Storage	Impact, abrasion, tipping over	Use personal protective equipment protecting against accidental abrasion, cuts and injuries from protruding elements. Follow the rules described in section 5 – TRANSPORT AND STORAGE – page 20, to protect the device structure against damage, loss of tightness, crushing or destruction.
D.	Installation	Impact, fall	The user must prepare a suitable floor adapted to the size and weight of the device, and the surface must be level and hard to allow free movement and a stable position when stopped, and above all to protect against self-sliding or rolling from the stopping place or tipping over. See section 6.3 – INSTALLATION on page 23 and 6.1 – WORK AREA AND COMMUNICATION SPACE on page 22.
E.		Electric shock, shock	It is necessary to ensure the correctness of connecting the device to a socket with a PE protective conductor and to check whether the grounding connection of the socket to the main grounding bar has been made – see section 6.4.1 – CHECK OF THE PE CONDUCTOR IN THE POWER SUPPLY INSTALLATION on page 25.

SAFETY RULES AND INFORMATION ON RESIDUAL RISK

No.	Phase	Hazard	Procedure
F.	Start-up / Starting / Work	Discomfort, stress caused by noise	Do not place the device near corners, near walls or on enclosed metal structures due to the possibility of causing vibrations and resonances. The device is a source of noise. Place appropriate warnings informing about noise generated by the device.
G.		Noise, discomfort, fatigue	The user or employer must comply with regulations on protection against daily exposure of operators to noise generated at the workplace (required by applicable European and national standards) and require the use of personal protective equipment (earmuffs, earplugs, etc.) depending on the general sound pressure level at individual workplaces and the daily personal exposure level of employees.
H.		Electric shock/burns caused by the motor	Make sure that the current drawn by the fan does not exceed the value given on the motor rating plate.
I.			Avoid repeated motor starts that lead to continuous overloads of the starting system, which overheat electrical elements. Allow the device to cool before restarting.
J.		Burn	Do not touch the motor during and after long-term operation. Wait for the motor housing and directly adjacent surfaces to cool down.
K.		Excessive vibrations	Provide planned maintenance to prevent technical failures that may occur over time as a result of excessive vibrations – see 9.2 – MAINTENANCE WORK SCHEDULE on page 34.
L.			Excessive vibrations should be avoided, as they may cause an increased noise level, bearing seizure, deformations or cracks of the impeller structure, loosening of bolts and nuts of important connections, and ultimately lead to destruction of rotating elements and create a situation endangering the safety of operators and persons nearby.
M.		Poisoning/suffocation	Both the end user and the installer must consider the risk resulting from conveying air mixtures other than those permitted by these instructions. Indicate with appropriate signs all types of hazards associated with situations resulting from non-compliance with the provisions concerning permitted use of the device.
N.		Slip, fall	Maintain minimum distances of the device from walls or partitions during installation; otherwise, this may cause hazards and inconvenience in confined spaces during operation or maintenance – see section 6.1 – WORK AREA AND COMMUNICATION SPACE on page 22.
O.			Properly illuminate the area surrounding the device.
P.	Maintenance / Cleaning / Fault detection / Disassembly	Impact, compression, crushing	Always lock the braked wheels after changing the device position to prevent it from rolling down an uneven surface, which may cause damage to other devices, impact on people, injury, and crushing resulting in serious injury.
Q.		Trip, fall, slip	Maintain minimum distances of the device from walls or partitions during installation; otherwise, this may cause hazards and inconvenience in confined spaces during operation or maintenance – see section 6.1 – WORK AREA AND COMMUNICATION SPACE on page 22.
R.			Properly illuminate the area surrounding the device.
S.			Operators must be equipped with appropriate personal protective equipment protecting against slipping footwear and protective clothing.

SAFETY RULES AND INFORMATION ON RESIDUAL RISK			
No.	Phase	Hazard	Procedure
T.			It is necessary to ensure that the power socket to which the device is connected has grounding connections with the PE conductor – see section 6.4.1 – CHECK OF THE PE CONDUCTOR IN THE POWER SUPPLY INSTALLATION on page 25.
U.		Cutting/entanglement/collision / electric shock/burns	Before any maintenance work, switch off and disconnect the power supply from the device. Wait until all mechanisms have completely stopped. The fan stops with a slow run-down.
V.			During maintenance of the impeller or inside the fan, even if the power supply has been disconnected, the impeller may rotate due to natural or induced air currents flowing through the device. As a result, there may be a serious risk of cutting, incision and/or entanglement. For this reason, it is necessary to mechanically block the moving parts of the fan. Operators must be equipped with appropriate personal protective equipment such as anti-cut gloves and protective clothing.
W.			It is strictly prohibited to: • maintain the device during operation, • remove guards or covers during operation of the device, • maintain the device without disconnecting the power supply.
X.		Burn	Do not touch the motor after long-term operation. Wait until the motor housing and directly adjacent surfaces cool down. In addition, wait until the temperature inside and outside reaches a value that is not dangerous to touch. Operators must be equipped with appropriate personal protective equipment such as gloves and protective clothing.

5. TRANSPORT AND STORAGE

5.1 TRANSPORT

- A. The temperature during transport **MUST** be within the range from **-30°C to +40°C**.
- B. The device **MUST** be protected from atmospheric precipitation, **preventing** moisture penetration or flooding. The device **MUST** be tightly protected against the influence of weather conditions.

5.1.1 MOVING DURING DAILY OPERATION

- A. Move on wheels while securing during movement. Hold by the handles or the device body.
- B. Move and position the device on a flat and level surface. Lock the wheels of the device after each change of position, protecting against possible rolling.

! WARNING

Possibility of destruction of the device, damage to property, injury or bodily injury.



After each change of position of the **mobile device**, the user **MUST** lock the wheels to protect against rolling down an inclined surface.



It is **PROHIBITED** to position the mobile device on an incline **greater than 3%** or on an **uneven** or **insufficiently rigid surface** to keep the device in a stable position! Failure to meet this condition **may lead to the device tipping over** when manoeuvring the extraction arm installed on the device. The device is stable in cooperation with a 2 or 3 m **ERGO type extraction arm** provided that the above requirement is met.

5.1.2 MOVING (TRANSPORT) USING LIFTING EQUIPMENT

- A. **When moving over short distances**, the device may be supported by a forklift under the device.
- B. The device **MUST** be secured at all times during transport using forklifts to protect it against slipping and tipping over.
- C. **To move and lift the device** using lifting equipment or forklifts, or to store the device, the device must be placed on a pallet and fastened with straps. The device **MUST** be fastened to the pallet with straps protecting it against tipping over.
- D. **ATTENTION:** The minimum fork length is 700 mm - see device dimensions – Figure 3 and Figure 4.

5.2 STORAGE

- A. The device should be stored in assembled condition, i.e. with closed covers and doors. It must be protected against moisture and dust penetration and external weather conditions; above all, protect it against direct sunlight or any other source of heat or radiation.
- B. The device may be stored on a EURO type pallet, but then adequate protection of the interior against moisture penetration must be ensured.
- C. The storage place **must be dry, dust-free**, with a temperature **from -30°C to +40°C**, and the device **must be completely empty and protected against moisture penetration**. Relative humidity must not exceed **95%**, without condensation.
- D. The device **MUST** be protected against the influence of shocks that could threaten its integrity.

- E. The device **MUST** be protected against the influence of oxidising or corrosive substances that may adversely affect sealing materials and accelerate erosion of materials, e.g. corrosion.
- F. It is **UNACCEPTABLE** to load the device with forces that may deform or destroy the device housing.
- G. The motor and fan impeller **must not remain stationary** for a long time, both during storage and when the system in which the device will be placed is still under construction or is in a standstill condition. During these periods, the condition of the impeller and fan should be checked by rotating the impeller to avoid damage to the motor bearings, and especially oxidation of the bearing tracks.

! WARNING

Possibility of damage to the electric motor with control automation and the cartridge filter



PROTECT the device against mechanical damage and moisture penetration as a result of flooding, inundation or atmospheric precipitation.



PROTECT the device against extreme temperature conditions during transport. Transport and storage are permitted in the temperature range from **-30°C** to **+40°C**.

! CAUTION



KLIMAWENT S.A. is not responsible for damage to mechanisms caused by long-term inactivity.



KLIMAWENT S.A. is not responsible for damage to filters caused by storage in a place with inappropriate humidity and ventilation.

6. ASSEMBLY, INSTALLATION AND START-UP

6.1 WORK AREA AND COMMUNICATION SPACE

- The device must be placed in locations protected against the influence of adverse weather conditions and free from corrosive factors.
- Due to safety, communication comfort and ergonomic operation of the device, it is necessary to provide a free area around the machine to prevent the risk of accidents.
- **At least 0.75 m of free space** must be left around the device, and on the side of the filter inspection doors **an additional 1.0 m more**, to enable filter replacement.
- Due to the air outlet at the bottom, the device must not be placed directly on the bottom plate during its use. It must be installed at a height allowing free air outflow. The minimum distance of the bottom plate from the partition is 100 mm. In addition, the space under the device must allow free distribution of air away from the device, which at the same time is the cooling air for the electric motor.
- Adequate space must remain above the device for installation of the ERGO extraction arm to allow free manoeuvring.

! WARNING

Possibility of damage to the electric motor with control automation and the cartridge filter



The device is adapted to operate only in a position with the suction opening directed upwards.

It is **PROHIBITED** to install the device at height with the suction opening directed downwards!

- Spaces around the device must be left free to allow safe performance of maintenance work.

6.2 ASSEMBLY

The device is delivered ready for use. Before start-up, the running sets or hanger sets must be installed. Mounting sets and wheel sets must be screwed to the threaded connectors in the device body with the bolts supplied with the sets. Use M6 threaded bolts. Tighten the bolts with a torque not exceeding 5 Nm.

6.3 INSTALLATION

! WARNING

Possibility of damage to the device, injury or significant bodily injury!



Before installing the device, check the load-bearing capacity of the structural elements to which it will be attached or on which it will move. **INCORRECT**, **CARELESS** or **UNSTABLE** fixing of the device may lead to its damage and will also create a real **HAZARD** to people nearby.



After positioning the device at the workplace, **LOCK** the wheels (in the case of the mobile version) to prevent it from moving away from its position or rolling down an uneven surface. After each change of position, **LOCK** the running wheels.

The size of the area intended for ergonomic and safe operation of the device is shown in section 6.1 – WORK AREA AND COMMUNICATION SPACE.

The device must be connected to:

- **electrical power supply** (see section 6.3.3 – CONNECTING THE POWER SUPPLY on page 23) and
- **ERGO type extraction arm**.

All installation activities must be performed by qualified personnel with confirmed authorisations after prior familiarisation with the requirements – see section 4.2 – SAFETY RULES AND LIMITATIONS OF USE – on page 14.

6.3.1 MOBILE DEVICE

The user must prepare a suitable floor adapted to the size and weight of the device, and the surface must be level, flat and sufficiently rigid to prevent the device from rolling under its own weight or tipping over when manoeuvring the extraction arm. When using the mobile device, its wheels must be locked after each change of position.

6.3.2 STATIONARY DEVICE

The user must prepare a suitable substrate adapted to the size and weight of the device, and the surface must be flat and sufficiently strong to prevent detachment when manoeuvring the extraction arm. When using the stationary device, it must be fixed using the mounting hangers supplied separately.

6.3.3 CONNECTING THE POWER SUPPLY

- A. The device requires connection to an electrical power supply which primarily meets the minimum requirements for the electric motor driving the fan, i.e. voltage variation in the network must be within $\pm 5\%$. The design and execution of the electrical connection to the power supply must be performed by a qualified electrician and in accordance with the diagrams in section 12 – ELECTRICAL DIAGRAMS on page 41 and with the operating instructions for the electric motor.
- B. The device **MUST** be supplied with 1-phase alternating current 230 V / 50 Hz – see section 12 – ELECTRICAL DIAGRAMS on page 41. Any modifications are not permitted.
- C. The device **MUST** be supplied with current adapted to the power consumption of the device – see technical data in section 3.3 – TECHNICAL DATA on page 13.
- D. The device **MUST** be connected to an installation equipped with a PE conductor.

! CAUTION



The user **is obliged to comply** with the provisions written in these instructions and related instructions, i.e. the operating instructions for the electric motor. These instructions **DO NOT** contain the operating instructions for the electric motor.

! DANGER

Possibility of severe health impairment or death as a result of electric shock!



The device **MUST NOT** be started before making sure that the continuity and connection of the **PE protective conductor** have been checked.

6.3.1 CONNECTION OF THE ERGO EXTRACTION ARM

For installation of the **ERGO** type arm, an open-end or ring spanner size 11 mm is required to tighten M6x55 hexagon bolts. In the case of socket head cap screws, an Allen key size 8 mm is required.

When bolting the arm to the spigot, the bolts must be tightened alternately, taking care to tighten them evenly. The tightening torque of the bolts must not exceed 5 Nm. Do not use electric, pneumatic or similar screwdrivers with high tightening force! After bolting the extraction arm, check the tightness of the connection during a movement test and with the fan operating by moving the extraction arm and listening for any air blow-through. Tighten the bolts if necessary.

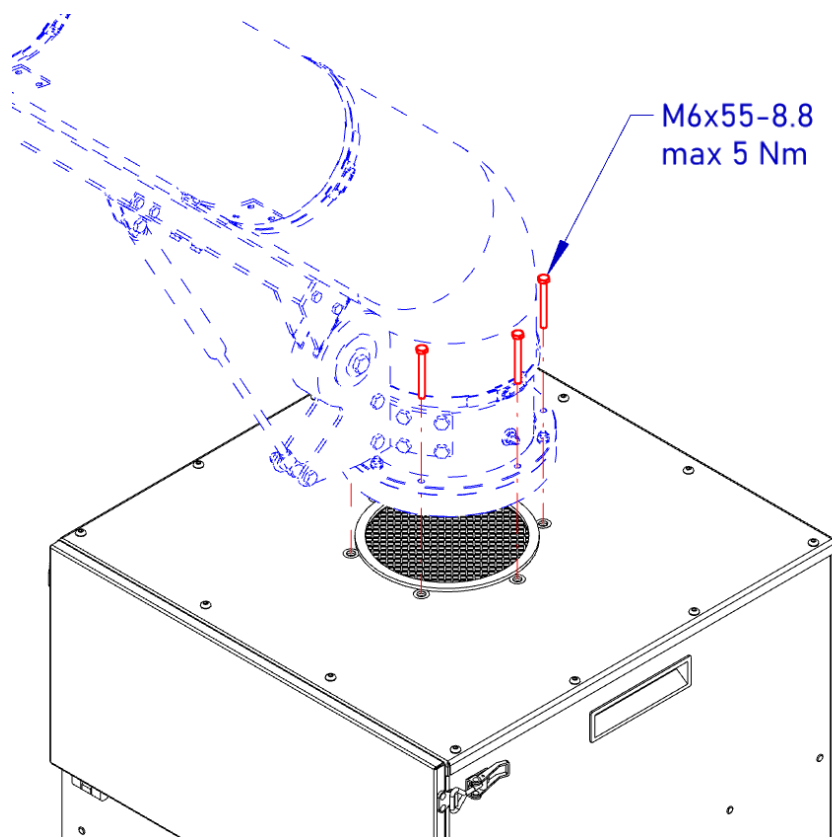


Figure 5 ERGO LUX mounting spigot

6.4 START-UP / CHECK

A. Before starting the device, the following must be done:

- Check the condition and connection of the installation to the PE conductor.

B. During test start-up, check:

- supply voltage value,
- current value drawn by the device,
- whether excessive vibrations or other motor operating irregularities occur.

INFORMATION



The user is obliged to comply with the provisions written in these instructions and related instructions, i.e. the operating instructions for the electric motor. These instructions **DO NOT** contain the operating instructions for the electric motor.

6.4.1 CHECK OF THE PE CONDUCTOR IN THE POWER SUPPLY INSTALLATION

The device is supplied with a cable equipped with a single-phase industrial plug with a protective conductor (PE). Before starting the device, check whether the protective conductor is correctly connected to the protective conductor in the power supply installation. Lack of an active protective conductor during device operation may lead to a risk of electric shock!

! DANGER

Danger of electric shock!



The device **MUST NOT** be started before making sure that the continuity and connection of the **PE protective conductor** have been checked. Check the condition of the installation supplying the device before starting it.

7. USE

7.1 OPERATION

The device must be installed vertically or positioned on a horizontal surface, because ERGO arms will be mounted on it and they require horizontal positioning. Otherwise, there will be a possibility of spontaneous change of position of the device and the extraction arm.

Both versions of the devices are equipped with a 5 m power cable ending with a plug. Before starting use, connect it to an appropriate 1-phase power socket.

Each time after finishing use of the device, it is recommended to disconnect the power supply with the switch on the device and remove the plug from the power socket.

7.1.1 SWITCHGEAR AND CONTROL PANEL

The device must be supplied with 1-phase alternating current 230 V / 50 Hz. The device is equipped with a 5 m power cable ending with a 1-phase industrial plug.

The device has a control panel connected to the electrical unit supplying the fan. The electrical unit is located at the front of the device at the bottom in a closed chamber behind the control panel. Inside the switchgear, there are electrical apparatuses (see section 12.1 – page 42). At the front of the device, on the inspection door side, there is a control panel (see Figure 6 below), on which there are control elements used to control and manipulate the operation of the device.

The control panel contains signalling elements and buttons such as:

- rotary **POWER** switch with **ON** and **OFF** positions,
- two-button **FAN** switch with **START** and **STOP** buttons and a white lamp indicating fan operation,
- yellow **FILTER ALARM** lamp indicating limit contamination of filters,
- yellow **MOTOR ALARM** lamp indicating motor alarm states.

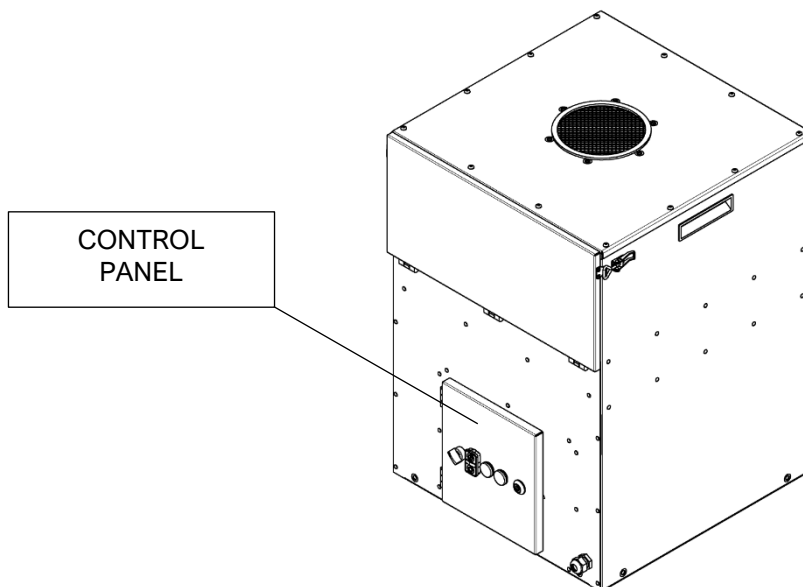


Figure 6 Location of switchgear and control panel

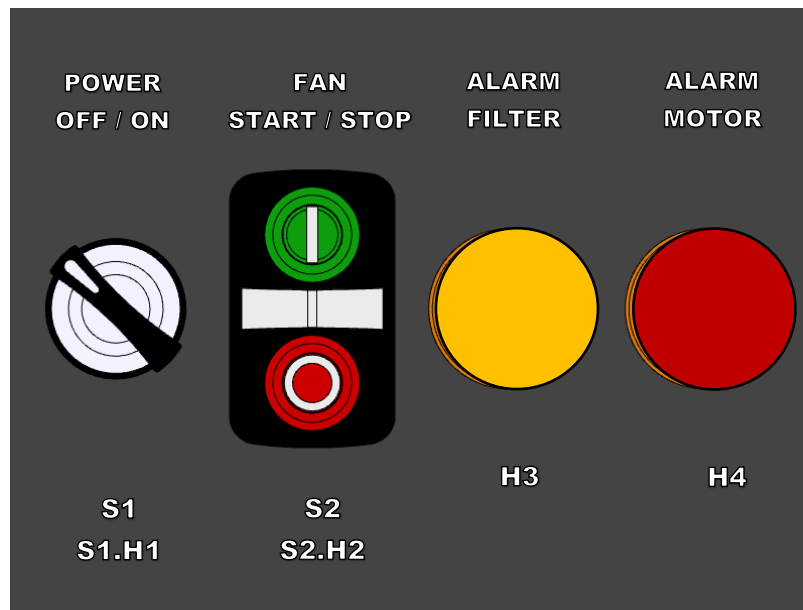


Figure 7 Appearance of the control panel

S1 - illuminated power switch; **S1.H1** - lamp indicating the appearance of voltage in the power supply system; **S2** - fan start and stop button; **S2.H2** - green lamp indicating fan operation; **H3** - yellow lamp indicating limit contamination of the cartridge filter; **H4** - red lamp indicating motor alarm;

7.1.2 SWITCHING ON THE POWER SUPPLY

! WARNING

Danger:

- pulling in of clothing or limbs,
- impact from closing doors under the influence of negative pressure,
- impact by a compressed air pulse,
- impact by outlet air from the outlet chamber,
- exposure to excessive impulse noise.



Before starting the device, **make sure** that the inspection doors to the filters and the device covers are closed.



DO NOT BRING limbs or other body parts or clothing close to the unprotected suction spigot of the device during fan operation. The device performs its task when assembled with an appropriate extraction arm.

- A. To switch on the power supply, set the rotary **POWER** switch located on the control panel to the **ON** position – see Figure 7 on page 27 above. Voltage will appear in the power supply circuit, and then the white lamp **S1.H1** located in switch **S1** will light up.

7.1.3 SWITCHING ON THE FAN

- A. Press the green **START** button in switch **S2** located on the control panel. Fan operation is indicated by the white lamp **S2.H2** in the middle of this switch lighting up – see Figure 7 on page 27 above.

7.1.4 SWITCHING OFF THE FAN

- A. Press the red **STOP** button in switch **S2** located on the control panel. The fan will stop with a **slow run-down**. The white lamp **S2.H2** will go out – see Figure 7 on page 27 above.

7.1.5 SWITCHING OFF THE POWER SUPPLY

- A. Switch off the power supply by setting the **POWER** switch to the **OFF** position. Lamp **S1.H1** will go out – see Figure 7 on page 27 above.

7.1.6 ALARM SIGNALS

! WARNING



Immediately **REACT** to alarm signals displayed by the control unit and take immediate **CORRECTIVE ACTIONS!**

7.1.6.1 MOTOR FAILURE

In **RAK** type devices, in the electrical switchgear, the fan motor is protected by motor circuit breaker **Q1M**.

Motor circuit breaker **Q1M** protects the fan motor against overload, short circuit and the consequences of blocked start-up. In the event of **tripping of breaker Q1M**, the control system will disconnect the motor power supply circuit - the fan will switch off, and the white lamp **S2.H2** will go out – see Figure 7 on page 27, and the alarm will be signalled by flashing of the red lamp **H4 "MOTOR ALARM"**. After this alarm occurs, the cause of the alarm must be identified, and then the condition of the motor must be checked electrically and mechanically.

! CAUTION



Activation of the alarm results in **blocking operation of the control system** until the cause of the alarm is removed.

7.1.6.2 FILTER ALARM

If the limit flow resistance through the filters is reached, a signal will occur on pressure switch **B1**, starting an alarm signalled by **flashing of the yellow lamp H3 "FILTER ALARM"**. This alarm will appear at the moment of limit contamination of the filters, usually caused by permanent contamination, i.e. wear. When the alarm is signalled by the **FILTER ALARM** lamp, the white lamp **S2.H2** goes out.

7.1.7 EMERGENCY STOP OF THE DEVICE

To stop the device in an emergency, turn the **POWER** switch to the **OFF** position or press the **S2 "STOP"** button (red field) on the electrical unit panel – see Figure 7 on page 27 above.

! WARNING



After disconnection of the power supply, the fan will stop with a **slow run-down resulting from the inertia of the rotating impeller and electric motor!**

7.1.8 RETURN TO NORMAL OPERATION AFTER REMOVING THE PROBLEM

Starting the device after stopping as a result of a failure requires performing a check of device operation - start the device and allow it to operate for **at least 15 min** so that its parameters stabilise and to make sure that there are no problems and that the failure does not return. After this time, the device may be used safely.

Restart according to section 7.1.2 – SWITCHING ON THE POWER SUPPLY on page 27 and 7.1.3 – SWITCHING ON THE FAN on page 27 and take into account all guidelines presented in the table „ Safety rules and information on residual risk” – see section 4.5 – INFORMATION ON RESIDUAL RISK on page 17.

7.1.9 UNPLANNED STOP AND RESTART

In the event of power failure, the fan will stop with a slow run-down. In this situation, before restarting, first check the condition of the device, whether the electrical apparatuses in the electrical unit are functional and have not been damaged.

Start the device and allow it to operate for **at least 15 min** so that its parameters stabilise and to make sure that there are no problems. After this time, the device may be used safely.

Restart according to section 7.1.2 – SWITCHING ON THE POWER SUPPLY on page 27 and 7.1.3 – SWITCHING ON THE FAN on page 27 and take into account all guidelines presented in the table „ Safety rules and information on residual risk” – see section 4.5 – INFORMATION ON RESIDUAL RISK on page 17.

7.1.10 FILTER REPLACEMENT

The device has a differential pressure switch measuring the flow resistance created by the filters in the device. During use, the filters gradually become clogged until they are completely worn, which is signalled by lighting of the yellow **FILTER ALARM** warning lamp.

- A. Switch off the fan with button **S2 "STOP"** on the control panel and wait until the fan stops and air flow ceases – see section 7.1.3 – SWITCHING ON THE FAN on page 27.
- B. Switch off the power supply with switch **S1** by setting it to the **OFF** position – see section 7.1.5 – SWITCHING OFF THE POWER SUPPLY SWITCHING OFF THE POWER SUPPLY on page 28, and then remove the plug from the power socket. Make sure that no one starts the device during maintenance work.
- C. Open the inspection doors and slide the filters out of the chamber. Pay attention to their degree of wear and the number of working hours on the working time counter. Record this to predict the replacement moment in the future.
- D. Slide new filters in the same order, i.e.: carbon mat **FCR** (in the recess under the compact filter) - compact filter **FKR** (at the bottom) – pre-filter **FWR** (at the top) – see section 3.2.2 – REPLACEABLE PARTS on page 12.

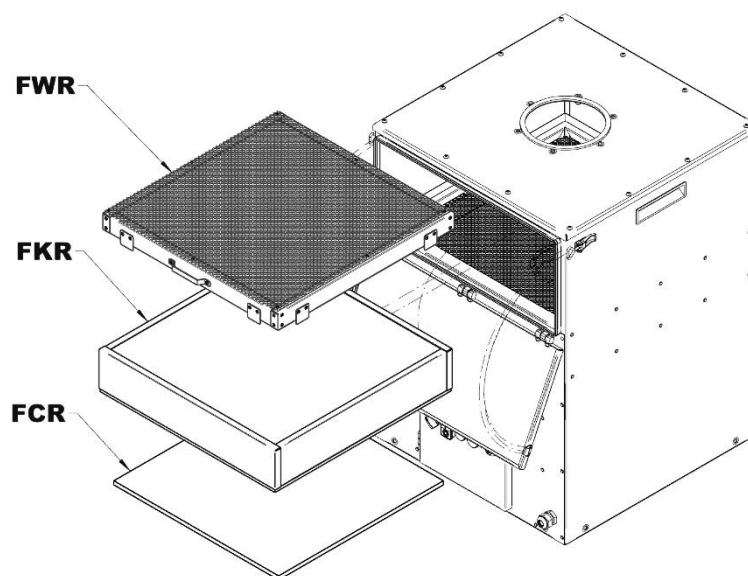


Figure 8 Order of filters in the device

7.1.10.1 REPLACEMENT OF FKR NONWOVEN FABRIC IN THE PRE-FILTER

The pre-filter is made as a metal cassette closed on both sides with mesh, in which there is a 50 mm thick **FWR** filter mat. To replace the mat, dismantle one of the meshes, which is fixed with housing screws. Replace the mat and screw the elements back together – see Figure 9 below and section 3.2.2 – REPLACEABLE PARTS on page 12.

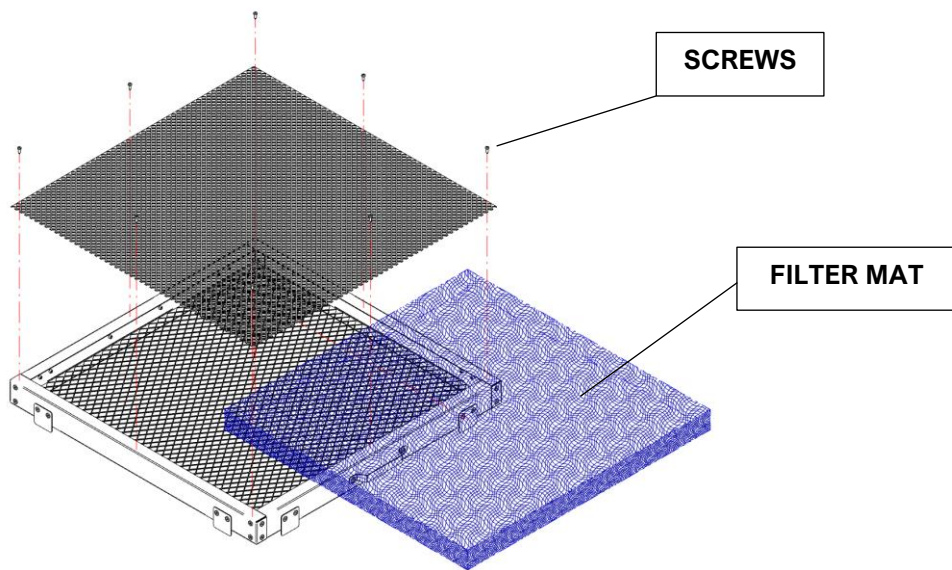


Figure 9 Disassembly of the pre-filter cassette

7.2 PERSONAL PROTECTIVE EQUIPMENT

During operation, maintenance, cleaning, i.e. use, cleaning of the container from dust and deposits, cleaning of the inside of the container and other maintenance activities, always use personal protective equipment:

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT	
	Mandatory use of a dust mask. The warning indicates the requirement for personnel to use protection. Protective equipment must always be used during operation and maintenance.
 	Mandatory disconnection of the device from the electrical network. The warning indicates the requirement to disconnect the device from the power supply when carrying out maintenance, fault detection and similar activities requiring opening of covers and access to dangerous elements, especially to the fan impeller.

See also the rules described in section 4.2 – SAFETY RULES AND LIMITATIONS OF USE on page 14 above.

8. OPERATING DISTURBANCES, CAUSES, REMEDIES

NO.	PROBLEM	PROBABLE CAUSES	REMEDIES
1.	Flashing of the red MOTOR ALARM lamp	Tripping of breaker Q1M and relay K2T. Motor overload or short circuit in the motor power supply circuit.	Check the condition of the motor windings. Check whether the motor is not blocked.
2.	Flashing of the yellow FILTER ALARM lamp	Limit contamination of filters - tripping of relay K1T as a result of exceeding the limit pressure on the filters.	Check the condition of the filters. In the event of damage or wear, replace with new ones.
3.	Fan does not start	Tripping of breaker Q1M. Motor overload or short circuit in the motor power supply circuit.	Check the condition of the motor windings.
4.			Check whether the motor is not blocked.
5.		No power supply.	Check the presence of voltage at terminals L1, N, PE of terminal strip X1. Correct the power supply parameters.
6.	No or very low fan draft	Clogged suction spigot or extraction arm.	Check condition, clean the spigot and extraction arm, open the dampers.
7.		Significant contamination of filters.	Check the condition of the filters. In the event of damage or wear, replace with new ones.
8.		Adhesion of sticky or moist dust to the filter surface.	Eliminate or limit the source of moisture or sticky substances entering the sucked air.
9.	Dust entering the discharge installation	Perforation or damage to the pressure gasket.	Replace the filter with a new one.
10.		Too high dust load on the device.	Limit the amount of dust sucked by the device into the device.
11.		Type of dust not provided for in the intended use of the device.	Contact the manufacturer KLIMAWENT S.A.
12.	Appearance of vibrations in the device	Loss of impeller balance as a result of damage or coating with substances from the filtered air.	Replace the impeller with a new one.
13.		Damage to motor bearings.	Replace the motor with a new one.

14.	Appearance of vibrations in the device	Foreign body inside the device.	Inspect the interior, detect and remove the foreign body.
15.	Appearance of noise in the form of a constant hiss or whistle	Damage to motor bearings.	Replace the motor with a new one.
16.	Appearance of noise in the form of intermittent ringing	Foreign body inside the device.	Inspect the interior, detect and remove the foreign body.

9. MAINTENANCE

9.1 GENERAL GUIDELINES

! WARNING

Danger of cutting, injury or shearing as a result of rotating parts of the device



DISCONNECT the device from the electrical power supply, **SWITCH OFF** the control, **WAIT** until all mechanisms stop!



USE personal protective equipment and protective clothing and work footwear! **FOLLOW** safety rules – see the guidelines contained in section 4 – SAFE USE on page 14.

! CAUTION



The **USER** is responsible for maintenance of the device and its parts. Systematic maintenance is a condition for safe use and fulfilment of the **WARRANTY CONDITIONS**.



All repairs are **PERFORMED BY THE MANUFACTURER** or its **REPRESENTATIVE**. In unusual cases, the **USER** may perform them, but for this purpose contact the manufacturer **KLIMAWENT S.A.** or its representative.

9.2 MAINTENANCE WORK SCHEDULE

Table 7 Recommended inspection and maintenance intervals

INTERVAL	ACTION	NOTES
Once every 1 to 3 months	Check the condition of filters	Section 9.2.2
Once every 3 to 6 months	Clean the device and its subassemblies to avoid excessive dust accumulation inside and outside.	Section 9.2.1
Once every 18 to 24 months	Check the condition of the electric motor - measure electrical parameters and check the insulation condition.	Section 9.2.3
Once every 2 years	Check whether the fan impeller rubs against the fan housing. Look inside the device, inspect the fan, and check visually and by hearing whether the fan operates correctly. Perform a vibration measurement of the fan.	Section 9.2.3

9.2.1 DEVICE MAINTENANCE

Check the cleanliness of the external and internal surfaces of the device. Prevent excessive dust settling on the device and in the cartridge filter chamber.

9.2.2 FILTER MAINTENANCE

The device has 3 filtration stages in the form of 3 filters – see section 3.2.2 – REPLACEABLE PARTS on page 12:

- Cassette filter with **FWR** filter mat,
- **FKR** compact filter and
- Nonwoven fabric impregnated with activated carbon **FCR**.

Each of the filters has a different purpose, and they wear to different degrees. As a result of increased resistance due to "clogging" of filters, the device loses the suction force needed to cooperate with the extraction arm.

If a decrease in performance is noticed or after an alarm is initiated on the **FILTER ALARM** control panel, the filters must be replaced with new ones. The filters listed above are not suitable for regeneration.

It is recommended to perform cyclic inspections of filters. This inspection should also be performed when a noticeable decrease in device efficiency is found, when the **FILTER ALARM** occurs on the control panel or when there is a significant increase in air flow combined with increased noise. In these situations, the filters must be removed from the device and inspected.

During inspection of filters, check:

1. correctness of fixing:
 - a. occurrence of loose airflow may worsen the efficiency of contaminant filtration, which will cause deposition of these contaminants on the fan impeller,
 - b. damage to the rubber gasket,
2. amount and type of contaminants:
 - a. degree (amount) of contamination,
 - b. occurrence of damage,
 - c. occurrence of foreign bodies,
 - d. occurrence of sticky deposits (stains) difficult to remove,
 - e. occurrence of moisture, etc.,
3. condition of the filtering surface:
 - a. occurrence of creases,
 - b. occurrence of abrasions or scratches,
 - c. occurrence of perforation.

9.2.3 FAN MAINTENANCE

If audible sounds coming from inside the device are noticed, this may indicate:

- suction of a foreign body into the inside of the fan,
- damage to electric motor bearings,
- damage to the impeller.

All the above situations require looking inside the device and inspecting the interior. For this purpose, the device must be turned over and placed on the top wall, the lower perforated guard and the deflector covering the fan must be removed – see Figure 10 below – and the inside of the device, the fan impeller and their surroundings must be inspected. Detect foreign bodies and remove them.

9.2.3.1 INSPECTION WITHOUT REMOVING THE FAN

When there is access to the fan without dismantling the fan, it must be checked for the presence of foreign bodies inside:

- rotate the impeller several times, observing whether elements rub against each other,
- during rotation, check whether the electric motor bearings emit a sound indicating their damage,
- during rotation, check whether the impeller moves freely without jumps indicating the presence of foreign bodies inside the fan,
- during rotation, check whether the impeller has axial or radial play indicating wear of the electric motor bearings.

If all the above actions did not reveal problems, it is assumed that the fan is functional and the device may continue to be used.

! WARNING

Probability of damage to the impeller or motor



DO NOT JERK OR PULL the impeller excessively, as this may damage it and lead to loss of stability during operation and destruction due to imbalance. **ROTATE** the impeller smoothly in both directions, changing the movement smoothly. The motor and impeller together have a certain inertia. Sudden changes in the direction of rotational movement together with jerks may deform the impeller. Rotate the impeller by holding it by the impeller disc.

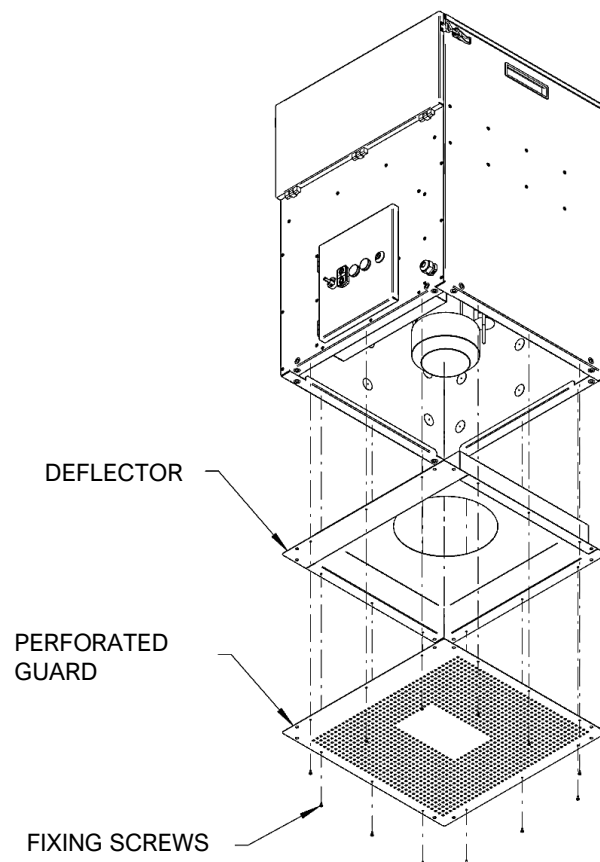


Figure 10 Disassembly of the lower guard

9.2.3.2 INSPECTION WITH FAN REMOVAL

If dismantling of the fan is also required in order to perform a thorough inspection of the inside of the fan, the bolts fixing the motor plate to the device housing must be unscrewed – see Figure 11 below.

! WARNING

Probability of damage to the impeller or motor



DO NOT PLACE the fan assembly on the impeller by loading it with the motor mass, as this may deform the impeller. Always put the fan assembly down with the motor downward, preferably using a stand supporting the fan around the motor plate.

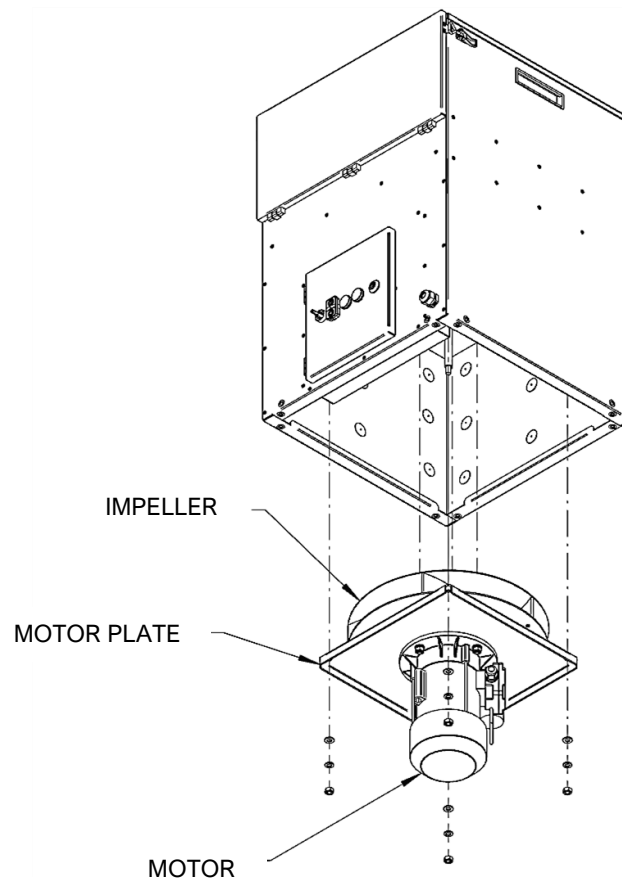


Figure 11 Fan disassembly

If damage to the impeller or motor is found, immediately contact the manufacturer **KLIMAWENT S.A.** to replace parts with new ones.

! WARNING

Possibility of damage to the device, operating disturbances.



It is **PROHIBITED** to use the device with a damaged fan or one showing excessive vibrations during operation. This may lead to destruction of the impeller or motor, fire or explosion because of sparking!

9.3 SERVICING AND REPAIRS

! CAUTION



The **USER** is responsible for maintenance of the device and its parts. Systematic maintenance is a condition for safe use and fulfilment of the **WARRANTY CONDITIONS**.



All repairs are **PERFORMED BY THE MANUFACTURER** or its **REPRESENTATIVE**. In special cases, the **USER** may perform them, but in this case the manufacturer **KLIMAWENT S.A.** or its representative must be contacted.

See manufacturer address – section 1.3 – MANUFACTURER DATA AND ADDRESS on page 5.

10. DISASSEMBLY, DECOMMISSIONING AND SCRAPPING

10.1 DISASSEMBLY AND DECOMMISSIONING

After the period of use, at the moment of decommissioning, the device must be dismantled and disassembled in compliance with general occupational health and safety and fire protection regulations, paying particular attention to internal elements and potentially hazardous substances accumulated inside. Use personal protective equipment such as that listed in section 4.3 – REQUIRED PERSONAL PROTECTIVE EQUIPMENT on page 16. Follow the recommendations presented in section 4 – SAFE USE on page 14.

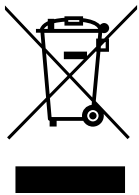
10.2 DISPOSAL, SCRAPPING AND RECYCLING

! CAUTION



At the moment of transferring the product for disposal, it is **NECESSARY TO COMPLY** with regulations concerning disposal of machines withdrawn from use and/or waste recycling.

! WEEE



The symbol shown next to it indicates that the product marked with it must not be discarded as unsorted waste. Such a product must be delivered to a separate collection point, where it will be subjected to recovery and recycling processes. The **WEEE label** is placed on every electrical and electronic device placed on the market in the EU.

Some parts included in the **RAK** device must be treated in accordance with the recommendations of Directive 2012/19/EU of the European Parliament on waste electrical and electronic equipment (WEEE). These are elements included in the electrical switchgear, in particular the control panel with microcontroller and display.

Such parts **MUST NOT** be thrown into a bin for unsorted waste but must be handed over to a special point for waste electrical and electronic equipment!

11. WARRANTY CONDITIONS

The warranty period is specified in the **Warranty Card** of the device.

! CAUTION



NON-COMPLIANCE with the recommendations of these instructions, and especially unauthorised modification of the device or use contrary to its intended purpose, results in **LOSS OF WARRANTY!**

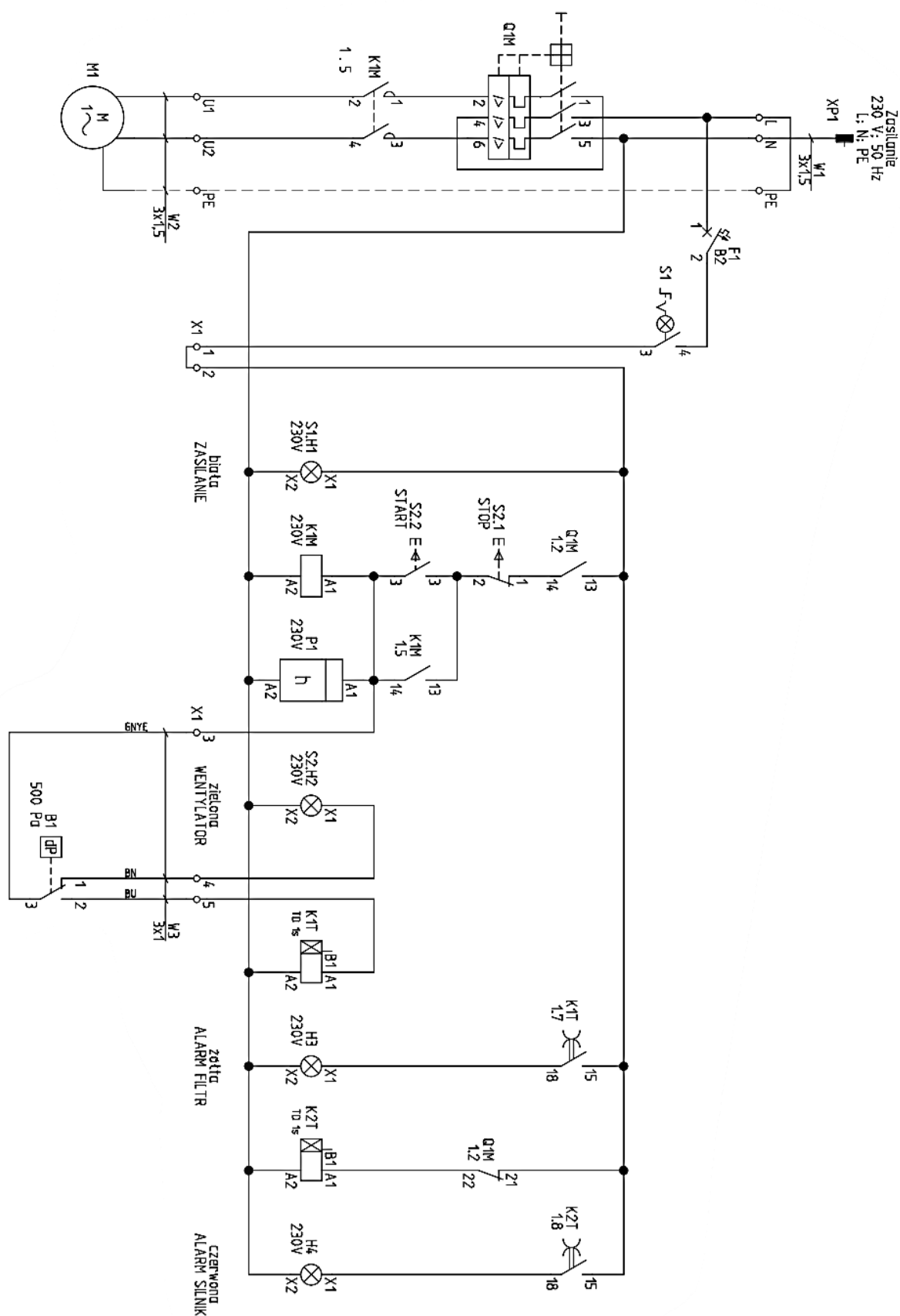


Figure 12 Electrical diagram of RAK-1000 and RAK-2000

12.1 ELECTRICAL APPARATUS

Table 8 Functions of electrical apparatuses – see Figure 12 Electrical diagram of RAK-1000 and RAK-2000

APPARATUS TYPE	DESCRIPTION	FUNCTION
S1	<i>Power switch</i>	Supplies power to the device; this is indicated by lamp H1
Q1M	<i>Motor circuit breaker</i>	Used to protect the motor against destruction because of blocked start-up, overload, or short circuit
F1	<i>Overcurrent circuit breaker</i>	Protects the control circuit
K1M	<i>Contactors</i>	Used to start the fan
K1	<i>Electromagnetic relays</i>	Pre-filter pressure switch
K2		Cartridge filter pressure switch
K1T	<i>Time relay</i>	Limit pressure switch of filters - starts lamp H3
K2T	<i>Time relay</i>	Motor failure - starts lamp H4
K4T	<i>Time relay</i>	Time gate of valve operation
P1	Working time counter	Working time counter
B1	Cartridge filter pressure switch	Starts relay K1T - filter contamination



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