

Operating Manual for the Shelter Ventilation Unit of Types VA-40/75/150

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For safe and proper operation follow this operating manual.
Store it in a safe place for future use.



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Types of presentation used

Instruction for action are shown as follows:

1. Do this.
 2. Do that.
- ➔ Actions yield the following interim result.
3. Do something else.
- ✓ You have completed the action.

Hazard classes and tips are shown as follows:

 DANGER	Severe bodily injury /death likely
 CAUTION	Slight to moderate bodily injury possible
ATTENTION	Property damage possible
 Tip	User tips / useful information

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Change history

Date	Subject
10.12.2022	First edition of the operating manual

Table of contents

1	Safety	6
1.1	Proper use	6
1.2	Improper use	6
1.3	Warning symbols	7
1.4	Mandatory symbols	7
1.5	Target group for this manual	8
1.5.1	Qualification	8
1.5.2	Qualification for individual tasks	9
1.6	Disabilities	9
1.7	Basic safety rules	10
1.7.1	Danger-conscious work	11
1.7.2	Modifications of products	11
1.8	Risks and dangers	12
1.8.1	Electric power	12
1.8.2	Rotating parts	12
1.8.3	Hot surfaces	12
1.8.4	Slipping or tripping	13
1.8.5	Hazardous substances	13
1.8.6	Wear, tear and unqualified replacement of parts	13
1.9	Conduct in an emergency	14
1.9.1	Fire	14
1.9.2	Earthquake	14
2	Description of shelter ventilation unit	15
2.1	General description of function	15
2.2	Scope of delivery	16
2.3	Variants of shelter ventilation unit	18
2.4	Available replacement parts	18
2.5	Technical data	18
2.5.1	Environmental conditions	18
2.5.2	Operating data, ventilator	19

2.6	Operating concept.....	20
3	Preparation for operation	21
3.1	Assembly.....	21
3.2	Testing the electrical connection.....	21
3.3	Commissioning.....	21
4	Operation	23
4.1	Fresh air mode (blue).....	24
4.1.1	Motor operation.....	24
4.1.2	Manual operation.....	25
4.2	Filter operation (red).....	26
4.2.1	Motor operation.....	26
4.2.2	Manual operation.....	27
5	Malfunctions, Messages and Faults.....	28
5.1	Procedure with malfunctions.....	28
5.2	Fault search.....	29
6	Maintenance and Service.....	30
6.1	Check regularly.....	30
6.2	Cleaning.....	31
6.2.1	Air intake grid.....	31
6.2.2	Pre-filter.....	32
6.3	Service and care.....	32
6.4	Repair and replacing parts.....	33
6.4.1	Pre-filter.....	33
6.4.2	Gas filter.....	34
7	Decommissioning, disassembly, disposal	35
7.1	Disassembly.....	36
7.2	Disposal and recycling.....	37
7.3	List of figures.....	39
7.4	List of tables.....	39
7.5	Keyword index.....	40

1 Safety

1.1 Proper use

The shelter ventilation unit is used in shelters for protection against nuclear, biological or chemical hazardous materials. The shelter ventilation unit feeds breathable air into the shelter and provides a constant excess pressure in the shelter.

Breathable air that has been contaminated with nuclear, biological or chemical agents can be purified using gas filters interposed in the airflow. The gas filter must always be replaced with a new one after use in a catastrophic event, see Chapter “6.4.2 Gas filter”

1.2 Improper use

Any different or expanded use of the shelter ventilation unit than that explained in Chapter “1.1 Proper use” on page 6 is deemed improper use and therefore constitutes improper use. The responsibility lies with the user.

This applies mainly for the use of the shelter ventilation unit for the filtering of uncontaminated air or use outside of shelters.

ATTENTION

Improper handling can damage to the gas filter.

- ▶ Keep sealed gas filters airtight when not in use. Otherwise, the activated charcoal in the filter can become saturated with moisture.

1.3 Warning symbols



Warning dangerous area



Warning biohazard



Warning electric current



Warning poisonous substances



Warning injury to extremities



Warning hot surfaces



Warning rotating shaft



Warning radioactive substances



Warning slipping hazard

1.4 Mandatory symbols



Use tips and useful information.



Follow manual



Ground before use



Release prior to maintenance and repair

1.5 Target group for this manual



DANGER

Severe bodily injury or death may result if untrained personnel use the shelter ventilation unit.

- ▶ All work on or with the shelter ventilation unit may only be carried out after training by Lunor G. Kull AG.

1.5.1 Qualification

This manual is intended for specialists with the following qualifications:

Specialists Specialists must be able to carry out the work assigned to them and independently recognize and avoid possible dangers. This is possible through professional training, experience, and skills, as well as the knowledge of relevant provisions.

Trained personnel Personnel who are instructed or have been trained for the tasks assigned them and instructed in possible dangers in the case of improper use. They have been trained on the necessary safety equipment and safety measures. Personnel who are being trained, educated, or instructed or are in the course of general education may only work on this unit under constant supervision of experienced personnel.

Electricians Electricians are trained for work in their specialized field and know the relevant norms and provisions. They can perform work on electrical plants and recognize and avoid possible dangers independently on the basis of their training and experience.

1.5.2 Qualification for individual tasks

Task	Who	Specific qualification
Transport	Lunor/client	Specialists
Storage	Client	Specialists
Re-packing	Client	Specialists
Assembly	Lunor/client	Specialists
Installation	Client	Electricians
Commissioning, Initial	Lunor/client	Trained/ instructed
Operation	Client	Trained/ instructed
Fault tracing/ clearance	Lunor/ client	Electricians
Cleaning	Client	Trained/ instructed
Maintenance, service	Client	Electricians
De-commissioning	Client	Trained/ instructed
Disassembly	Lunor/ client	Specialists
Recycling, waste disposal	Lunor/ client	Trained/ instructed

Table 1 Who does what matrix

1.6 Disabilities

Persons with limited physical, sensory or mental abilities or persons with limited experience or knowledge should **ONLY** use the shelter ventilation unit under supervision.

Along with these disabled persons, the person who is responsible for their safety must be instructed in the safe and correct use of the shelter ventilation unit.

1.7 Basic safety rules

Special safety rules can apply for certain tasks. You will find safety instructions and warnings for these in the relevant chapters of this operating manual.

To operate the shelter ventilation unit, you must:

- ▶ have been trained in the shelter ventilation unit
- ▶ or have read and understood this operating manual, especially the safety-relevant information
- ▶ observe the safety instructions during use.

Only those persons may be allowed to use the unit who may be expected to carry out their work reliably. Persons whose reaction times are impaired, e.g., by drugs, alcohol or medications, are **NOT** allowed.

1.7.1 Danger-conscious work

Complete all work with or on the shelter ventilation unit with careful attention to detail.

Use the shelter ventilation unit only:

- ▶ after training by Lunor G. Kull AG, or study of the operating manual.
- ▶ proper, danger-aware observation of this operating manual
- ▶ when all safety equipment is installed, functional and active,
- ▶ when the shelter ventilation unit is in a technically sound condition.

This includes also:

- ▶ Only perform calibration and/or maintenance work if the shelter ventilation unit is shut off and secured against re-activation.
- ▶ Tie back long hair and use a hair net if needed.
- ▶ Do not wear any loose, broad clothing, neck scarves, ties or jewelry when working with/on the shelter ventilation unit.

1.7.2 Modifications of products

Modifications to the shelter ventilation unit are strictly prohibited.

Should modifications be necessary, discuss this in advance with Lunor G. Kull AG and secure permission to do this in writing.

1.8 Risks and dangers

1.8.1 Electric power



Electric shock possible from improper use

- ▶ When operating the shelter ventilation unit, observe all basic safety rules for handling electric power, essentially the five safety rules for electrical engineering.
- ▶ Work on electronic components of the shelter ventilation unit may only be performed by electricians.

1.8.2 Rotating parts



Rotating shafts can cause severe injuries to your extremities



- ▶ Only work on the shelter ventilation unit if you are appropriately trained.
- ▶ In electrical operation: The shaft guard cap must be in place. Only activate the shelter ventilation unit once it is.
- ▶ For manual operation: Make sure that the electric power is not accidentally re-connected.

1.8.3 Hot surfaces



Hot surfaces can cause burns

- ▶ Be aware that in hot climate zones the temperature of the electrical motor can rise in excess of 50°C/122°F
- ▶ Do **NOT** touch the electric motor with bare hands
- ▶ Wait until the electric motor has cooled off before you touch it.

1.8.4 Slipping or tripping

Slight injuries are possible from slippery surfaces or tripping hazards

- ▶ Lay all cables such that no tripping hazards are created (e.g., cable duct).
- ▶ Remove loose cables and objects from the floor of the work area.
- ▶ Always keep the work area clean and dry.
- ▶ Equip the floor under the shelter ventilation unit with a slip-resistant underlayer (e.g. anti-slip matting).



1.8.5 Hazardous substances

Damage by toxic, biohazardous or radioactive substances

- ▶ Close off the gas filter of the shelter ventilation unit if it becomes contaminated with hazardous materials, see Chapter “6.4.2 Gas filter” on page 34.
- ▶ Avoid handling carbon which has been contaminated in this way.
- ▶ Activated carbon filters are special waste. **ONLY** allow the gas filter to be disposed of by a specialized firm.



1.8.6 Wear, tear and unqualified replacement of parts

The ventilator can wear out after intensive use or after being left idle for too long. As soon as you notice signs of wear, inform your dealer, and have the ventilator replaced by an authorized specialist.

If unauthorized persons intervene in the device, all warranty and guarantee claims are invalidated and the shelter ventilation unit can be impaired.

1.9 Conduct in an emergency

Shut the shelter ventilation unit off:

- ▶ when there is danger of injury,
- ▶ when the ventilator overheats,
- ▶ when the excess pressure in the shelter is too high, e.g. because the exhaust is blocked, see Chapter “2.5 technical data” on page 18.
- ▶ when the shelter ventilation unit or shelter has been damaged.

In the event of an emergency, carry out the immediate response measures and call the local emergency number.

1.9.1 Fire

Only extinguish the shelter ventilation unit with extinguishing agents that are approved for electrical devices.

Makes sure that suitable extinguishers are ready-to-hand in the proximity of the shelter ventilation unit.

1.9.2 Earthquake

The shelter ventilation unit is mounted on the wall.

Check the anchoring and the torque on the mounts for the shelter ventilation unit every six months or after any earthquake. Tighten any connectors that have gotten loose.

2 Description of shelter ventilation unit

2.1 General description of function

Product name / designation	Shelter ventilation unit / Small ventilation unit
Type number	VA-40/75/150
Conformity to regulations and norms	BZS TE 98-005
Product versions	VA-40/75/150

Table 2 Identification characteristics

The shelter ventilation unit has two modes of operation:

- In fresh air operation the shelter ventilation unit provides shelters with fresh, breathable air. In this mode the gas filter is **NOT** attached.
- In filter operation, the shelter ventilation unit also runs the breathable air that is being drawn in through a gas filter before the breathable air is fed into the room. When not in use, the gas filters are sealed.

2.2 Scope of delivery

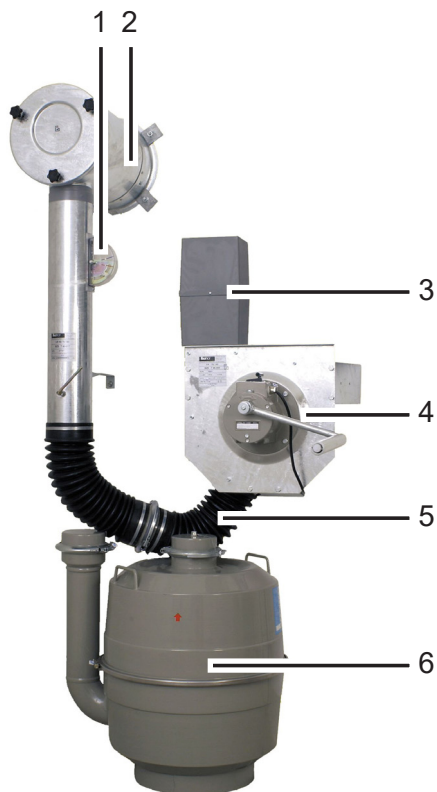


Figure 1 Components in the scope of delivery

Pos.	Designation
1	Air flow meter
2	Explosion protection valve with pre-filter
3	Overpressure explosion protection valve
4	Ventilator
5	Hose fittings with coupling
6	Gas filter

The following components are included in the scope of delivery:

- Ventilator (BZS-Nr. TE 98-005):
 - Drive motor 3 x 400 V, 50 Hz
 - Hand crank
 - Dynamo
 - Noise dampener
 - Emergency lighting
 - 1 m connection cable
 - Synthetic cover tarpaulin
- Gas filter:
 - Suspended solids filter
 - Active charcoal filter component
 - Housing with 2 handles
 - Floor mounting bar
- Air flow meter (BZS-No. T 80-017):
 - Measuring tube NW 125 mm
 - Throttle valve
 - Calibrated measuring and display unit
- Hose fittings with coupling:
 - 2 x hose NW 125 mm
 - 4 x hose clips NW 125 mm
 - hose coupling NW 125 mm
- Explosion protection with pre-filter on the air intake
- Overpressure explosion protection valve at air intake

2.3 Variants of shelter ventilation unit

There are three variants of the shelter ventilation unit:

- VA-40
- VA-75
- VA-150

2.4 Available replacement parts

ATTENTION

Property damage possible from incorrect replacement parts.

- ▶ Only use replacement parts from Lunor G. Kull AG.
- ▶ Use of other replacement parts means function cannot be guaranteed.

All components included in the scope of delivery can be purchased new individually from Lunor G. Kull AG.

2.5 Technical data

2.5.1 Environmental conditions

Ambient temperature	[°C] [°F]	ca. 20 ca. 68
Storage temperature	[°C] [°F]	< 40 < 104
Relative humidity	[%]	< 60
Ambient pressure	hPa	945
Emitted noise level	[dB]	≤ 68

Table 3 Environmental conditions

The conditions at the site of the shelter ventilation unit must at least meet the conditions that are listed in the operating manual as permissible ambient conditions. Higher temperatures lead to a higher operating temperature, elevated relative humidity can lead to corrosion.

Permissible environments are normal shelter environments without corrosive substances (acids, etc.), flammable gases or flammable, volatile liquids.

Any use under other conditions must be agreed to in writing by Lunor G. Kull AG.

2.5.2 Operating data, ventilator

Operating data		VA-40	VA-75	VA-150
BZS-No.		TE 98-005	TE 98-005	TE 98-005
Air flow rate as	[m ³ /h] [yd ³ /h]	40 ... 80 52.3 ... 104.6	75 ... 150 98.1 ... 196.2	150 ... 300 196.2 ... 392.4
Static pressure	[Pa] [psi]	700 ... 1100 0.102 ... 0.160	700 ... 1100 0.102 ... 0.160	700 ... 1100 0.102 ... 0.160
Voltage	[V]	3 x 400	3 x 400	3 x 400
Frequency	[Hz]	50	50	50
Rotation	[U/min]	2825	2825	2825
Amperage	[A]	0.6	0.6	0.6
Starting current	[A]	2.7	2.7	2.7
Power uptake	[W]	180	180	180
Type of air flow meter (BZS-No.)		LM 40 (T 80-017)	LM 75 (T 80-017)	LM 150 (T 80-017)
Type of gas filters (BZS-No.)		GF 40 (T 76-003)	GF 75 (T 75-004)	GF 150 (T 89-009)

Table 4 Operating data

2.6 Operating concept



Figure 2 Areas for use

Pos.	Designation
1	Flashlight box for emergency lighting
2	Motor switch
3	Marker fresh air operation (blue)
4	Marker filter operation (red)

3 Preparation for operation

3.1 Assembly

Only allow trained specialists to assemble the shelter ventilation unit. Only electricians may carry out the electrical connection.

3.2 Testing the electrical connection

Test the correct installation as follows:

1. Switch the unit on.
 2. Check to see if the ventilator is rotating.
 3. Check whether the rotational direction agrees with what is shown on the housing (clockwise).
 4. If you cannot detect any air flow, have the ventilator repaired by authorized specialists or replace it.
- ✓ You have checked for correct electrical installation.

3.3 Commissioning

ATTENTION

Damaged ventilators can cause property damage.

- ▶ Turn off the shelter ventilation unit if it overheats or becomes unusually loud.
- ▶ Pull out the main power plug for the shelter ventilation unit.
- ▶ Informieren Sie Ihren Fachhändler über übermäßige Wärme- oder Lärmentwicklung.
- ▶ You may only return the shelter ventilation unit to operation after it has been approved by the dealer.

Precondition

- The overpressure valve is not blocked; air can flow freely out of the shelter.
- The ventilator can draw air in; the air intake is not blocked.

Commission the shelter ventilation unit as follows:

1. Turn the hand crank.
 2. Test the drive's ease of motion.
 3. Disconnect the hand crank.
 4. Put the shaft guard cap on.
 5. Switch on the electric motor when the unit is turning regularly.
 6. **FUNCTION CAN BE IMPAIRED BY A BLOCKED AIR FLOW!**
Remove any covers that do not belong to the shelter ventilation unit and impede the air flow.
 7. Set the desired air flow using the air flow meter.
 8. Switch the shelter ventilation unit on.
 9. If possible, check the overpressure in the shelter. It should be between 50-250Pa.
 10. Let the shelter ventilation unit run in fresh air mode for an hour. Check the temperature of the electric motors.
 11. Check the condensate reservoir on the explosion protection valve.
- ✓ You have commissioned the shelter ventilation unit.

4 Operation

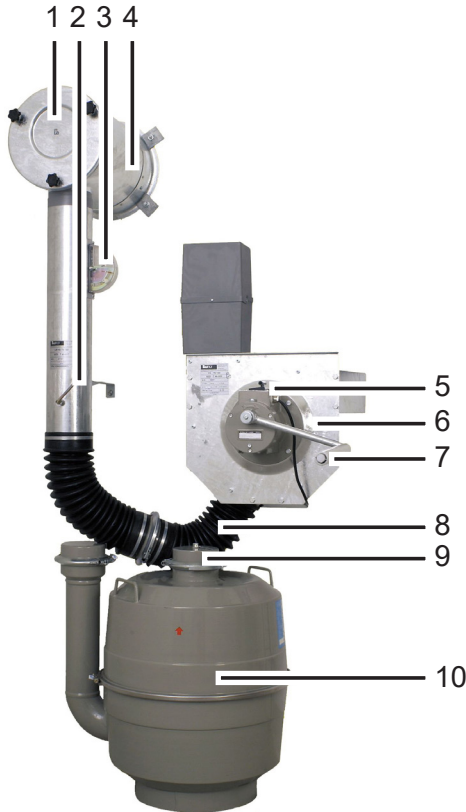


Figure 3 Components for operation

Pos.	Designation	Pos.	Designation
1	Condensate reservoir	6	Ventilator
2	Throttle valve	7	Hand crank
3	Air flow meter	8	Hose fittings
4	Explosion protection valve	9	Pressure equalization screw
5	Motor switch	10	Gas filter

 **TIP**

- ▶ *If not stated otherwise, the position numbers refer to those given in Chapters 4.1 and 4.2 in Figure 3.*
-

4.1 Fresh air mode (blue)

Set the shelter ventilation unit to fresh air mode:

1. Clean the pre-filter on the explosion protection valve (Pos. 4) according to the directions printed on it.
 2. Remove the condensate reservoir (Pos. 1).
 3. Drain the condensate reservoir (Pos. 1).
 4. Put the condensate reservoir back in place (Pos. 1).
 5. Connect the hose fittings (Pos. 8).
- ✓ You have set the unit to fresh air mode.

4.1.1 Motor operation

Set motor operation:

1. Set the throttle valve (Pos. 2) to “closed”.
 2. Set the motor switch (Pos. 5) to “I”.
 3. Set the air flow with the throttle valve (Pos. 2) on the air flow meter (Pos. 3) to the blue mark (Figure 2, Pos. 3).
- ✓ You have set motor operation.

4.1.2 Manual operation

Set manual operation:

1. Set the throttle valve (Pos. 2) to “open”.
 2. Remove the shaft guard cap.
 3. Lock the hand crank into place (Pos. 7).
 4. Turn the hand crank until the air flow meter (Pos. 3) is set to the blue mark (Figure 2, Pos. 3).
- ✓ You have set manual operation.

 **TIP**

- ▶ *The gas filter (Pos. 10) and the flashlight compartment for emergency lighting (Figure 1, Pos. 1) must be sealed when not in operation.*
-

4.2 Filter operation (red)

The gas filter will only be used in the event of an ABC-threat. The gas filter must be disposed of after use, see “7.3 Disposal and Recycling” on Page 37.

Set the shelter ventilation unit into filter operation:

1. Remove the protective sheath from the gas filter (Pos. 10).
 2. Clean the pre-filter on the explosion protection valve (Pos. 4) according to the instruction on the unit.
 3. Drain the condensate reservoir (Pos. 1).
 4. Put the condensate reservoir back in place (Pos. 1).
 5. Remove the pressure equalization screw (Pos. 9).
 6. Remove the sealed cover on the gas filter (Pos. 10).
 7. Connect the hose fittings (Pos. 8) at the openings of the gas filter.
- ✓ You have set the filter operation.

4.2.1 Motor operation

Set motor operation:

1. Set the throttle valve (Pos. 2) to “closed”.
 2. Set the motor switch (Pos. 5) to “I”.
 3. Set the air flow with the throttle valve (Pos. 2) to air flow meter (Pos. 3) to the red mark (Figure 2, Pos. 4).
- ✓ You have set motor operation.

4.2.2 Manual operation

Set manual operation:

1. Set the throttle valve (Pos. 2) to “open”.
 2. Remove the shaft guard cap.
 3. Lock the hand crank (Pos. 7) in place.
 4. Turn the hand crank until the air flow meter (Pos. 3) is locked at the red mark (Figure 2, Pos. 4).
- ✓ You have set manual operation.

5 Malfunctions, Messages and Faults

TIP

If the desired air flow is not achieved, the causes could be the following:

- ▶ *Intake lines that are clogged, overly long, or too small in diameter.*
- ▶ *Contaminated pre-filter*
- ▶ *Closed air flow meter*
- ▶ *Blocked drive / blocked impeller*
- ▶ *Electrical feed defective*
- ▶ *Ventilator defective*

5.1 Procedure with malfunctions

Malfunction clearance:

1. Make sure that there is no danger to persons or objects.
 2. Determine the cause of the malfunction.
 3. Contact Lunor G. Kull AG if needed.
 4. **ROTATING SHAFT POSES RISK OF INJURY!**
You must shut down the shelter ventilation unit.
 5. Only reach into the danger area of the shelter ventilation unit if no one nearby can be injured.
 6. If the malfunction was not caused by the shelter ventilation unit, check the power supply and air intake.
- ✓ You have cleared the malfunction.



5.2 Fault search

Check the function of the ventilators:

1. Switch the unit on.
 2. Check whether the ventilator is turning in the right direction. Pay attention to the shaft and the arrow on the housing.
 3. Check whether the ventilator is overheating.
 4. If this is not the case, check whether an air stream is coming out of the ventilator.
 5. If you detect no air flow or the ventilator overheats, have the ventilator replaced by an authorized specialist.
- ✓ You have checked the ventilator.

6 Maintenance and Service

Precondition:

- The shelter ventilation unit is shut off.

Prepare for maintenance and service:



1. Pull the plug on the shelter ventilation unit.
2. Secure the shelter ventilation unit against re-activation.
3. Check to make sure that the shelter ventilation unit is de-powered.



4. Ground the shelter ventilation unit.
 5. Cover or block off adjacent components that are powered.
- ✓ You have prepared for maintenance and service.

6.1 Check regularly

Interval	Component	Testing / task	Measures on faults
Before each use	Entire unit, cable and other connections	Visual check for wear and looseness of connections	Plug connections/ tighten, make connections
	Labelling and/ or engraving on parts	Visual check	Cleaning, renew illegible labels and / or engravings
Monthly	Pre-filter	Visual check	Clean pre-filter
Every 3 months	Air intake grid-Ventilator	Clean	Contact Lunor G. Kull AG (CH) dealer
Every 4 months	Ventilator	Turn on ventilator	Contact Lunor G. Kull AG (CH) dealer
Every 6 months	Entire unit	Turn on unit	Contact dealer
	Wall mount	Check for tight fit	Tighten bolts to torque / contact dealer Lunor G. Kull AG (CH)

Interval	Component	Testing / task	Measures on faults
Every 36 months	Entire unit	Have Lunor G. Kull AG service	Contact dealer
Unplanned	Electrical connections on cabinets	Insulation check	Contact electricians
After earthquake	Wall mounting	Check for tightness	Have wall mounting re-done by Lunor G. Kull AG (CH) Dealer
After water damage	Entire unit	Check whether water unit affected, water in accordion hoses	Have unit replaced

Table 5 Inspection schedule

6.2 Cleaning

Do not use any cleaning fluids. All parts may only be cleaned with brooms or vacuum cleaners.

6.2.1 Air intake grid

Clean the air intake grid every three months with a vacuum cleaner or broom.

6.2.2 Pre-filter

Clean the pre-filter monthly:

1. Unscrew the star grips.
 2. Remove the filter basket.
 3. If the filter basket is slightly fouled, clean it with a vacuum cleaner.
 4. If the filter basket is severely fouled, remove the filter basket from the cover and replace it, see Chapter “6.4.1 Pre-filter” on page 33.
- ✓ You have cleaned the pre-filter.

6.3 Service and care

Switch the ventilator on for 15 minutes at least every 4 months in order to prevent deterioration from disuse.

Check the function of the shelter ventilation unit every 6 months by turning it on for at least 15 minutes.

Every 36 months, have a service call performed by Lunor G. Kull AG (CH) or their dealer.

6.4 Repair and replacing parts

6.4.1 Pre-filter

Change the pre-filter at the latest every 36 months:

1. Unscrew and remove the star grips.
 2. Remove the filter basket.
 3. Remove the filter basket from the cover.
 4. Replace the filter basket with a new one.
 5. Insert the filter basket into the cover.
 6. Push the filter basket into place.
 7. Screw the star grips back into place.
- ✓ You have replaced the pre-filter.

6.4.2 Gas filter

If the seal is opened, have the gas filter tested for weight gain by Lunor.

Gas filter	Max. allowed weight gain
GF40 [kg] [lbs]	0.45kg
GF75 [kg] [lbs]	0.85kg
GF150 [kg] [lbs]	1.65kg

Table 6 Weight increase, gas filter

8. If the gas filter weighs more than the maximum allowed weight, the activated charcoal is saturated with moisture. Replace the gas filter with a new one.
9. Have the used gas filter disposed of, see Chapter “7.3 Disposal and recycling” on page 37.
- ✓ You have tested the gas filter for weight gain.

7 Decommissioning, disassembly, disposal

Have the disassembly of the shelter ventilation unit carried out by authorized specialists.

Decommissioning

Decommissioning the shelter ventilation unit:

10. Press the off-switch.
 11. Pull the plug.
- ✓ You have decommissioned the shelter ventilation unit.

7.1 Disassembly



CAUTION

Spring tension poses danger of injury.

- ▶ Do **NOT** open the protective gas filter housing on the gas filter.
- ▶ Dispose of the whole gas filter.

Precondition:

- The shelter ventilation unit has been decommissioned.

Disassemble the shelter ventilation unit:

1. Make sure that the plug is pulled and the shelter ventilation unit is de-powered.
 2. Disconnect the connections between components, e.g. cables and hoses.
 3. Loosen each component in the prescribed sequence from the respective wall mount.
- ✓ You have disassembled the shelter ventilation unit.

7.2 Disposal and recycling

Provide for a safe and professional disposal, especially of the parts or substances harmful to the environment.

The disposal of the shelter ventilation unit including operating materials is guided by the local waste disposal regulations and environmental laws.

Commission an approved specialized company to carry out the disposal, in order to avoid hazards to the environment. Your local community authorities can provide you with instructions about this.

Used gas filters are special waste. Have the used gas filters disposed of only by a specialized company.

Dispose of materials which can be fed into the recycling stream properly with due consideration for the environment.

The packing materials consist of cardboard and wood. Feed the packing material separately into the recycling stream in an eco-friendly way.

Table 7 BZS-permits

7.3 List of figures

Figure 1	Components in the scope of delivery	16
Figure 2	Areas for use	20
Figure 3	Components for operation	23

7.4 List of tables

Table 1	Who does what matrix	9
Table 2	Identification characteristics.....	15
Table 3	Environmental conditions	18
Table 4	Operating data	19
Table 5	Inspection schedule	31
Table 6	Weight increase, gas filter	34
Table 7	BZS-permits.....	37

7.5 Keyword index

A

Accidents	14
Air flow	19
Ambient conditions	18
Assembly	21

C

Cleaning.....	31
Commissioning.....	21
Contact address.....	2

D

Dangers	12
Description of function.....	15
Disposal	36

E

Electrical hazard	12
Earthquake	14
Electric shock.....	12
Emergency.....	14
Emergency situations	14

F

Faults	28
Fault tracing.....	29
Fire hazard.....	14
Function test.....	21

I

Identifying characteristics 15
Improper use 6
Inspection 21
Inspection schedule 31
Instructed personnel 8

M

Mandatory signs 7
Maintenance 32
Malfunctions 28
Modifications 11

O

Operating concept 20
Operating data 19
Outline 20

P

Performance 19
Personnel training 8
Pressure 19
Product-identification 15
Product variants 18
Proper use 6

R

Recycling 36
Repairs 33
Replacement parts 18
Replacing parts 33
Risks 12

S

Safety rules, basic.....	10
Scope of delivery.....	16
Service.....	32
Site plan.....	20
Specialists.....	8
Substances, hazardous.....	13

T

Target group.....	8
Technical data.....	18
Trained personnel.....	8

W

Warnings.....	7
Wear and tear.....	13
Who does what matrix.....	9
Work areas.....	20

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