Preliminary statement

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1 Preliminary statement

Your doctor has found that you require an additional oxygen supply. With the aeroplus m you received a German brand product for oxygen supply, which has been developed on the basis of the latest knowledge in both medical engineering and electronics. Permanent quality inspections ensure uniform quality on the highest level.

The aeroplus m is a highly reliable portable oxygen concentrator , intended for mobile or stationary use in homes or at home, as well as for clinical applications.

However, should problems arise with the aeroplus m, you may contact your dealer at any time.

This medical care product from Kröber Medizintechnik is labeled with the CE-sign according to MDD (Medical Device Directive).

Only use the aeroplus m after a medical indication and only in compliance with the doctor's orders by following these instructions for use.

If side effects or extreme health restrictions occur during the therapy, you should immediately consult your doctor.

2 General

2.1 Information in these instructions for use

These instructions for use describe the installation, operation and maintenance of the unit. Strict compliance with the stated notes on safety and instructions for use is a prerequisite for safe and proper work with the unit.

Moreover, compliance with the accident prevention instructions valid at the location of use and the general safety regulations is mandatory.

This instruction manual is part of the product and should be kept near the unit so that it is at any time available for personnel involved in installation, operation, maintenance and cleaning.

The graphic illustrations in this manual may perhaps differ slightly from the actual design of the unit.

2.2 Liability and warranty

All details and notes for the operation, maintenance and cleaning of the unit are made to the best of our knowledge taking into consideration our experience and knowledge gained up to now.

We reserve the right to make technical changes to the machine dealt with in these instructions for use within the context of ongoing development.

Translations are also carried out to the best of knowledge. We do not accept any liability for errors in translation. The German version of the instructions for use, which is also delivered with the unit, is the definitive version.

Texts and illustrations do not necessarily correspond to the scope of delivery. The drawings and graphics are not to scale 1:1.

Read instructions for use carefully before starting operation of the unit!

The manufacturer will not assume liability for damage or disruptions that occur as a result of non-compliance with the instructions for use.

Handing over these instructions for use to third parties is not permitted and results in the obligation for compensation.

2.3 Explanation of symbols

Important safety and equipment related notes in these instructions for use are highlighted by symbols. These notes must be strictly adhered to in order to avoid accidents, personal injuries and damage to property.

 **WARNING!**

This symbol warns of dangers that can lead to adverse effects on health, injuries, permanent physical damage or to death.

Strictly comply with all notes regarding work safety, and be particularly careful in these situations.

WARNING! Danger of electric current!

This symbol draws attention to dangerous situations involving electrical currents. There is a danger of serious injury or death if the safety notes are not complied with. The related work may only be carried out by qualified electricians.

ATTENTION!

Information highlighted with this symbol must be strictly complied with in order to avoid damage to the machine, malfunction and/or breakdown.

NOTE!

This symbol highlights hints and information to be observed for efficient and non-disrupted operation of the unit.

2.4 Copyright protection

These instructions for use are to be treated confidentially. They should only be used by persons who have been authorized accordingly. It may only be passed on to third parties with the written consent of the manufacturer.

All documents are protected by copyright protection law.

It is not permissible to pass on or reproduce the documents, either as a whole or excerpts thereof, to evaluate or communicate their content, unless explicitly entitled to do so. Any violations are liable to prosecution and require compensation.

We reserve the right to exercise industrial property rights.

2.5 Return and waste disposal

– If the unit has been delivered through a parcel service and not directly by a dealer you should keep the packaging material for possible service instances.
– If there is no corresponding agreement regarding the return of packing material, then the packing material remains with the customer. He is responsible for environmental waste disposal in accordance with the applicable waste disposal legislation.
– After use the unit may be returned to the dealer, who is then responsible for proper disposal of the unit.
– Non-infectious used accessories (e.g. nasal cannula) can be disposed off as domestic waste
– Infectious accessories (e.g. nasal cannula of an infected user) must be disposed of through a specially approved waste disposal company. Addresses are available from your local municipality.

2.6 Customer service

Service work should normally be carried out by your local authorized dealer.
You can contact the customer service team of Kröber GmbH as follows:

Office hours:	Mo - Fr 8.00 a.m. -3.30 p.m.
Address:	Kröber Medizintechnik GmbH Salzheck 4 D-56332 Dieblich Germany
Phone:	+49 (0) 2607 – 94040
Fax:	+49 (0) 2607 – 940422
Internet:	www.kroeber.de
eMail:	info@kroeber.de

3 Safety

This section provides an overview over all important safety aspects for safe and trouble-free operation of the unit.

The individual chapters additionally contain actual safety notes highlighted with symbols, which will help to avoid immediate dangers.

3.1 General

The machine is built according to the currently applicable rules of technology and is safe to operate.

However, dangers may still arise from the unit if it is incorrectly operated or used for purposes it is not intended for.

Any persons using this unit must have read and understood these instructions before starting operation. This also applies if the person in question has already worked with just such a unit or similar equipment or was trained by the manufacturer.

Knowing the content of these instructions for use is a prerequisite for the avoidance of mistakes and for safe and trouble-free operation of the unit.

Neither changes nor conversions may be carried out on the equipment, which have not been explicitly authorized by the manufacturer, to avoid dangers and to ensure optimal performance.

All safety decals and operating signs on the unit must be kept well legible at all times. Damaged or illegible decals must be replaced immediately.

3.2 Operator’s Responsibility

These instructions for use must be kept near the unit, so that it is available for the user at any time.

Apart from the notes on safety mentioned in this manual, all generally valid safety and accident prevention instructions must also be observed and adhered to.

The machine may only be operated in a technically perfect condition and if operationally safe.

The information contained in the instruction manual is complete and must be adhered to without limitation.

3.3 Intended Use

The operational safety of the unit is only assured when used for the purpose it is intended for, as specified in the instructions for use.

The aeroplus m solely intended for use within the scope of a medical therapy for the additional, non-life-sustaining supply of oxygen. The unit may thereby be used in hospitals, homes or at home on mobile or portable basis.

The unit must only be used according to the medical indication and only in accordance with the doctor's prescription by following these instructions for use

The intended use also includes the compliance with the assembly instructions, as well as the notes on cleaning and maintenance of the unit.

Any other use of the unit beyond these limits is prohibited and is not considered as unintended use! Claims of any kind against the manufacturer and/or his authorized

representatives resulting from damage caused by unintended use of the unit are excluded. The customer is solely liable for any damage resulting from unintended use.

3.4 Dangers which may arise from the unit

The unit was subjected to a risk analysis. The resultant construction and design of the unit corresponds to the current status of technology.

However, there is still a remaining risk!

The unit requires responsibly minded and cautious operation. Improper operation or operation by unauthorized persons can endanger persons.

WARNING! Risk of health damage!

If an absolutely safe oxygen supply is required, it is strictly necessary to have a second, independent oxygen source available as replacement (e.g. a mobile oxygen savings system with an oxygen cylinder).
If the patient or the operator notices at any time that the available amount of oxygen is not sufficient, you should immediately contact your dealer and/or doctor.

WARNING! Risk of health damage!

Particular supervision is required if the unit is to be used in the vicinity of children or bedfast persons. The unit must under no circumstances be used with children without additional supervision!

WARNING! Danger of side effects!

If side effects or extreme health restrictions occur during the therapy, you should immediately consult your doctor.

WARNING! Fire hazard caused by oxygen!

Oxygen is vital, but in concentrators with only a few percentage points above the normal oxygen content in the air it is a highly dangerous fire accelerant. There are only a few materials which will not burn off like an explosion under a raised concentration of oxygen.

Therefore:

- **Oxygen may only be handled by trained or specially instructed persons!**
- **The misuse of oxygen, e.g. to cool down or improve the ambient air, to cool down and dust or blow off of persons, clothes, furniture etc. is dangerous and therefore prohibited!**
- **Smoking and handling ignition sources and open flames is prohibited when working with oxygen!**
- **Keep a minimum distance of 2 metres from all spark generating equipment and open fire!**
- **After having stayed in a possible oxygen saturated atmosphere you should thoroughly aerate your cloths, because oxygen adheres to the clothes very well! An ignition source, e.g. a burning cigarette, could easily cause burning of your clothes.**
- **Materials that do not burn in air may burn very vigorously and even spontaneously in oxygen or oxygen enriched air. This already applies for an enrichment of only a few percent!**
- **Oil and grease (even creams and gels) can react in an explosion like manner when coming in contact with oxygen. It is therefore mandatory to keep the unit free of oil and grease!**
- **Oxygen considerably increases the temperature of a flame and the speed of combustion!**
- **Do not fill the moisturizer with inflammable fluids!**

WARNING! Danger of electric current!

Electric energies can cause severe injury. Damaged insulation or components cause a danger to life.

Therefore:

- **Work on the equipment must only be performed by trained professionals.**
- **Pull the mains plug out and remove also the battery before starting work on the unit!**
- **Check mains leads for damage before every use.**

ATTENTION! Observe high frequency safety!

Medical equipment can be influenced by (mobile) HF communication equipment (e.g. mobile phones).
Do not use mobile radio equipment in the immediate vicinity of the aeroplus m.

ATTENTION! Observe electromagnetic compatibility!

Electrical medical equipment is subjected to stringent protective measures concerning electromagnetic compatibility (EMC) and must be installed and operated in accordance with the EMC information contained in the accompanying documents. The following should be noted in particular:

- **Floors should be made of wood or concrete or should be covered with ceramic tiles. If the floor is covered with a synthetic material, the relative humidity must be at least 30%.**
- **During operation the unit must therefore not be exposed to extremely strong magnetic fields.**
- **Magnetic fields at mains frequency must comply with the typical values found in business or hospital environments.**

ATTENTION! Keep the minimum distance!

The air intake of the aeroplus m is located on the front side of the unit, the following is therefore of importance:

- **There should be a minimum distance of 30cm from walls, curtains and other large objects (e.g. cupboards), so that an unrestricted entry of air is assured at the back of the unit.**
- **The aeroplus m must not be used directly beside with other equipment.**

ATTENTION! Avoid overheating!

The unit is air cooled, in order to avoid overheating it must not be placed near heaters, etc.

3.5 What to do if a hose caught fire

Should a hose catch fire despite all protective measures, it is not enough to just switch the unit off, because oxygen will continue to flow for a while after the unit has been switched off.

Take the following steps:

- Pull the oxygen hose off the unit to interrupt the oxygen supply.
- Choke the flames (e.g. with a blanket).
- Ventilate well after extinguishing the fire, because a burning PVC-hose will emit toxic gases.

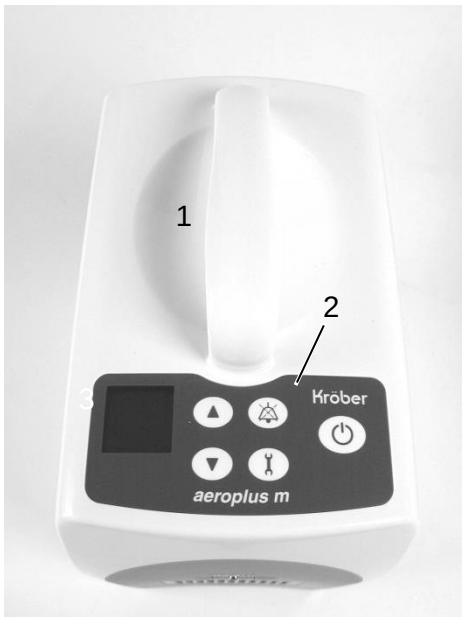
The metal connection on the oxygen outlet acts as a fire inhibitor, preventing the flames from spreading into the unit.

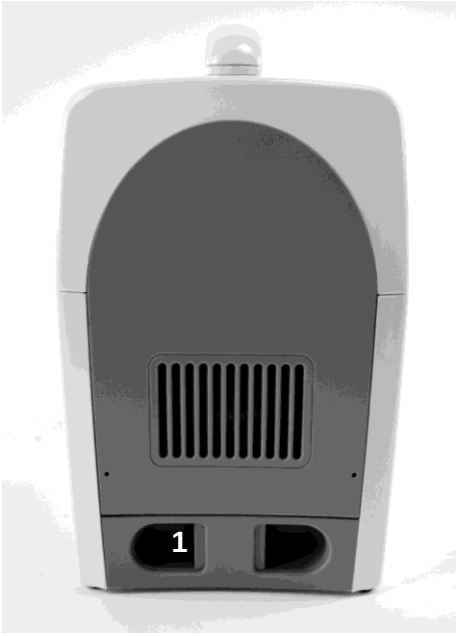
4 Design and function

4.1 General description

The aeroplus m oxygen concentrator for has been optimized for the oxygen supply at home. The electronically controlled oxygen concentrator separates the oxygen from the ambient air and supplies the user through the nasal cannula with highly concentrated oxygen with each detected breath.

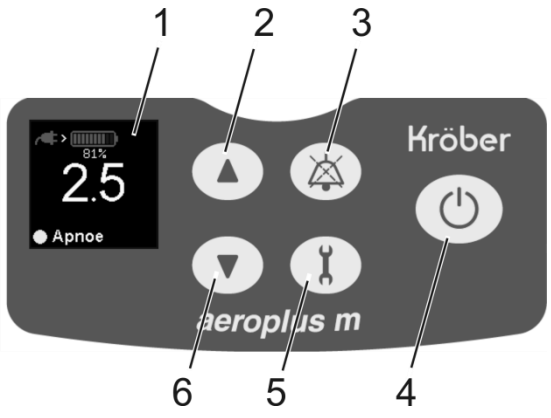
4.2 Design

	1 Carrying handle 2 Keypad 3 Color display
	1 Oxygen outlet 2 Coarse dust filter 3 DC Voltage input

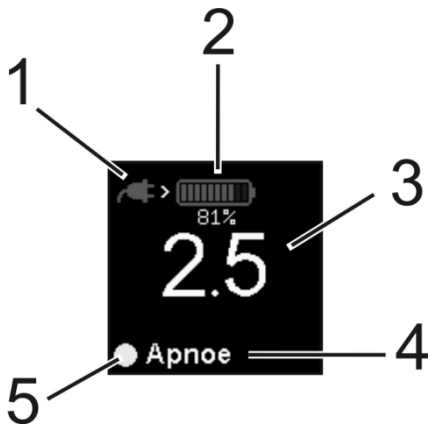
	1 Battery drawer

NOTE!
The typeplate of the aeroplus m is located underneath.

4.3 Keypad

	1 Color display 2 Arrow-up-key 3 Alarm-mute key 4 On-/Off key 5 Menu key 6 Arrow-up key

4.4 Display



1 Mains supply
2 Battery capacity
3 Therapie setting
4 Message line
5 System state
green: all systems o.k.
blue: information message
yellow: alarm status

5 Technical Data

Model	**aeroplus m**
MDD Classification	IIa
Power Supply	100 - 240 V~, 50/60 Hz Desktop power supply: Type APS 100EM-190530-8 19 V DC Battery: Type 49-5010 14.4 V 97 Wh Lithium Ion
Environmental conditions:	Operating temperature: +5 to +40°C Storage temperature: -25 to +70°C Relative humiity: 15% - 93 % r.F., non-condensing Pressure: 700 to 1060 mbar
Noise level:	< 40 dB(A)
Power consumption	max. 100 W
Coarse dust filter	underneath the oxygen outlet
Finefilter	inside
Interface	USB (mini) **WARNING! Unsafe connection!** **Use only authorized and approved equipment on this interface.**
Weight	3.6 kg unit 0.7 kg battery
Dimensions (HxBxT)	(25 x 23 x 16) cm
Warranty of the manufacturer	2 years
O2-Abgabe	CMV 150 ml per setting (CMV = constant minute volume) 10 therapy settings from 0.5 to 5.0
O2-Konzentration	> 90%
Trigger frequency	< 30 bpm
Trigger sensitivity:	0.1 cmH_2O, 0.2 cmH_2O
Battery operation:	@ setting 2: 4 h, @ setting 5: 2 h
Recharging duration (for 80% battery capacity)	90 min with device shut off or in stand-by 180 min with device switched on

6 Transport, packaging and storage

The following should be noted when transporting the aeroplus m (without operation):

- The unit should only be shipped and transported in its original packaging.
- Remove the battery before transport.
- For transport, e.g. by car, the unit may stand.
- Open the transport box from the top. Do not stand the transport carton upside down or on one of its sides.

NOTE!

Mit dem Tragegriff an der Oberseite des Geräts kann das Gerät sicher angehoben werden.

During mobile use, the aeroplus m should be placed in its carrying case. This case offers enough storage space for the accessories and has the necessary openings for air in- and outlet as well as for the nasal cannula and the power supply cord.

ATTENTION! Quiet alarm signals!

The alarm signals are quieter when the device is operated in the carrying case.

Take the aeroplus m oxygen concentrator out of the carrying case whenever it is possible and use this bag for transport only!

6.1 Transport inspection

It is highly recommended to check the complete delivery for completeness and possible transport damage, immediately after receipt.

In case of externally detectable transport damage you should not accept the delivery, or only with reservation. Acknowledge the receipt only with reservation (e.g. on the freight document). Specify the expected damage and inform the manufacturer immediately.

Hidden damage should be claimed immediately after detection, because damage claims can only be lodged within the applicable claims periods.

The packaging material should be saved, it may be needed if the unit has to be returned.

6.2 Storage

If the package is to be stored before it is taken into service, please observe the following instructions:

– Store in a dry environment. Relative humidity: max. 93 %.
– It must be assured that the package is not stored outdoors.
  It must also be assured that the floor used for storage is dry over the entire storage period.
– Storage temperature -20 to +70°C.
– Store in a dust-free environment.
– Avoid mechanical shocks and damages.

6.3 Mobile Use

To use the aeroplus m mobilely:

	Insert the aeroplus m into the carryin case and close the zippers.
	Connect the nasal cannula.
	Flip the caddy open.
	Let the carrying case slide over the leverage.

7 Taking into service

7.1 Before assembling

Check before assembling whether all components needed for correct operation are available.

NOTE!

For assistance during assembly, operation or maintenance, contact the manufacturer or the your local service. The address of the manufacturer can be found on page ***Fehler! Textmarke nicht definiert.****. The address of your local service provider should be handed over briefing.*

You should also contact the a.m. companies in case of unexpected operating conditions or events.

1 aeroplus m
2 nasal cannula
3 battery
4 power supply
5 instructions for use
6 coarse dust filter
7 carrying case
8 caddy

7.1 Choosing the location

Please consider the following when choosing the location:

– The unit should have 30cm clearance from any walls, curtains and other large objects (e.g. cupboards), to ensure unrestricted entry of air through the back of the unit.
– The unit is air cooled. It must therefore not be placed near heaters, etc. At such a location there is a risk of overheating.

NOTE!

The unit can be safely lifted and moved by the carrier handle on top of the unit.

ATTENTION! Ensure a sufficient air supply!

The aeroplus m oxygen concentrator must not be operated directly next to or even stacked with other equipment. Ensure a sufficient distance from the walls, etc.!

8 Short operating instructions

	Insert the battery.
	Check the condition of the coarse dust filter and replace it if needed.
	Connect the power supply to the mains and to the aeroplus m.
	Connect the nasal cannula.
	Insert both cannula openings into your nose. Place both feed hoses over your ears. Pull the sling with the sliding piece tight under your chin

	 WARNING! Strangulation danger! Pay attention for a proper tubing routing without any loops to reduce the risk of strangulation.  WARNUNG! Skin irritations! Pay attention for a proper fit of the nasal cannula to avoid any skin irritation caused by movements of the device .  WARNUNG! Missing trigger! Eventually, the aeroplus m is not able to detect all breathing efforts. Optimize the trigger sensitivity and adjust the placement of the nasal cannula prongs.
	Press the ON-/Off-button to start the therapy.

 **WARNING! Strangulation danger!**

Pay attention for a proper tubing routing without any loops to reduce the risk of strangulation and tripping hazards.

9 Main operating functions

WARNING! Health risk!

Inappropriate use of the aeroplus m can lead to severe personal and/or material damage.
You should therefore only start up the unit in strict compliance with the instructions for use and the notes on safety.

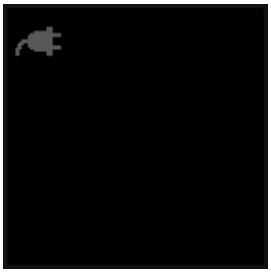
9.1 Furnish the power supply

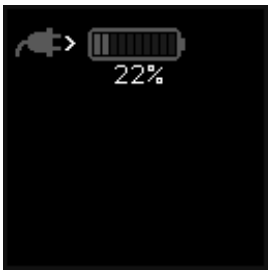
The aeroplus m oxygen concentrator can be alternatively supplied by mains or by the internal rechargeable battery.

It is advisable to keep and charge the battery in the device during mains operation. Thereby an optimal charging state and availibility can be maintained, in case the mains supply is interrupted fails.

However if the aeroplus m oxygen concentrator is not in use for a longer period of time, remove the battery from the system to ensure optimum battery lifetime.

9.1.1 Connecting to the mains power

	For connecting to the mains power system, first connect the desktop power adapter with a wall outlet. Plug in the DC connector into the mating jack on the aeroplus m. The connector must snap into place. In the display, the power plug symbol is turned on.
	After every first energyzing cycle (that is to say: from a currentless state / no battery), the aeroplus m perform a selftest: Display and loudspeaker functions are checked: • Display shows a black / white pattern. • Sound signal is activated.
	After that the aeroplus m goes automatically into standby-state. *NOTE!* *If the battery has not been inserted, only the power plug symbol is activated.*

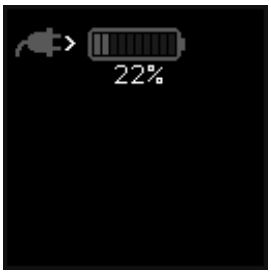
	With inserted battery: Both power plug symbol and the remaining battery capacity in percent value are displayed. A charging process is presented by a wandering arrow.

9.1.2 Disconnecting from mains

	For disconnecting, de-latch the dc connector by pulling back the Überwurfhülse entrasten and remove the whole conector. In the display, the mains power symbol goes dark. *NOTE!* *While the aeroplus is used, after disconnection from the mains supply, the unit goes unterbrechungsfrei in battery operation mode, if the installed battery has sufficient capacity.* *NOTE!* *If a battery has not been installed, the whole device will be without current: the display goes dark.*

9.1.3 Battery operation

Internal battery charging

	For charging the battery internally, connect the aeroplus m tot he mains power. Both in operation and when turned off, the battery will be charged. Chargign durations for a complete cycle. • unit turned on: 300 minutes • unit turned off: 90 minutes

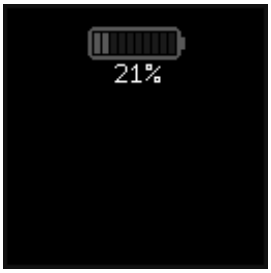
Charging the battery externally

Alternatively, the battery can be charged externally – outside of the aeroplus m – by the external charger (p/n 49-5003).

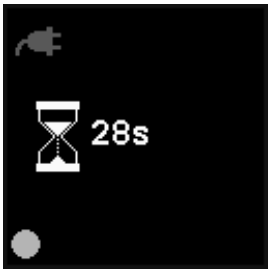
	Open the battery drawer. For that purpose, push both sliders to the middle. Pull out the drawer including battery
	Remove the battery from the drawer. For doing so, lift the battery at the connector and pull the battery out.
	Charge the battery in the external charger. Observe additional instructions for use for this optional accessory!
	Insert the charged battery into the drawer; the connector must match into corresponding opening of the drawer.

	Insert battery drawer including battery into the battery compartment and close the latch. You must clearly identify a clicking sound for completed action.

Determining the remaining battery operation time

 	When sufficiently charged, the aeroplus m can be used for battery mode operation. In stand-by-mode, the remaining battery capacity in % is displayed. In therapy mode, the remaining battery capacity is displayed in minutes of operation. NOTE! *The remaining capacity is continuously updated according to the actual settings. Depending on the therapy setting and breathing frequency, this figure can slightly fluctuate.*

9.2 Starting the therapy

	To start the therapy, press the on-/off-button shortly. The aeroplus m starts the oxygen production process, initially with selftest of compressor and solenoids. During this preparation phase, no oxygen output is available. Thereafter the remaining time until reaching readiness for oxygen delivery is displayed.

	After the preparation phase, oxygen is available for therapy. The therapy setting is displayed in the display.

9.3 Self test

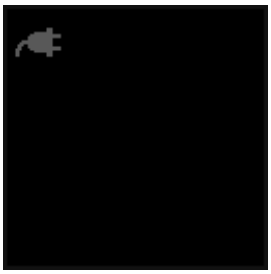
The aeroplus m runs an internal self test after power-up cycle. In case of a detected error, a correspinding error message is displayed. In addition, all systems undergo systematic cyclic testing during operation. For manual control, perform an inspiration and check for oxygen delivery. If proper oxygen delivery is detected, the system is ready for operation.

In addition always check for the remaining battery capacity!

9.4 Terminating or interrupting the therapy

NOTE!

There is no distinction between an interruption or a termination of the therapy. In both situations, the aeroplus m is set into stand-by mode:

	For termination, press the **On-/Off button** . The oxygen production process is terminated; the system is shut down.
	The aeroplus m goes into stand-by mode.

9.5 Adjusting the therapy setting

ATTENTION!

The patient-specific settings must be determined for each patient individually.

Settings known from continuous flow oxygen therapy cannot be transferred without professional medical consultation!

<table>
<tr>
<td> 


</td>
<td>To adjust the therapy setting, press the arrow-up or arrow-down button .
The arrow-up button increases the oxygen dose while the arrow-doan button decreases the volume.

NOTE!
The settings can be adjusted in steps of 0.5.

If activated in the menu, each button activation is confirmed with a short acoustical signal.</td>
</tr>
<tr>
<td></td>
<td>NOTE!
The therapy setting can also be adjusted through the main menu, see chapter 10.4 Therapy setting.</td>
</tr>
</table>

NOTE!

The maximum gas output temperature is maximum 6 degree higher than the ambient temperature.

ATTENTION!

The unit has been designed for operation at altitudes of up to 2000 m above seal level. If the unit is used beyond this specification, compliance with the specified performance data can no longer be guaranteed.

10 Menu and advanced settings

With the advanced settings in the menu, the aeroplus m can be individually configured and customized to the needs of the user.

10.1 Menu operation

	To call the menu, press the menu button .
	The menu list is displayed, starting with the first menu entry: ***Information.***
	With the arrow-up-button and the arrow-down-button respectively, it is possible to select the previous or next menu item of the list. The selected menu item is inverted.
	With the menu button , the inverted menu item is selected and can be further adjusted. *In addition, this button has a confirming function.*

10.2 Menu structure

Following menu and submenu items can be selected:

Menu level 1	Menu level 2	Description
Information	Operating hours	Operating hours counter for device operation
	Software version	Software revisions
	Serial numbers	Seral number of modules
Setting		Therapy settings
O2-Min		Lower limit for therapy setting
O2-Max		Upper limit for therapy setting
Trigger		Setting of the trigger sensitivity
Language		Choice of menu language
Volume button		Volume setting for button click
Volume alarm tone		Volume setting for button click
Volume trigger signal		Volume setting for inspiration detection
CF mode		Quasi constant flow. Only displayed in running mode.

10.3 Information

Display/Message	Description
	To choose menu item ***Information,*** select and confirm this choice in the main menu with the menu button .
	First information displayed are the **operating hours** in format hours:minutes (here: 211 hours, 50 minutes). Either press arrow-up - or arrow-down-button to access further information or confirm ***return*** with the menu button to return to the main menu.
	The arrow-up button leads to the display of the installed **Software** revisions for both microprocessor systems (here: V-1.01 and V-1.00). Either press arrow-up - or arrow-down-button to access further information or confirm ***return*** with the menu button to return to the main menu.
 	The arrow-up button leads to the display of the serial number of the **rechargeable battery** (here: S/N 119). Either press arrow-up - or arrow-down-button to access further information or confirm ***return*** with the menu button to return to the main menu. In case that no battery is detected, dashes appear.
	One further press on the arrow-up button leads to the operating hours counter menu item.

10.4 Therapy setting

In this menu, the therapy setting and thus the delivered amount of oxygen per breath can be set.

Display/Message	Description
	To choose menu item ***Setting,*** select and confirm this choice in the main menu with the menu button. The selection is inverted with white back ground color *NOTE!* *The therapy setting can already be seen here (setting 3). It is not necessary to enter the submenu just for control of the setting.*
	To increase the setting press the arrow-up-button. To decrease the setting press the arrow-down-button.
	To leave this menu, press the menu button (=*return**)**.*
	The new therapy setting is already active.
	

10.5 Lower limit for the therapy setting

In order to limit the therapy range, a lower (minimum oxygen volume, O2-Min) and an upper limit (maximum oxygen volume, O2-Max) can be stored. These limits ensure the operation only between the applied limits.

Display/Message	Description
	To set the lower limit, select menu item **O2-Min.** in the main menu; the selection is inverted with white back ground color. *NOTE!* *Already in the main menu, the current setting can be controlled (here: setting 0.5). It is not necessary to call the submenu.* Confirm selected menu item with the menu button.
	To increase the setting press the arrow-up-button. To decrease the setting press the arrow-down-button.
	To leave this menu, press the menu button (=*return**)**.* *NOTE!* *If the lower limit has the same value as the upper limit, this will freeze the therapy setting.*
	*NOTE!* *The lower limit can only be set between 0.5 and the upper therapy limit. If applicable, the upper limit must be modified first; not till then the lower limit can be adjusted as desired.*

10.6 Upper limit for the therapy setting

In order to limit the therapy range, a lower (minimum oxygen volume, O2-Min) and a upper limit (maximum oxygen volume, O2-Max) can be stored. These limits ensure the operation only between the applied limits.

Display/ Message	Description
	To set the upper limit, select menu item **O2-Max.** in the main menu; the selection is inverted with white back ground color. *NOTE!* *Already in the main menu, the current setting can be controlled (here: setting 5.0). It is not necessary to call the submenu.* *Confirm selected menu item with the menu button .*
	To increase the setting press the arrow-up-button . To decrease the setting press the arrow-down-button .
	To leave this menu, press the menu button (=*return**)**.* *NOTE!* *The upper limit can only be set between the lower therapy limit and 5.0. If applicable, the lower limit must be modified first; not till then the upper limit can be adjusted as desired.*
	*NOTE!* *If the lower limit has the same value as the upper limit, this will freeze the therapy setting.*

10.7 Trigger

The sensitivity of the inspiration trigger can be optimized to the user's needs: The trigger can be set to either ***normal*** or ***sensitive***.

NOTE!

The setting "sensitive" implies that the trigger is more susceptible for disturbances.

NOTE!

The trigger sensitivity setting is displayed only in the menu but not in the standard screen.

Display/Message	Description
	To adjust the ***trigger sensitivity,*** select menu item ***Trigger*** in the main menu; the selection is inverted with white back ground color. Confirm selected menu item with the menu button.
  	To toggle the setting press arrow-up- or arrow-down button. *NOTE!* *Setting **normal (N)** corresponds with a trigger sensitivity of 0.2 cmH_2O.* *Setting **sensitive (S)** corresponds with a trigger sensitivity of 0.1 cmH_2O.* To exit the menu, press the menu button (=return).

10.8 Language

It is possible to select different languages for the menu.

NOTE!

The list of available languages will be constantly ammended.

Display/Message	Description
	To change menu the language, select menu item ***Language*** in the main menu; the selection is inverted with white back ground color. Confirm selected menu item with the menu button .
  	To change the language setting, press arrow-up- or arrow-down button . All currently available languages are displayed. Select the desired language and/or exit the menu by pressing the menu button (=return).

10.9 Button tone volume

This menu item allows for adjustment of the button tone volume, the confirmation message after a press of the button.

Display/Message	Description
	To change the **Button tone volume**, select menu item **Button Vol.** in the main menu; the selection is inverted with white back ground color. Confirm selected menu item with the menu button .
  	To set the volume, press arrow-up- or arrow-down button . The sound level can be set between ***0 (= off)*** and ***9 (= very loud)***. *NOTE!* *With each modification, a sample tone with the set volume is generated.* To leave this menu, press the menu button (=*return**)***.

10.10 Alarm tone volume

This menu item allows for adjustment of the alarm tone volume.

Display/Message	Description
	To change the **Alarm Tone Volume**, select menu item **Alarm Vol.** in the main menu; the selection is inverted with white back ground color. Confirm selected menu item with the menu button.
  	To set the volume, press arrow-up- or arrow-down button. The volume can be set between ***0 (= off)*** and ***9 (= very loud)***. *NOTE!* *With each modification, a sample tone with the set volume is generated.* To leave this menu, press the menu button (=*return**)**.

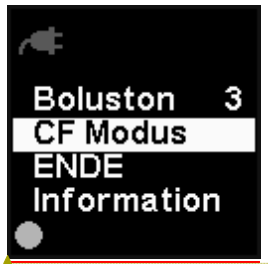
10.11Trigger signal volume

It is possible to activate a trigger signal tone and to adjust its volume. The bolus tone indicates a successful trigger effort to the user.

Display/Message	Description
	To adjust the **Trigger signal volume** select menu item ***Trigger V.*** in the main menu; the selection is highlighted with white back ground color. Confirm selected menu item with the menu button .
  	To set the volume, press arrow-up- or arrow-down button . The volume can be set between ***0 (= off)*** and ***9 (= very loud)***. *NOTE!* *With each modification, a sample tone with the set volume is generated.* To leave this menu, press the menu button (=*return**)***.

10.12 Quasi-constant flow

The Quasi-constant flow (continously chopped volume flow) can be selected in the menu. With this setting, oxygen will be delivered without inspiration efforts.

Display/Message	Description
	To activate the **CF mode,** select menu item **CF mode** in the main menu; the selection is highlighted with white back ground color. Confirm selected menu item with the menu button . NOTE! *This setting can be only selected during normal oxygen operation. Without available oxygen, this menu item is hidden.*
	CF is displayed. NOTE! *The constante flow mode can be only stopped by turning off the device. To stop by menu is not possible.*

11 Messages and Alarms

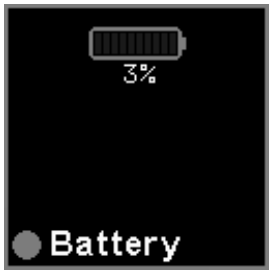
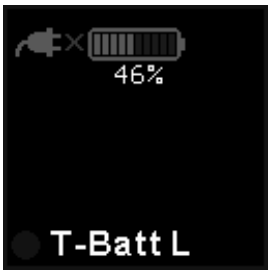
11.1 Alarm priority

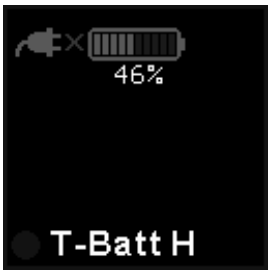
On the aeroplus m, in addition to information messages there are only **alarms with low priority**:

Alarm priority	Description
Low priority:	An increased level of alertness of the user is necessary. Alarm regime beepbeep - - 30 sec. pause - - beepbeep - - 30 sec. pause - -

11.2 Information messages

Information messages have an advising and oftentimes technical character and are supposed to suppport the user to maintain a trouble-free operation of the aeroplus m.

Display/Message	Description
Low battery capacity 	***The battery capacity is low (< 10 % or remaining operation time < 15 minutes). Only shortterm operation possible.*** **Counter measures:** • Charge the battery. • Connect the aeroplus m to the mains power supply. • Replace the depleted battery with charged spare battery. • Where appropriate, decrease the therapy setting (increases the remaining operation time).
Low battery temperature 	***Temperature of the battery is too low to start the charging process. Charging function is interrupted.*** **Counter measures:** • Take the aeroplus m into a higher ambient temperature. *NOTE!* *The charging process will automatically continue at a battery temperature of > 3° Celsius.*

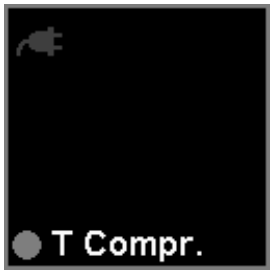
Display/Message	Description
High battery temperature 	***Temperature of the battery is too high for the charging process. Charging function is interrupted.*** **Counter measures:** • Take the aeroplus m into a lower ambient temperature. *NOTE!* *The charging process will automatically continue at a battery temperature of < 42° C.*

11.3 Alarms

Following low-priority alarms can be triggered:

Alarm category/ Display	Description
Oxygen 	***The product gas does not have the specified oxygen concentration.*** The oxygen concentrator aeroplus m is equipped with an innovative multifunctional sensor that monitors constantly the oxygen concentration of the production process. In case of a deviation from the technical specifications, the oxygen alarm is triggered. **Counter measures** • with constant alarms, consult technical service.
Pressure 	***The pressure in the oxygen reservoir is too low.*** **Counter measures:** • Re-boot the unit. If alarm still continues, contact the technical service.

Alarm category/ Display	Description
Sensor 	***There is malfunction of the multifunctional sensor.*** The sensor is not able to detect the oxygen concentration with sufficient accuracy. However, the unit can be used. **Counter measures** • Re-boot the unit. If alarm still continues, contact the technical service.
Asphyxia 	***The maximum time to detect an inspiration has been exceeded.*** **Counter measures** • Possibly the nasal cannula is slipped away: check the fit and position of the nasal prongs. • Possibly the tubing is blocked: check the routing for kinks. • Possibly the nasal cannula is not connected properly: check the connection to the oxygen outlet at the aeroplus m. • Possibly the inspiration trigger signal is too weak: set the inspiration trigger sensitivity to „sensitive“.
Battery capacity 	***The battery capacity is no longer sufficient to ensure a safe operation. The aeroplus m stopps operations automatically and performs a controlled shut-down.*** **Counter measures:** • Connect the aeroplus m to the mains supply. • Charge the battery. • Install a charged spare battery.

Alarm category/ Display	Description
Battery temperature 	***The temperature of the battery is too high. The aeroplus m stopps operations automatically and performs a controlled shut-down.*** **Counter measures:** • Take the aeroplus m to a lower ambient temperature. • Remove the battery. Then connect the aeroplus m to the mains supply. *NOTE!* *Under this circumstance, the system re-boots meanwhile.* • Replace the battery with a charged spare battery.
Compressor temperature 	***The temperature of the compressor is too high for operation.*** ***The aeroplus m stopps operations automatically and performs a controlled shut-down.*** **Counter measures:** • Take the aeroplus m to a lower ambient temperature. • Check the fan for proper operation. (Check at the air in- and outlet for air flow).
System 	***System failure*** **Counter measures:** • Disconnect battery **and(!)** mains supply. • Re-connect device to mains supply. • Re-boot the unit. If alarm still continues, contact the technical service.
Battery type 	***This battery type is not recognized/supported by the unit. Operation is not possible.*** **Counter measures:** • Use only original battery type

WARNING! Danger of Health Impairments!

Before taking the device into service again, make sure that the cause of the failure has been professionally fixed.

11.4 Alarm muting

When during an alarm the alarm mute button is pressed, the acoustical alarm is muted for the preset duration of 120 seconds.

	In the display, the remaining duration for alarm muting is displayed (here 115 seconds). *NOTE!* *A repeated press of the alarm mute button resets the muting counter to 120 seconds.*

12 Maintenance

12.1 Safety

WARNING! Danger of electric current!

Before starting cleaning the unit must be switched off and disconnected from the mains supply.

12.2 General notes

Cleanliness is a prerequisite for the success of an oxygen therapy at home. The specified cleaning intervals must therefore strictly adhered to!

12.2.1 Cleaning

– The unit should be cleaned with a damp (not wet) cloth, so that not fluid can enter.
– You should only use commercial cleansing agents (e.g. washing-up liquid).
– Aggressive cleansers must not be used under any condition!

12.2.2 Disinfecting

– Any commercial disinfectant can be used for disinfecting. An up-to-date list is available from the manufacturer.
– The information for use issued by the disinfectant manufacturer must be strictly complied with..

12.3 Maintenance plan

Maintenance and cleaning work must be performed at regular intervals as specified in the table below.

Interval	Cleaning work
daily	The **humidifier** must be cleaned and disinfected every day.
daily (when used in homes or for nursing care)	Clean the **nasal cannula**.
every 14 days **earlier if necessary**	The **aeroplus m** must be cleaned with a damp cloth and disinfected after.
every 4 weeks	Replace the **coarse dust filter**
every 4 weeks (when used in homes or for nursing care)	Replace the **nasal cannula**.
annually / after 5000 operating hours	Replace the **air intake filter** *NOTE!* *With extremely dirty ambient air the filter must be changed earlier.*
with changing patients	The **aeroplus m** must be cleaned with a damp cloth and disinfected after.
with changing patients	Replace the **humidifier**.
with changing patients	Replace the **nasal cannula**. **WARNING! Health risk!** **In order to avoid cross infection, each user of the aeroplus m should wear his/her own nasal cannula.**
after infections	After an infection a new **nasal cannula** should be used to prevent re-infection.
after service work	The **aeroplus m** must be cleaned with a damp cloth and disinfected after.

Interval	Cleaning work
after service work	**Nasal cannula** should be disposed of and replaced by a new one.
after service work	Replace the **coarse dust filter**
after service work	Replace the internal **air intake filter** (performed by a qualified technician).

Interval	Inspection
annually	Safety inspection

Lifetimes are expected as follows:

article	Expected lifetime
aeroplus m	min. 5 years
Nasal cannula	1 month
Coarse dust filter	1 months with average air pollution

12.4 Maintenance work

Wartungsarbeit	Beschreibung
Cleaning the nasal cannula	**1** Disconnect the hose of the nasal cannula from the aeroplus m. **2** Clean the nasal cannula in warm soapsuds. You may alternatively use a weak acetic solution (10% vinegar, 90% water). **3** Rinse the nasal cannula with lots of clear water. **4** Let the nasal cannula dry in air. The nasal cannula may only be used again for the therapy after it has properly dried.
Replacing the coarse dust filter  	1 Remove the nasal cannula from the aeroplus m. 2 Remove coarse dust filter drawer from the fron oft he aeroplus m: press the latch down and pull out the drawer. 3 Remove the used coarse dust filter. 4 Insert the new filter. 5 Reinstall the drawer. Insert the bottom part first and snap in the top part. **WARNING! USB interface!** **Use only authorized and approved equipment on this interface.**

13 Accessories

ATTENTION!

The intended use of the equipment is only possible when using approved accessories. The use of accessories that have not been designed for use with this unit, can severely affect the performance of the unit.

The following article numbers should be used when ordering:

Article Number	Designation
AEm.00	Instructions for Use aeroplus m
KRO2.07	Nasal Cannula, 2 m
AEm.09	Coarse dust filter (set of 3)
AEm.01	Power adapter
AEm.01.1	Power cord for power adapter, EU plug
AEm.02	Battery
AEm.03	Carrying Case
AEm.06	Caddy
AEm.04	External Charger

14 Appendix

14.1 EMC regulations

14.1.1 Electromagnetic compatibility, interference emission

Regulations and declaration of manufacturer - Electromagnetic compatibility, interference emission		
The aeroplus m is intended for use in an environment as described below. The operator of the aeroplus m must make sure that the unit is operated in such an environment.		
Measurement of interference emission	**Compatibility**	**Electromagnetic environment - regulations**
HF emissions acc. to CISPR 11	Group 1	The aeroplus m uses HF energy solely for its own function. The HF emission is therefore very low and any interference with adjacent electronic equipment is very unlikely.
HF emissions acc. to CISPR 11	Class B	The aeroplus m is intended for use in all facilities, including living quarters and other environments that are connected to the public supply network, which also supplies buildings used for the purpose of living.
Emission of harmonics acc. to IEC 61000-3-2	Class A	
Emission of voltage fluctuations/flickers acc. to IEC 61000-3-3	compatible	

Table 1: Electromagnetic compatibility, interference emission

14.1.2 Electromagnetic compatibility, interference emission

Regulations and declaration of manufacturer - Electromagnetic compatibility, interference emission
The aeroplus m is intended for use in an environment as described below. The operator of the aeroplus must make sure that the unit is operated in such an environment.

Immunity test	IEC 60601 test level	Compatibility level	Electromagnetic environment - regulations
Discharge of static electricity acc. to IEC 61000-4-2	±6 kV contact discharge ±8 kV Air discharge	±6 kV contact discharge ±8 kV Air discharge	Floors should be made of wood or concrete or should be covered with ceramic tiles. If the floor is covered with synthetic materials, the relative humidity must be at least 30%.
fast transient electric interference/bursts acc. to IEC 61000-4-4	±2 kV for mains leads ±1 kV for input/output leads	±2 kV for mains leads ±1 kV for input/output leads	The quality of the supply voltage should match the typical office or hospital environment.
Surge voltages acc. to IEC 61000-4-5	±1 kV Push-pull	±1 kV Push-pull	The quality of the supply voltage should match the typical office or hospital environment.
Voltage dips, short-term interruptions and fluctuations in supply voltage IEC 61000-4-11	< 5 % U_T (>95 % dip in U_T) for ½ period	limited functionality	The quality of the supply voltage should match the typical office or hospital environment. NOTE: U_T is the a.c. supply voltage before application of the test levels
	40 % U_T (60 % dip in U_T) for 5 periods	Mains failure alarm Restart of unit	
	70 % U_T (30 % dip in U_T) for 25 periods	limited functionality	
	<5 % U_T (95 % dip in U_T) for 5 s	Mains failure alarm Restart of unit	
Magnetic field at a supply frequency (50 Hz) acc. to IEC 61000-4-8	3 A/m		Magnetic fields at mains frequency must comply with the typical values found in office or hospital environments.
			Portable and mobile radio equipment should not be used closer to the aeroplus m and the leads, than the safety distance calculated by using the equation applicable for the

Immunity test	IEC 60601 test level	Compatibility level	Electromagnetic environment - regulations
			transmission frequency. Recommended safety distance:
radiated HF interference acc. to IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	d= 1.2 √P for 80 MHz to 800 MHz d= 2.3 √P for 800 MHz to 2.5 GHz

Immunity test	**IEC 60601 test level**	**Compatibility level**	**Electromagnetic environment - regulations**
directed HF interference acc. to IEC 61000-4-6	3 V_{eff} 150 kHz to 80 MHz	3 V_{eff}	d= 1.2 √P with P being the rated power of the transmitter in Watt (W) acc. to the specifications of the transmitter manufacturer and d being the recommended safety distance in metres (m). According to an in-situ examination [a] the field intensity of stationary radio transmitters is with all frequencies lower than the compatibility level [b]. In environments marked with the following symbol interferences are possible: 
NOTE 1 For 80 MHz the higher value is valid. NOTE 2 These regulations may not apply in all situations. The propagation of electromagnetic waves is influenced by the absorption and reflection by building, objects and persons.			
[a] The field intensity of stationary transmitters, such as base stations of radiophones and land mobile services, amateur stations, AM- and FM-radio and television stations can theoretically not be exactly predetermined. In order to determine the electromagnetic environment and the effect of stationary HF transmitters, it is recommend to examine the corresponding location. If the detected field intensity at the location of the aeroplus m exceeds the compatibility level specified above, the aeroplus m must be examined at a different location, with respect to its normal operation. If unusual performance characteristics are detected, it may be necessary to apply additional measures, such as reorientation or relocation of the aeroplus m. [b] Beyond the frequency range from 150 kHz to 80 MHz the field intensity is less than 3 V/m.			

Table 2: Electromagnetic compatibility, interference emission

14.1.3 Recommended safety distances

Recommended safety distances between portable and mobile HF communication equipment and the aeroplus m			
The aeroplus m is intended for operation in an electromagnetic environment with controlled HF interferences. The customer or user of the aeroplus m can help to avoid electromagnetic interferences by maintaining minimum distances between the portable and mobile HF communication equipment (transmitters) and the aeroplus m, according to the maximum output power of the communication equipment, as recommended below .			
Rated power of transmitter W	Safety distance acc. to transmitting frequency m		
	150 kHz to 80 MHz $d=1.2\sqrt{P}$	80 MHz to 800 MHz $d=1.2\sqrt{P}$	800 MHz to 2.5 GHz $d=2.3\sqrt{P}$
0,01	0,12	0,12	0,23
0,1	0,38	0,38	0,73
1	1,2	1,2	2,3
10	3,8	3,8	7,3
100	12	12	23
For transmitters for which the rated power is not contained in the tale above, the distance can be calculated using the equation for the corresponding column, whereby *P* represents the rated power of the transmitter in Watt (W), specified by the transmitter manufacturer. NOTE 1 For calculation of the recommended safety distance for transmitters in the frequency range from 80 MHz to 2.5 GHz an additional factor of 10/3 was used, in order to reduce the likelihood that a mobile/portable communication unit, that has unintentionally been brought near the patient, will trigger an interference. NOTE 2 These regulations may not apply in all situations. The propagation of electromagnetic waves is influenced by the absorption and reflection by building, objects and persons.			

Table 3: Recommended safety distances

15 Symbols

Symbol	Meaning
	Attention, observe notices in the instruction for use.
	Attention, observe notices in the instruction for use.
	Applied part type BF (body floating)
	Class of protection II
IP 21	Degree of protection IP 21, Finger protection and protection against dripping water
CE 0197	Notified Body: TÜV Rheinland LGA
	On-/Off key
	Menu key
	Arrow-up key: increase values; in menu: navigate up
	Arrow-down key: decrease values; in menu: navigate down
	Alarm tone mute key
	No smoking!
	No open flames!

Symbols

Symbol	Meaning
	Do not use any grease or oil!
	Do not remove any covers!
	Do not dispose of into standard household waste!

16 Index