

EMS⁺



AIR-FLOW[®] PREP K1 MAX Operating instructions

Dear customers,

Thank you for buying a new EMS unit. Your AIR-FLOW PREP K1 MAX meets the highest quality and safety standards.

The AIR-FLOW PREP K1 MAX accelerates fine powder particles to a high speed in a stream of air. When the powder particles impact the surface, tooth structure is reduced due to kinetic energy.

The AIR-FLOW PREP K1 MAX was developed for the following indications:

- Cleaning, opening and widening the fissures in preparation for sealing
- Creating micromechanical retention for acid etched/adhesive restorations on enamel and dentine
- Preparing minor carious defects
- Removing deep-rooted discolorations from enamel

Please read this before beginning work!

These operating instructions are intended to help you install, connect and operate your AIR-FLOW PREP K1 MAX properly.

Please read these operating instructions carefully - they explain all the most important details and procedures. Please pay special attention to the safety precautions.

Always keep these instructions close at hand.

To prevent injury to people and damage to property, please heed the relevant warnings and remarks. They are marked as follows:

- o Danger
Where people are at risk
- o Caution
Where property may be damaged and the environment harmed
- o Please note
Useful additional information and hints

We would be pleased to answer your questions or listen to your suggestions about the AIR-FLOW[®] PREP K1 MAX. We do, of course, provide technical support in case of technical problems. Please call our EMS service staff or your dealer. The telephone numbers and addresses of the EMS service staff covering your area are on the last page of these operating instructions.

We wish you lots of success!

EMS

Figure 1:
Front view of an AIR-FLOW PREP K1 MAX

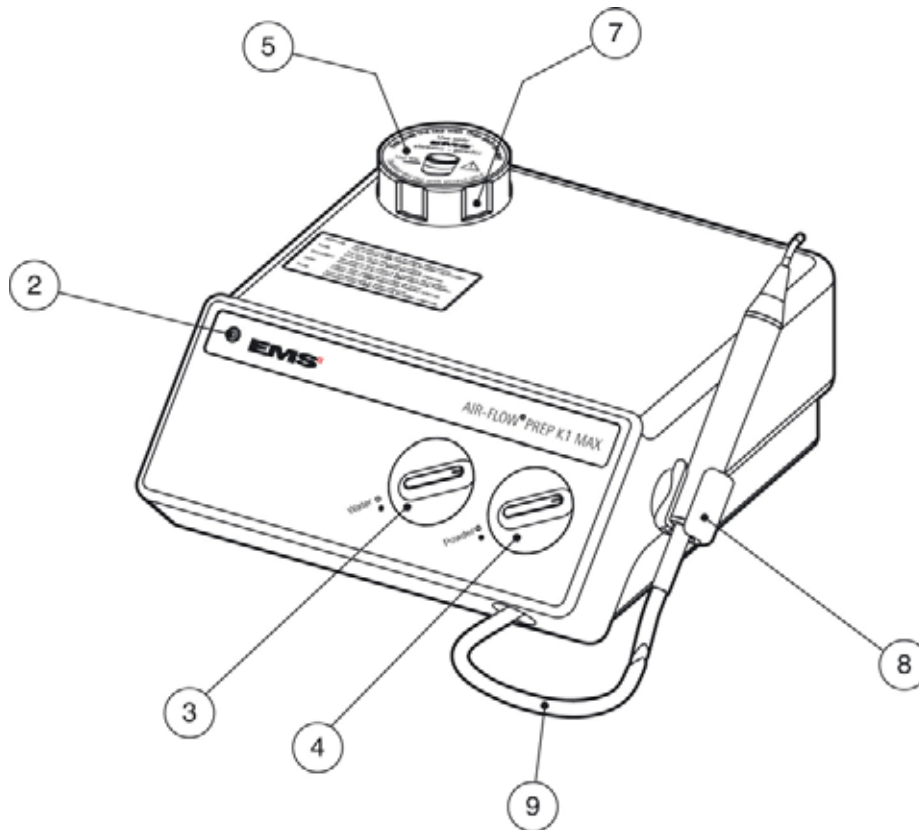
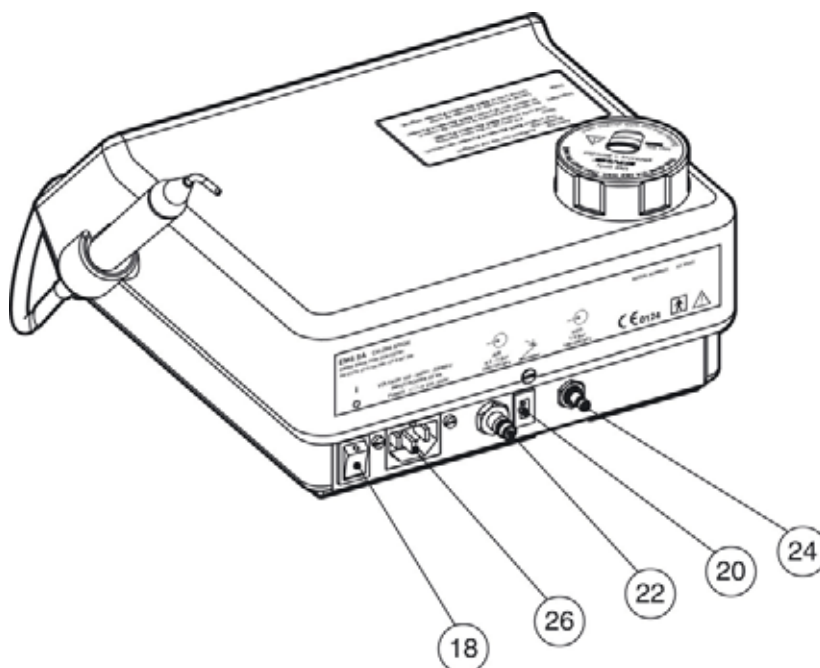


Figure 2:
Rear view of an AIR-FLOW PREP K1 MAX



Technical modifications

EMS reserves the right to modify the technique, accessories, operating instructions or contents of the original AIR-FLOW PREP K1 MAX set due to technical or scientific improvements.

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Safety precautions

Danger - For use by dentists only

As the AIR-FLOW PREP K1 MAX reduces tooth structure, it must only be used by dentists.

Danger - Do not install where there is a risk of explosion

The AIR-FLOW PREP K1 MAX is not intended for operation in areas where there is a risk of explosion.

Please note - Try the AIR-FLOW PREP K1 MAX first

The AIR-FLOW PREP K1 MAX reduces tooth structure. If it is used incorrectly, excessive amounts of tooth structure may be reduced inadvertently. You should try the AIR-FLOW PREP K1 MAX in vitro first.

Danger - This is not a prophylaxis unit

The AIR-FLOW PREP K1 MAX is not a prophylaxis unit. Never aim the powder jet at healthy tooth structure. The AIR-FLOW PREP K1 MAX is very abrasive. It also reduces healthy tooth structure. Do not use the AIR-FLOW PREP K1 MAX for professional prophylaxis, i.e. for removing soft plaque or surface staining.

Caution - Use EMS Abrasive Powder only

When treating patients with an AIR-FLOW PREP K1 MAX, use original EMS Abrasive Powder only. Do not use powder manufactured by other companies or EMS AirFlow Prophylaxis Powder. They would damage the AIR-FLOW PREP K1 MAX or impede its performance.

Danger - Contraindications

Patients suffering from chronic bronchitis or asthma must not be treated as the fine, air/powder spray may cause difficulty breathing. EMS Abrasive Powder may cause allergic reactions in a few exceptional cases. The AIR-FLOW PREP K1 MAX must not be used on patients known to react in this manner.

Danger - Only use sterilized nozzles

When treating patients with an AIR-FLOW PREP K1 MAX, only use sterilized nozzles. As non-sterilized nozzles may be contaminated and cause bacterial or viral infections, you must always sterilize the nozzles after each treatment.

Danger - Disinfect the handpiece hose and housing

Always disinfect the handpiece hose and housing after each treatment. This reduces the risk of infection.

Danger - Wear safety glasses

All persons involved in the treatment must wear safety glasses. Should the powder jet be aimed at the eyes inadvertently, it will injure them seriously.

Please note - No anaesthesia required

Treatment carried out with an AIR-FLOW PREP K1 MAX is generally considered painless. In case of hypersensitivity, anaesthesia may be necessary.

Danger - Use a rubber dam - Risk of irritation, abrasion and embolism

Before commencing treatment with an AIR-FLOW PREP K1 MAX, place a rubber dam in the patient's mouth. Should the powder jet be aimed at the soft tissues inadvertently, it may cause irritation and/or abrasion. In addition, there is a risk of embolism due to air being blown into the circulatory system. The rubber dam also reduces the chances of powder being inhaled.

Please note - Wear a face mask

Inhaling EMS Abrasive Powder may place the operator and dental assistant at risk unnecessarily. We recommend wearing a face mask.

Please note - Use a high volume evacuation

Please use the high volume evacuation on your dental unit during treatment. Please use the high volume evacuation to extract the air/powder mixture which rebounds from the tooth.

Caution - Use disposable mirrors

As EMS Abrasive Powder is highly abrasive, it may damage smooth surfaces. Therefore, it is advisable to use a disposable mirror when treating with an AIR-FLOW PREP K1 MAX.

Please note - Remove powder deposits

Fine powder deposits are best removed with a suction unit. Wiping them away with a cloth may scratch sensitive surfaces. Rinse powder off components which are not sensitive to moisture by holding them under running water.

Danger - The housing only protects against splashing

Please note that the AIR-FLOW PREP K1 MAX housing only protects against splashed water. Only use a small amount of liquid to clean the housing, otherwise you may get an electric shock.

Danger - Never open the unit

You risk electric shock by opening the housing of the AIR-FLOW PREP K1 MAX. Also, important components may be damaged by opening the housing.

Danger - Check that the powder chamber is correctly placed on the device and sufficiently tightened before starting to use the device.

Caution - This product needs special precautions regarding electromagnetic compatibility and needs to be installed and put into service according to the section "Electromagnetic compatibility" provided in this document.

Caution - Certain types of mobile telecommunication equipment could potentially interfere with this product. The separation distances recommended in the section "Electromagnetic compatibility" of this document must be taken into account.

Danger - This product should not be used adjacent to or stacked with other equipment. If adjacent or stacked use is necessary, this product should be observed to verify normal operation in the configuration in which it will be used

Danger - The use of accessories and cables other than those specified or sold by EMS as replacement parts, may result in increased emissions or decreased immunity of this product.

Controls and components of the AIR-FLOW PREP K1 MAX

- 1 Housing
- 2 Green control lamp
- 3 "Water" knob
- 4 "Powder" knob
- 5 Powder chamber
- 6 Red level marking - powder chamber
- 7 Screw-on lid - powder chamber
- 8 Handpiece holder
- 9 Handpiece hose
- 10 Handpiece housing
- 11 Screw cap for tightening the handpiece housing
- 12 Handpiece coupling
- 13 Nozzle
- 14 Steribox
- 15 Nozzle spacer
- 16 Large "O" ring for handpiece coupling
- 17 Small "O" ring for handpiece coupling
- 18 Power switch
- 19 Footswitch
- 20 Footswitch connection
- 21 Compressed air hose (grey/red stripes) with quick-link coupling
- 22 Compressed air hose connector
- 23 Water hose (grey) with quick-link coupling
- 24 Water hose connector
- 25 Power cable
- 26 Power socket
- 27 Cleaning rod
- 28 Nozzle checking rod
- 29 Condensation water collector
- 30 Water filter
- 31 Water filter cartridge
- 32 Tool for replacing the water filter cartridge

Figure 3:
Compressed
air/water hose (21, 23)

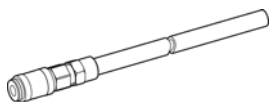


Figure 4:
Footswitch (19)

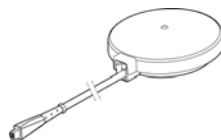


Figure 5:
Power cable (25)



Connecting the AIR-FLOW® PREP K1 MAX

Please note - It is advisable to keep the original packaging of the unit. Keep the packaging for storing or transporting the unit.

The following are required for operating the unit:

- A cold water supply of between 1.0 and 5.0 bars (100 - 500 kPa)
- A compressed air supply of between 4.5 and 7.0 bars (450 - 700 kPa)
- An electrical outlet

You need four quick-link couplings to connect the AIR-FLOW® PREP K1 MAX. The two quick-link couplings for connecting the water hose and compressed air hose to the unit are supplied with the AIR-FLOW® PREP K1 MAX. You require two additional quick-link couplings for connecting the AIR-FLOW® PREP K1 MAX to the water/air supplies in the practice. As various couplings are available for water and air, they cannot be supplied with the unit. Please order them from your dealer.

Begin by removing the two caps from the back of the unit.

Plug the quick-link coupling on the grey water hose (23) onto the connector (24) on the right hand side of the back of the unit. Ensure that the quick-link coupling clicks onto the connector.

Then plug the quick-link coupling on the reddish grey compressed air hose (21) onto the connector (22) at the back of the unit on the left hand side. Ensure that the quick-link coupling clicks onto the connector.

Connect the electric footswitch (19). Insert the plug on the cable into the footswitch socket (20) on the back of the unit.

Use the power cable (25) to connect the unit to the power supply. Plug the power cable (25) into the power socket (26) on the back of the unit and then into a mains power socket.

Figure 6: Shows a dismantled handpiece

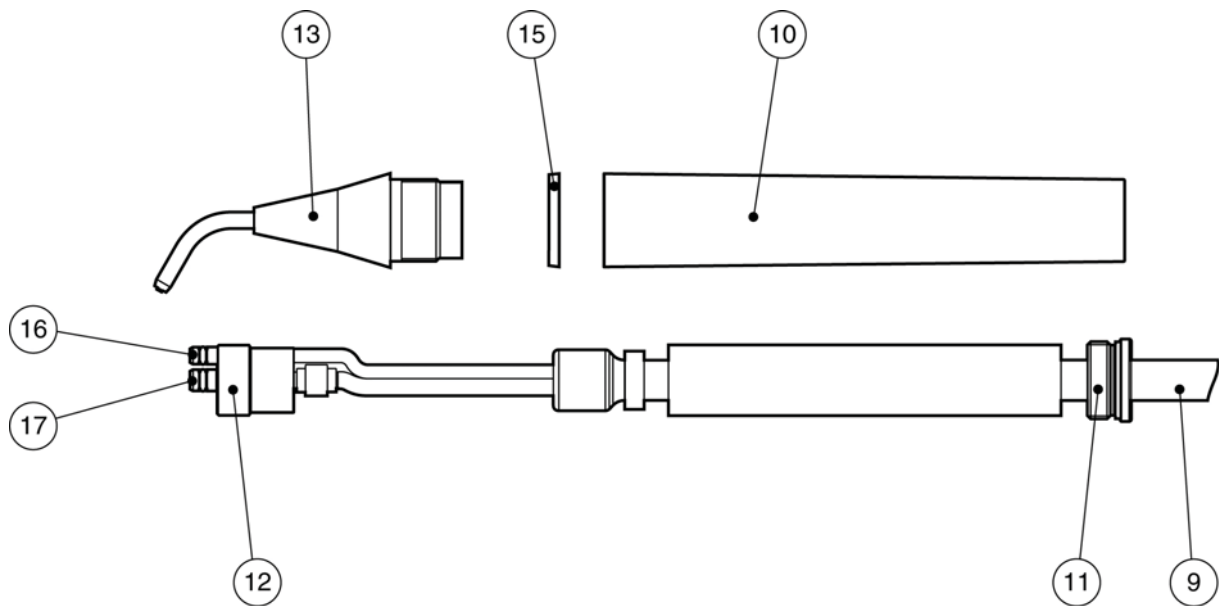
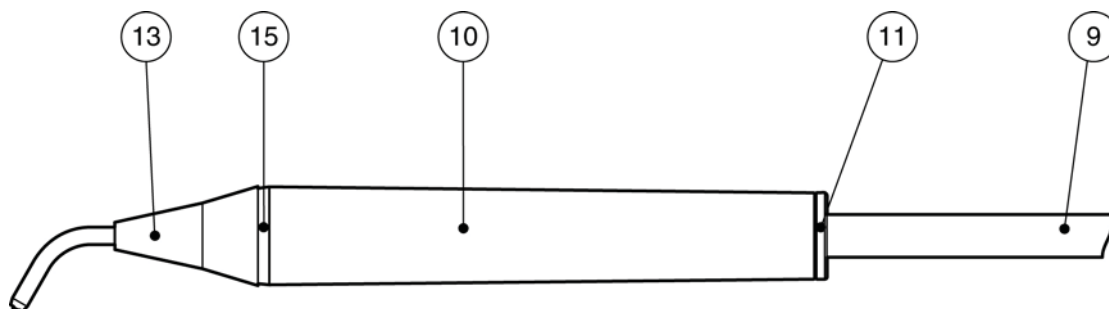


Figure 7: Shows an assembled handpiece



Preparing for treatment

Attaching the nozzle to the handpiece hose

Remove the cap from the handpiece housing (10). Fit a sterilized nozzle (13) to the handpiece. Slide the handpiece housing (10) backwards along the handpiece hose (9). Press the nozzle (13) onto the handpiece coupling (12). Ensure that the two O-rings (16, 17) fit properly as, otherwise, water may leak from the coupling. Slide the handpiece housing (10) until it touches the nozzle (13). Hold the nozzle (13) firmly and screw the handpiece housing (10) onto it. Check that the screw cap (11) is fitted to the handpiece housing (10) properly. If necessary, tighten the screw cap (11) in the handpiece housing (10).

Filling with EMS abrasive powder

Please note - Although the powder chamber never empties completely during treatment, the performance is reduced considerably once less than 10 g of powder remain.

The unit must not be switched on while being filled. Unscrew the lid from the powder chamber (7). Use original EMS Abrasive Powder only. Do not fill the powder chamber (5) above the red marking (6).

Caution - Do not fill the chamber with too much powder. The powder will not be dispensed correctly and the performance will be adversely affected. The air channels of the unit may also become blocked.

Once you have filled the chamber with powder, clean the chamber lid (7) and the two threads with a soft, dry cloth. Screw the lid back onto the unit. Any powder remaining on the smooth sealing surfaces of the thread and lid may permit air/powder to leak out of the powder chamber.

Caution - Ensure that the powder chamber (5) remains completely dry. Otherwise, lumps may form in the powder.

Switch the AIR-FLOW[®] PREP K1 MAX on at the power switch (18). The green control lamp (2) illuminates and you will hear a brief hissing sound for approximately 3 seconds. The pressure required for the treatment builds up in the powder chamber (5) during this period. The AIR-FLOW[®] PREP K1 MAX is now ready for use.

Adjusting the water flow rate and air/powder mixture

Danger - Before adjusting the water flow rate and air/powder mixture, you, your assistant and the patient should put on safety glasses. Keep them on until the treatment has been completed. When the AIR-FLOW[®] PREP K1 MAX is switched off, any remaining powder is automatically cleared out of the air channels with compressed air. Should the powder jet be aimed at the eyes inadvertently, it will injure them seriously.

Danger - Before commencing treatment with an AIR-FLOW[®] PREP K1 MAX, place a rubber dam in the patient's mouth to prevent the jet being aimed at the soft tissues or sulcus inadvertently. Should the powder jet be aimed at the soft tissues inadvertently, it may cause irritation and/or abrasion. In addition, there is a risk of embolism due to air being blown into the circulatory system. The rubber dam also reduces the chances of powder being inhaled.

The footswitch is necessary for adjusting the water flow rate and air/powder mixture. The AIR-FLOW[®] PREP K1 MAX footswitch (19) only has one setting - it activates both the water and air/powder.

Begin by adjusting the water flow rate. Turn the "Powder" knob (4) to its lowest setting ("0"). Remove the handpiece from its holder (8). The handpiece holder includes a safety mechanism which interrupts the water and air/powder supply as long as the handpiece is in the holder. Aim the nozzle at wash basin or cuspidor bowl, approximately 20 cm from it. Begin adjusting with the "Water" knob (3) at its lowest setting. Activate the footswitch (19). Adjust the water flow rate so that the water spray is uniform and round. This setting ensures that the water spray envelopes the air/powder mixture optimally and reduces the amount of dust.

To treat the patient, you must adjust the air/powder flow rate as required for the treatment. The "Powder" knob (4) regulates the amount and speed of the powder particles, and therefore the reducing power, indirectly via the air supply. The higher the air flow rate, the more air/powder mixture exits the nozzle (13). You can adjust the amount of air/powder mixture progressively from the lowest setting, via the low and medium settings, up to the highest setting. Adjust the air/powder mixture according to the tooth structure being treated and the type of treatment.

Treating with an AIR-FLOW[®] PREP K1 MAX

Caution - Use a disposable mirror when treating patients with an AIR-FLOW[®] PREP K1 MAX. The Abrasive Powder may damage standard mirrors.

Please note - Extract the powder with a high volume evacuator. Both the dentist and assistant should wear face masks.

Please note - Anaesthesia is usually not required for treatment carried out with an AIR-FLOW[®] PREP K1 MAX as it is generally considered painless. In case of hypersensitivity, anaesthesia may be necessary.

While carrying out the treatment, hold the nozzle (13) perpendicular to the tooth surface with its tip approximately 1 mm from it. Press the footswitch (19) and pass the tip of the nozzle over the tooth surface. The powder jet creates a cavity in the direction of the jet. Interrupt the treatment regularly to check your work.

The AIR-FLOW[®] PREP K1 MAX handpiece and ejector should always be operated by the same person. This ensures that the ejector and nozzle are coordinated properly.

Once the treatment has been completed, aim the nozzle at a wash basin or cuspidor bowl approximately 20 cm from it. Then switch the unit off. When the unit is switched off, a stream of air automatically blasts the remaining powder completely out of the air channels of the AIR-FLOW[®] PREP K1 MAX. Replace the handpiece in the handpiece holder (8). The unit can then be prepared for treating the next patient.

Once the rubber dam has been removed, the patient should rinse his/her mouth thoroughly with water.

Cleaning, sterilizing and servicing

After every treatment session

The air channels of the AIR-FLOW® PREP K1 MAX are cleaned automatically when the unit is switched off. Once the AIR-FLOW® PREP K1 MAX has been switched off and air has escaped from its nozzle, it has been cleaned properly.

Sterilize the nozzle (13) after every treatment.

Disinfect and clean the nozzle (13) before sterilizing it. To do so, dismantle the handpiece. Unscrew the handpiece housing (10) from the nozzle (13) and slide the housing (10) backwards along the handpiece hose (9). Pull the nozzle (13) off the handpiece coupling (12). Hold the coupling firmly. Do not pull on the handpiece hose (9). Use a commercially available disinfectant. Then clean the nozzle (13) with a soft cloth. Place the nozzle (13) in its holder in the Steribox (14) supplied.

Autoclave the nozzle (13) for approximately 3 minutes at a maximum temperature of 135°C.

Before fitting the handpiece again, clean the threads on the handpiece coupling (12) and nozzle (13) as well as both O-rings (16, 17) with a soft cloth. Any remains of powder may jam the thread or damage the O-rings.

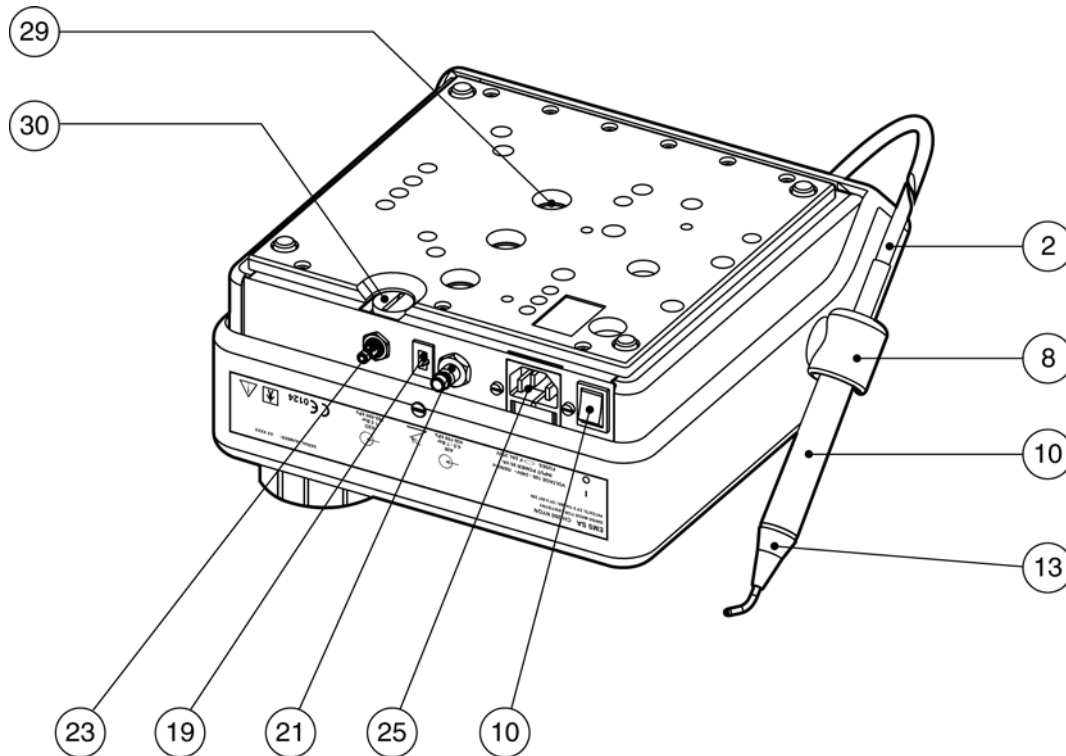
Please disinfect the handpiece housing (10) and handpiece hose (9) with standard disinfectant. In addition, the handpiece housing (10) can be autoclaved at up to 135°C. To do so, loosen the screw cap (11) from the handpiece housing (10) and pull it off the handpiece hose (9). Place the handpiece housing (10) in its holder in the Steribox (14) for sterilizing. After sterilization, slide the handpiece housing (10) - with its smallest diameter first - back onto the handpiece hose (9) and screw the screw cap (11) onto the handpiece housing (10) again.

Regular care and maintenance

Disinfect the AIR-FLOW® PREP K1 MAX housing with standard disinfectant. Do not use scouring powder as it will scratch the surface of the housing.

Danger - Please note that the housing of the AIR-FLOW® PREP K1 MAX only protects against splashed water.

Figure 8:
 The base plate of the AIR-FLOW® PREP K1 MAX



The water must be drained from the condensation water collector (29) once per week. To do so, switch the unit on and press the first button which can be felt on the bottom of the unit. You will feel and hear the compressed air escaping. Hold the button in until the water (a few drops) has been forced out of the condensation water collector (29).

The screw cap of the water filter (30), which allows access to the integral water filter cartridge (31), is on the bottom of the unit. Clean the filter cartridge monthly. To do so, unplug the unit from the power supply and pull the quick-link coupling off the back of the unit to disconnect the water supply. Use a coin or screwdriver to unscrew the cap of the water filter (30) and drain the water. Unscrew the water filter cartridge (31) with the tool (32) supplied. Clean the water filter cartridge (31) under running water and by blasting it with compressed air. Tenacious dirt can be removed by immersing the water filter cartridge (31) in an ultrasonic cleaner. Only use ultrasonic cleaning liquids suitable for brass. Should this still not clean the water filter cartridge (31) properly, replace it with a new one. Reconnect the water filter cartridge (31) and check that the screw cap (30) seals properly.

All materials which contact EMS Abrasive Powder were selected specifically for this purpose. In spite of this, components such as the nozzle (13) which are subjected to extreme stress do not have an unlimited service life. In time, the powder jet widens the diameter of the nozzle opening. Therefore, the diameter should be checked regularly after every 10 treatment sessions.

A nozzle checking rod (28) is included with the unit for checking the diameter. Insert the tapering rod (28) into the opening of nozzle (13). If the rod can be inserted into the opening completely, the nozzle (13) is worn out and must not be used again. A worn nozzle (13) cannot be used for working precisely. There is a risk that you will reduce more tooth structure than necessary during the treatment. Therefore, once the nozzle checking rod (28) can be inserted into the nozzle opening fully, replace the nozzle (13).

There are two O-rings (16, 17) on the handpiece coupling (12) between the nozzle (13) and handpiece hose (9). If the O-rings are damaged or worn, water may leak from the coupling. Should this occur, replace both O-rings.

In rare cases, powder particles may block the air channels in the nozzle (13). Use the cleaning rod (27) to unblock them. Insert the cleaning rod (27) carefully into the openings in the nozzle (13), turning it alternately. Do not use force as this may break the cleaning rod (27). Repeat the procedure until the nozzle has been unblocked completely. Use the cleaning rod (27) only - do not use wire or other objects.

EMS service

Should your AIR-FLOW[®] PREP K1 MAX need servicing or repairing, please send it to your dealer or our EMS service staff. The telephone numbers and addresses of the EMS service staff covering your area are on the last page of these operating instructions.

The EMS service staff are committed to servicing and repairing your equipment as quickly as possible.

Only have your AIR-FLOW[®] PREP K1 MAX repaired by EMS or someone authorized by EMS. Only use original EMS spare parts and accessories. Should the unit be opened without authorization or damaged due to non-adherence to the operating instructions, EMS accepts no liability whatsoever. This will void the guarantee.

Please note - Apart from the regular maintenance checks which you have to carry out, this unit should be serviced once per year by EMS. This will ensure that your AIR-FLOW[®] PREP K1 MAX functions properly. Send your AIR-FLOW[®] PREP K1 MAX and all the accessories directly to the EMS service department. If you complete the enclosed guarantee card and return it to EMS, we will remind you when your unit is due for servicing.

Please note: It is best to ship your AIR-FLOW[®] PREP K1 MAX in the original packaging. It protects your AIR-FLOW[®] PREP K1 MAX against damage during shipping. Before dispatching your AIR-FLOW[®] PREP K1 MAX, please clean and disinfect it and sterilize the AirFlow nozzles as described in the instructions. When sending your AIR-FLOW[®] PREP K1 MAX directly to the EMS service department, please include the name and address of your dental dealer. This simplifies processing for us.

Ordering EMS Abrasive Powder

Please use original EMS Abrasive Powder in your AIR-FLOW[®] PREP K1 MAX only. Otherwise, EMS cannot guarantee the AIR-FLOW[®] PREP K1 MAX. You can order the powder from your dental dealer.

Storing the AIR-FLOW[®] PREP K1 MAX when out of use for extended periods

Should you wish to put your AIR-FLOW[®] PREP K1 MAX out of use for an extended period of time, please observe the following recommendations:

- disconnect all hoses and cables from the unit,
- remove any remains of powder from the powder chamber,
- drain the condensation water from the condensation water collector,
- drain the water remaining in the water filter,
- disinfect and clean the housing and handpiece hose,
- disinfect, clean and sterilize the nozzles and handpiece housing,
- pack the AIR-FLOW[®] PREP K1 MAX and all accessories in the original packaging.

This will ensure that, even after being stored for some time, your AIR-FLOW[®] PREP K1 MAX will still function properly.

Please refer to the storage and transport conditions in the "Technical Data" section on page 19.

Disposing of the AIR-FLOW[®] PREP K1 MAX, accessories and packaging

Keep the original packaging until the AIR-FLOW[®] PREP K1 MAX is to be disposed of permanently. You can use it for shipping or storing your AIR-FLOW[®] PREP K1 MAX.

Should you wish to dispose of your AIR-FLOW[®] PREP K1 MAX, please comply with the regulations for disposing of the AIR-FLOW[®] PREP K1 MAX, accessories and packaging which apply in your country.

Contents of the original package

- 1 AIR-FLOW[®] PREP K1 MAX with handpiece hose
- 2 Handpiece housings
- 2 Nozzles
- 1 Footswitch
- 1 Steribox
- 1 250 g bottle EMS abrasive powder
- 1 Cleaning rod
- 1 Nozzle checking rod
- 1 Set of spare O-rings for the handpiece coupling
- 1 Tool for replacing the water filter cartridge
- 1 Power cable
- 1 Compressed air hose (grey/red) with quick-link coupling
- 1 Water hose (grey) with quick-link coupling
- 1 Operating instructions
- 1 Guarantee card

Technical data

Manufacturer:	EMS SA, CH-1260 Nyon, Switzerland
Model:	AIR-FLOW [®] PREP K1 MAX
Classification:	EN 60601-1: - Class I - IP 20 93/42 EU: - Class IIa
Mode:	Continuous operation
Supply voltage:	100 - 240 V ~
Mains frequency:	50 / 60 Hz
Nominal power ratings:	100 V AC: 66 VA 110 V AC: 67 VA 220 V AC: 82 VA 230 V AC: 83 VA 240 V AC: 84 VA
Fuses:	F 2AL 250V Ø 5 x 20 mm
Compressed air supply:	4.5 - 7.0 bars (450 - 700 kPa)
Water supply:	Cold water 1.0 - 5.0 bars (100 - 500 kPa)
Weight:	Approximately 3.4 kg
Dimensions:	Height: 120 mm Width: 250 mm Length: 250 mm
Operating conditions:	+10°C - +40°C, 30% - 75% relative humidity 700 hPa - 1060 hPa air pressure
Storage and transport conditions:	-10°C - +40°C, 10% - 90% relative humidity, 700 hPa - 1060 hPa air pressure









Symbols

Front panel

"Water" and "Powder" knob settings

-  Minimum
-  Maximum

Symbols on the rear panel

-  Power switch "ON"
-  Power switch "OFF"
-  Caution! Read the operating instructions
-  Complies with EN 60601-1
-  Compressed air coupling
Water coupling
-  Footswitch connection
-  Fuse
-  EU symbol
Refers to EU directive 93/42 EU
Including EN 60601-1 and EN 60601-1-2

Marking on footswitch

- PX1 Degree of protection against water permeability

Text on the top of the unit:

Caution - Only fill to the coloured marking.
Use original EMS Abrasive Powder only!

Electromagnetic compatibility

Electromagnetic emissions

The AIR-FLOW® PREP K1 MAX is intended for use in the electromagnetic environment specified below. The customer or the user of the AIR-FLOW® PREP K1 MAX should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The AIR-FLOW® PREP K1 MAX uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The AIR-FLOW® PREP K1 MAX is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ Flicker emissions IEC 61000-3-3	Complies	

Electromagnetic immunity


The AIR-FLOW® PREP K1 MAX is intended for use in the electromagnetic environment specified below. The customer or the user of the AIR-FLOW® PREP K1 MAX should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines	±2 kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ± 2 kV common mode	±1 kV differential mode ± 2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % U_T (>95 % dip in U_T) for 0.5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles <5 % U_T (>95 % dip in U_T) for 5 sec	<5 % U_T (>95 % dip in U_T) for 0.5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles <5 % U_T (>95 % dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the AIR-FLOW® PREP K1 MAX requires continued operation during power mains interruptions, it is recommended that the AIR-FLOW® PREP K1 MAX be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

NOTE: U_T is the a.c. mains voltage prior to application of the test level.

Electromagnetic immunity, RF portable equipment

The AIR-FLOW® PREP K1 MAX is intended for use in the electromagnetic environment specified below. The customer or the user of the AIR-FLOW® PREP K1 MAX should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Portable and mobile RF communications equipment should be used no closer to any part of the AIR-FLOW® PREP K1 MAX, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.			
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	Recommended separation distance $d = 1.2 \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	20 V/m	$d = 0.2 \sqrt{P}$ 80 MHz to 800 MHz $d = 0.4 \sqrt{P}$ 800 MHz to 2.5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m).
Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, ^a should be less than the compliance level in each frequency range. ^b			
Interference may occur in the vicinity of equipment marked with the following symbol: 			

NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

^a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the AIR-FLOW® PREP K1 MAX is used exceeds the applicable RF compliance level above, the AIR-FLOW® PREP K1 MAX should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the AIR-FLOW® PREP K1 MAX.

^b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended separation distances

The AIR-FLOW® PREP K1 MAX is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the AIR-FLOW® PREP K1 MAX can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the AIR-FLOW® PREP K1 MAX as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter		
	150 kHz to 80 MHz $d = 1.2 \sqrt{P}$	80 MHz to 800 MHz $d = 0.2 \sqrt{P}$	800 MHz to 2.5 GHz $d = 0.4 \sqrt{P}$
0.01	0.12 m	0.02 m	0.04 m
0.1	0.38 m	0.06 m	0.13 m
1	1.2 m	0.2 m	0.4 m
10	3.8 m	0.63 m	1.3 m
100	12 m	2 m	4 m

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Cables length

Cables and accessories	Maximum length	Complies with
Footswitch	3 m	RF emissions, CISPR 11, Class B/Group 1 Harmonic emissions, IEC 61000-3-2 Voltage fluctuations/flicker emission, IEC 61000-3-3 Electrostatic discharge (ESD), IEC 61000-4-2 Electric fast transient/burst, IEC 61000-4-4 Surge, IEC 61000-4-5 Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11 Power frequency (50/60 Hz) magnetic field IEC 61000-4-8 Conducted RF IEC 61000-4-6 Radiated RF, IEC 61000-4-3

Troubleshooting

Type of fault	Possible cause	Remedy
No power (green control lamp (2) is not on)	Power switch (18) switched OFF	Switch power switch (18) ON
	Mains plug either not plugged in or defective	Check the mains plug
	Mains socket not live	Check the power supply in the practice
	Defective fuse	Send the unit to the EMS service department
	Electrical fault	Send the unit to the EMS service department
No air when the footswitch is activated	Power switch (18) switched OFF	Switch power switch (18) ON
	Compressed air hose quick-link coupling not pressed onto the back of the unit properly	Check that the quick-link coupling is connected properly
	Compressed air supply is not pressurized	Check the compressed air supply
	Footswitch (19) is not connected properly	Check the footswitch coupling
	The powder circulation system is blocked	Clean and dry powder chamber (5) and nozzle (13)
	Pneumatics controller or footswitch defective	Send the unit to the EMS service department
No spray	"Water" knob (3) set to minimum	Turn "Water" knob (3) up
	Water hose quick-link coupling not connected properly to the back of the unit	Check that the quick-link coupling is connected properly
	Water hose is not pressurized	Check water supply
	Nozzle (13) blocked	Clean nozzle (13)
	Water filter cartridge (31) blocked	Clean water filter cartridge (31)
	Water circulation system defective	Send the unit to the EMS service department

Type of fault	Possible cause	Remedy
Air or water leak out of the nozzle continually without the footswitch being activated	Fault in the pneumatic or water circulation system	Send the unit to the EMS service department
Inadequate reduction of tooth structure	Inadequate compressed air supply	Check the pressure of the compressed air supply
	Powder chamber (5) empty or almost empty	Fill with powder
	Powder chamber (5) overfilled	Remove excess powder
	Powder circulation system blocked or the powder is moist	Clean and dry powder chamber (5) and nozzle (13)
	Fault in the pneumatic system	Send the unit to the EMS service department
Air or water escapes from the handpiece coupling (12)	Nozzle (13) and handpiece hose (9) are not properly connected to handpiece coupling (12)	Check the coupling
	The O-rings (16,17) are missing or defective	Fit new O-rings (16,17)
Air escapes from the thread of the powder chamber lid (7)	Powder in the thread or on the seal	Clean the powder off the threads and seal
	The seal does not fit properly, is defective or missing	Order a new powder chamber lid (7) from EMS
Water or air escapes elsewhere	Fault in the pneumatic or water circulation system	Send the unit to the EMS service department

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