Instructions for use
ELECTROtorque plus 4892
as of software version V4.0

Always be on the safe side.

KaVo. Dental Excellence.

KaVo Dental Corporation
11729 Fruehauf Drive
Charlotte, NC 28273 USA
Toll Free: 800 323 8029
Direct Customer Service 1-888-ASK-KAVO
888-275-5286
www.kavousa.com

Manufacturer:
Kaltenbach & Voigt GmbH
Bismarckring 39
D-88400 Biberach
www.kavo.com

CE 0124

Table of contents

1 User instructions

1.1 User guide

Requirement
Read these instructions prior to first use to avoid misuse and prevent damage.

Requirement
If other language versions are required, they can be requested from the corresponding KaVo branch. Prior approval from KaVo must be obtained before copying and passing on the Instructions for Use.

1.1.1 Abbreviations

Abbreviation	Explanation
IfU	Instructions for Use
CI	Care instructions
AI	Assembly instructions
TI	Technician's instructions
SC	Safety checks
IEC	International Electrotechnical Commission
RI	Repair instructions
EMC	Electromagnetic compatibility
PI	Processing instructions

1.1.2 Symbols

	See the Safety/Warning Symbols section
	Important information for users and technicians
CE	CE mark (European Community). A product bearing this mark meets the requirements of the applicable EU directive.
▶	Action required

1.1.3 Target group

This document is for dentists and dental office staff.

1.2 Service

Please direct all questions regarding the product, service, and maintenance to the following addresses.
Please refer to the serial number of the product in all requests!

KaVo Dental Corporation
11729 Fruehauf Drive
Charlotte, NC 28273 USA
Toll Free: 800 323 8029
Direct Customer Service 1-888-ASK-KAVO 888-275-5286
www.kavousa.com

1.3 Warranty terms and conditions

Within the scope of the applicable KaVo delivery and payment conditions, KaVo guarantees proper function, absence of defects in material and workmanship for a period of 12 months from the date of purchase as confirmed by the salesperson. In case of justified complaints, KaVo will honour its warranty with a free replacement or repair.
The warranty does not cover defects and their consequences that arose or may have arisen due to natural wear, improper handling, cleaning or maintenance, non-compliance with operating, maintenance or connection instructions, corrosion, contaminated media supply or chemical or electrical influences deemed abnormal or impermissible in accordance with factory specifications.
The warranty does not usually cover lamps, light conductors made of glass and glass fibres, glassware, rubber parts and the colourfastness of plastic parts.
The warranty expires if defects or their consequences could possibly have arisen because the product has been modified or changed. Warranty claims can only be asserted when they are immediately reported to KaVo in writing.
This notification must be accompanied by a copy of the invoice or delivery note on which the manufacturing number is clearly visible. In addition to the guaranty, the statutory warranty claims of the purchaser also apply with a warranty period of 12 months.

1.4 Transportation and storage

1.4.1 Damage in transit

Outside Germany

Note

KaVo is not liable for damage arising from transportation.
Immediately inspect the delivery after receipt!

If the packaging is visibly damaged on delivery, please proceed as follows:
1. The recipient of the package must record the loss or damage on the delivery receipt. The recipient and the representative of the shipping company must sign this delivery receipt.
   Without this evidence, the recipient will not be able to assert a claim for damages against the shipping company.
2. Leave the product and packaging in the condition in which you received it.
3. Do not use the product.

If the product is damaged but there was no discernable damage to the packaging upon delivery, proceed as follows:
1. Report any damage to the shipping company either immediately or no later than 7 days after delivery.
2. Leave the product and packaging in the condition in which you received it.
3. Do not use a damaged product.

Note

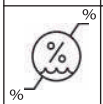
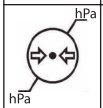
Failure on the part of the recipient to comply with one of the above obligations will mean that the damage will be considered to have arisen following delivery (in accordance with CMR law, Chapter 5, Art. 30).

1.4.2 Information on the packaging: Storage and transportation

Note

Please keep the packaging in case you need to return the product for servicing or repair.

The symbols printed on the outside are for transportation and storage, and have the following meaning:

	Transport upright with the arrows pointing upwards!
	Fragile - protect against impact!
	Protect from moisture!
	Permissible stacking load
	Temperature range
	Humidity
	Air pressure

2 Safety

2.1 Description of safety instructions

2.1.1 Warning symbol

	Warning symbol

2.1.2 Description of hazard levels

Safety instructions with three hazard levels are used in this document to prevent personal and property damage.

	⚠ CAUTION CAUTION indicates a hazardous situation that can cause damage to property or mild to moderate injuries.

	⚠ WARNING WARNING indicates a hazardous situation that can cause death or serious injury.

	⚠ DANGER DANGER indicates a hazardous situation that can directly cause death or serious injury.

2.1.3 Structure

	⚠ DANGER **The introduction describes the type and source of the hazard.** This section describes the potential consequences of non-observance. ▶ The optional step includes necessary measures for hazard prevention.

2.2 Purpose – Proper use

2.2.1 General

The ELECTROtorque is intended to convert pneumatic output from a dental treatment center to electrical energy to drive a dental motor for operation of electrically driven dental handpieces. These devices are designed for use by a trained professional in the field of general dentistry.

The overarching guidelines and/or national laws, national regulations and the rules of technology applicable to medical devices for start-up and use of the KaVo product for the intended purpose must be applied and followed.

Definition (purpose)	Explanation
Primary function	Dental preparation
Application	For dental treatment of humans
Specification of the primary function	Mains-dependent accessory device for the dentist unit
Duration of use	Approximately 30 - 40 minutes with individual pauses daily

This KaVo product is intended for use in dentistry only. Any other type of use is not permitted.
"Proper use" includes compliance with all instructions for use and the inspection and maintenance intervals.

The user must ensure that the unit works properly and is in satisfactory condition before each use.

It is a responsibility of the user:
- to use properly working equipment only.
- to protect him- or herself, the patient, and third parties from hazards.
- to use the equipment for the proper purpose.
- to avoid contamination by the product.
- to avoid using damaged functional parts.

The following individuals are authorised to repair and service the KaVo product:
- service technicians of KaVo branches after appropriate product training.
- technicians of KaVo franchised dealers specifically trained by KaVo.

Note

It is obligatory to use original KaVo replacement parts for operation and repair only.
After servicing, interventions, and repairs of the device, the device must be tested according to IEC 62353 - VDE 0751-1 before re-use.

The applicable national legal regulations must be observed during the use of the device, in particular:
- the applicable occupational health and safety regulations.
- the applicable accident prevention regulations.

⚠ CAUTION

Improper service and care.
Wear, malfunctions, and reduced product service life.
- ▸ Perform proper service and care regularly.

Note

The product must be cleaned and serviced according to instructions if it is not to be used for an extended period of time.

KaVo does not accept responsibility for damage caused by:
- External influences, poor media quality or faulty installation.
- The use of incorrect information.
- Repair work carried out incorrectly.

Information about electromagnetic compatibility

The interfering radiation and immunity test levels required in IEC 60601 are met.

Note

Based on EN 60601-1-2 concerning the electromagnetic compatibility of electromedical devices, we need to point out that:
• Medical electrical devices are subject to special precautionary measures regarding electromagnetic compatibility and must be commissioned in accordance with the KaVo assembly instructions.
• portable and mobile high-frequency communications devices may interfere with electrical medical devices.

⚠ CAUTION

Damage from unsuitable accessories.
The use of accessories, other components, and cables other than those specified (with the exception of components and cables sold by KaVo as replacement parts for internal components) can increase emissions or reduce the electromagnetic immunity of the product.

▸ Use accessories recommended by KaVo only!

Note

KaVo cannot guarantee the compliance of accessories, enclosed cables, and other components not supplied by KaVo with EMC requirements of EN 60601-1-2.

Disposal

Note

Any waste which is generated must be recycled or disposed of in a manner which is safe both for people and for the environment. This must be done in strict compliance with all applicable national regulations.
Questions on proper disposal of the KaVo product can be answered by the KaVo branch.

Disposal of electronic and electrical devices

Note

According to EC directive 2002/96 concerning used electrical and electronic devices, this product is subject to the cited directive and must be disposed of accordingly within Europe.
For more information, please contact KaVo (www.kavo.com) or your dental supplier.

For final disposal, contact:

Germany

To return an electrical device, proceed as follows:

1. At the homepage www.enretec.de of enretec GmbH, you can download a form for a disposal request under the menu item eom, or you can use it as an online request.
2. Fill out the request with the corresponding information, and send it as an online request or by fax (+49(0)3304 3919 590) to enretec GmbH.
   The following avenues are also available for questions and for initiating a disposal request:
   Telephone: +49 (0) 3304 3919 500
   E-mail: pickup@eomRECYCLING.com and
   Post: enretec GmbH, eomRECYCLING Department
   Kanalstraße 17
   16727 Velten
3. Your**movable**device will be picked up in your practice, and your**permanently installed**unit will be picked up at the curb at your address on the agreed deadline.
   The owner or user of the device will bear the costs for disassembly, transportation and packaging.

International (EU)

For country-specific information on disposal, contact your dental supplier.

2.3 Safety instructions

2.3.1 General

KaVo recommends the sole use of **original KaVo parts®** for operation and repairs as these have been tested extensively for safety, functioning and specific suitability.

⚠ DANGER

Explosion hazard.
Risk of fatal injury.

- Do not use KaVo product in areas subject an explosion hazard.

⚠ WARNING

Injury or damage from damaged functional parts.
If functional parts are damaged, it can cause additional damage or personal injury.

- If functional parts are damaged: discontinue your work and repair the damage nor notify service technician!
- Check the electrode lines and accessories for damage to the insulation.

⚠ CAUTION

Improper product maintenance or repair.
Damage to product.

- Repair and servicing work on the electronic part of the unit may be done only by skilled staff or by technicians trained by KaVo.
- Only use original KaVo spare parts!

⚠ CAUTION

Damage by liquids.
Faults on electric components.

- Protect openings of the product from any ingress of liquids.
- Have a service technician remove liquids from the interior of the device.

⚠ CAUTION

Premature wear and malfunctions from improper servicing and care.
Reduced product life.

- Perform regular proper care and maintenance!

⚠ CAUTION

Malfunctions due to electromagnetic fields.
The product meets the applicable requirements regarding electromagnetic fields. Given the complex interactions between equipment and cell phones, the product may be influenced by a cell phone that is in use.

- Do not use cell phones in medical offices, hospitals or laboratories!
- Put electronic devices such as e.g. computer storage media, hearing aids etc. down during operation!

⚠ CAUTION

Damaged mains cable / missing protective conductor.
Electrical shock.

- Check the mains cable before use. The socket outlet must have a protective contact and meet the respective national guidelines.
- Always plug the mains cable into the socket on the device before establishing contact to the mains supply.

⚠ CAUTION

Damage to the handpiece hoses from stickers.
Handpiece hoses can burst.

- Do not affix stickers or adhesive tape.

⚠ CAUTION

Inadvertent penetration of liquids.
Electrical shock.

- Do not immerse the product in a tub-like container.
- Check and ensure the absence of leakage from the coolant containers and lines. If any liquid is detected on the device, do not touch the device and disconnect the device from the mains supply without delay. Make sure that the surface of the device is completely dry before plugging the main plug back in the socket.

⚠ CAUTION

Risks from electromagnetic fields.
Electromagnetic fields might interfere with the functions of implanted systems (such as pacemakers).

- Check with your patients before treatment.
- Evaluate the risks and benefits.
- Do not situate motors close to the systems.
- Take suitable emergency precautions and immediately respond to any changes in health.
- Symptoms such as elevated heart beat, irregular pulse, and dizziness may be signs of pacemaker problems.

Note

To completely disconnect the device from the mains, the power plug must be pulled.

Note

The SAFEdrive function is a monitoring function for detection of defective straight and contra-angle handpieces. These can heat up strongly due to additional friction and possibly cause burn injuries. KaVo recommends to activate the SAFEdrive function during treatments inside the oral cavity in order to reduce the risk of burn injuries caused by defective straight and contra-angle handpieces.

2.3.2 Product-specific

⚠ CAUTION

Improper use of handpieces.
Improper use can cause personal injury.

- Follow the instructions for use for the dental handpiece.

⚠ CAUTION

Hazard from the use of handpieces equipped with electronic micromotors.
Electronic micromotors generate much more energy than conventional pneumatic turbines and motors. Given the higher torque and speed, handpieces that are poorly serviced, damaged or used improperly can overheat which can cause serious burn injuries to the patient.

- Observe the following points.

⚠ CAUTION

Eye hazard from blue light
The light of the KL motors with MINI LED / Multi-LED may damage the cornea and the lens of the eye.

- ▸ Do not look into the lamp when it is in operation.
- ▸ Use adequate shielding or eye protection.

The following guidelines must be observed to ensure safe use of the electrically-driven handpieces:

- Check the speed setting each time before you turn on the unit.
- Comply with the permissible maximal speed and maximal tool pressure values specified by the tool manufacturer.
- Make sure that the tools are firmly seated.
- Before each treatment, insert a dental dam for safety reasons.
- Strict compliance with the service instructions of handpieces is required when using KAVOspray or QUATTROcare care systems.
- Before each use, the handpiece must be checked for external damage.
- Perform a test run with the handpiece. During the test run, check for uncharacteristic heating, conspicuous noise, and vibrations.
- Immediately stop using handpieces that act unusual.
- Never press the push-button during operation of the device. This also includes lifting the cheek or tongue!

To ensure proper function, the medical device must be set up according to the reprocessing methods described in the KaVo Instructions for Use, and the care products and care systems described therein must be used. KaVo recommends specifying a service interval at the dental office for a licensed shop to clean, service and check the functioning of the medical device. This service interval depends on the frequency of use and should be adjusted accordingly.
Service may only be carried out by KaVo-trained repair shops using original KaVo replacement parts.

Operating mode

⚠ CAUTION

Torque too high.
Injuries or harm of instruments.

- ▸ Instruments for root canal treatments should only be used in the ENDO mode.

Note

The **ELECTROtorque plus 4892** is proven at standardised test conditions with a duty cycle of 30 seconds operating time / 9 minutes pause (full load at maximal speed) according to IEC 60601-1 for handpieces and motors in good condition.

Note

In practice, pulse loads lasting seconds or pause times lasting seconds or minutes are realistic, usually without reaching the maximal possible motor current. This corresponds to the common working procedure of a dentist.

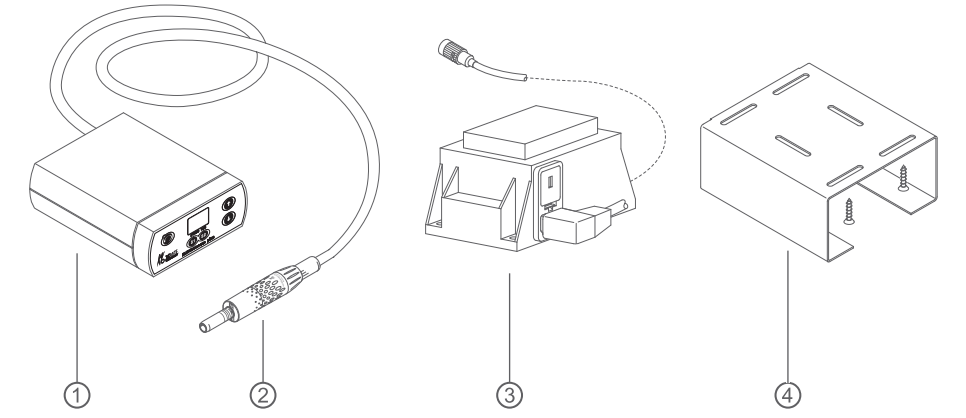
Note

In case of defective handpieces, the operation time could be less than 30 seconds due to the SAFEdrive feature.

3 Product description

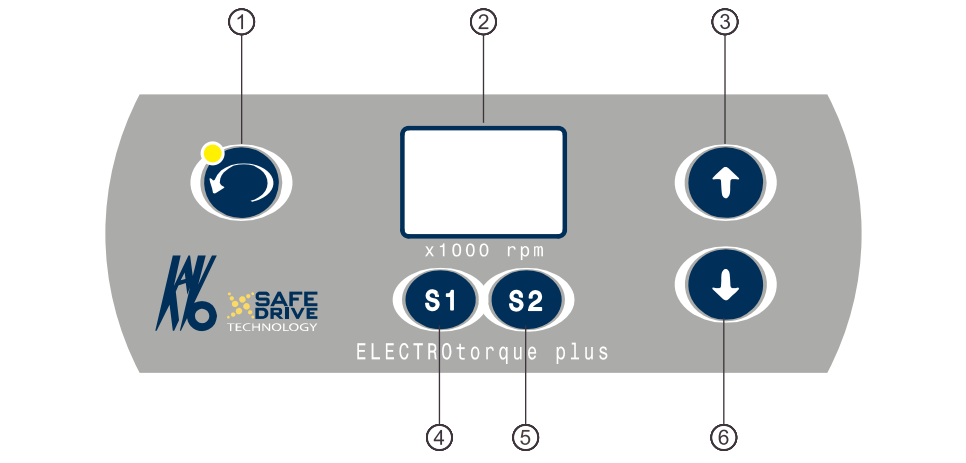
Note
The transformer connection must correspond to the country-specific regulations and requirements for medical devices.

3.1 Scope of delivery



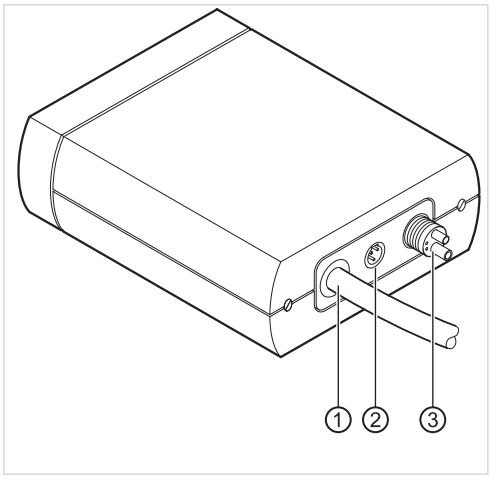
① ELECTROtorque plus 4892 (**Mat. no. 1.001.8748**)
② Motor INTRA LUX KL703 (**Mat. no. 1.007.0150**)
③ Transformer 4881 (**Mat. no. 1.003.8542**)
④ Mounting plate with screw set (**Mat. no. 1.001.5113**)

3.2 Basic unit



Control panel

① "REVERSE" key (switch for reversing the direction of rotation)
② Display (digital display of speed and operability)
③ "UP" key (speed control, increase)
④ "S1" key (user speed 1)
⑤ "S2" key (user speed 2)
⑥ "DOWN" key (speed control, decrease)



Connections

① External hose

② Transformer connection

③ Connection of standard 4-hole turbine hose

3.3 Technical specifications of the ELECTROtorque plus 4892

Dimensions of the package

Length	540 mm / 21.26"
Width	240 mm / 9.45"
Height	120 mm / 4.72"

Dimensions and weight of basic device

Width	125 mm / 4.92"
Height	55 mm / 2.16"
Depth	150 mm / 5.90"
Weight	780 g / 2.75 ounces

Ambient conditions

Ambient temperature range	+5°C to +40°C / 41°F to 104°F
Max. relative humidity	80 %
Max. elevation above sea-level of the installation	2000 m
Air pressure	700 hPa to 1060 hPa

Ambient conditions during transport

Permissible ambient temperature range	-20°C to +70°C / -4°F to +158°F
Permissible at up to a maximal relative humidity of	95 %, non condensing

Mode: intermittent operation

Operating time	0.5 minutes
Pause time	9 minutes

Requirements, classification

Class of protection	I
Overvoltage category	II
Degree of soiling	2
Application part	Type B
Protection class	IP 40

Media

Water quality according to DIN EN 7494-2	Tap water
pH	7.2 to 7.8
System pressure	1.8 to 5 bar / 26 to 72.5 psi
Spray air	1.0 to 2.5 bar / 14.5 to 36.2 psi
Spray water	0.8 to 2.0 bar / 11.6 to 29 psi
Cooling air exit at the motor coupling	6 to 10 Nl/min.
Air filter	50 µm
Water filter, supplied by customer	80 µm

Ideal settings at the dental unit

System pressure	3 bar / 43.5 psi
Spray air pressure [1)]	1 bar / 14.5 psi
Spray water pressure [1)]	0.8 bar / 11.6 psi

[1)] pressure measured at the motor coupling using a pressure gauge **Mat. no. 1.003.1050**.

Speed

Speed range	100 to 40 000 rpm
Clockwise rotation	40,000 rpm
CCW rotation	40,000 rpm

Motor torque

Torque	Max. 3 Ncm

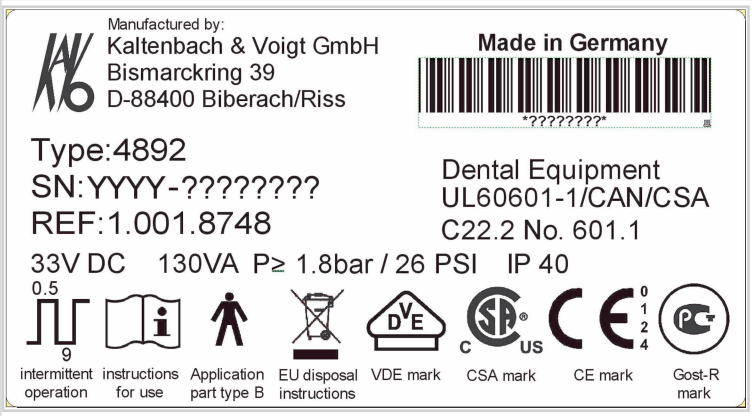
Nominal voltage

Motor voltage	22 V AC
LUX- Lamp voltage (high pressure lamp or KaVo MULTI LED- / MINI LED lamp)	3.2 V
Setting range	3.0 - 3.6 V

Current values

Motor current	Max. 4.1 A per phase
Continuous current	Maximal motor current for max. 7 seconds, 2 A for max. 1 minute
LUX lamp current	Max. 0.7 A

3.4 ELECTROtorque plus 4892 rating plate

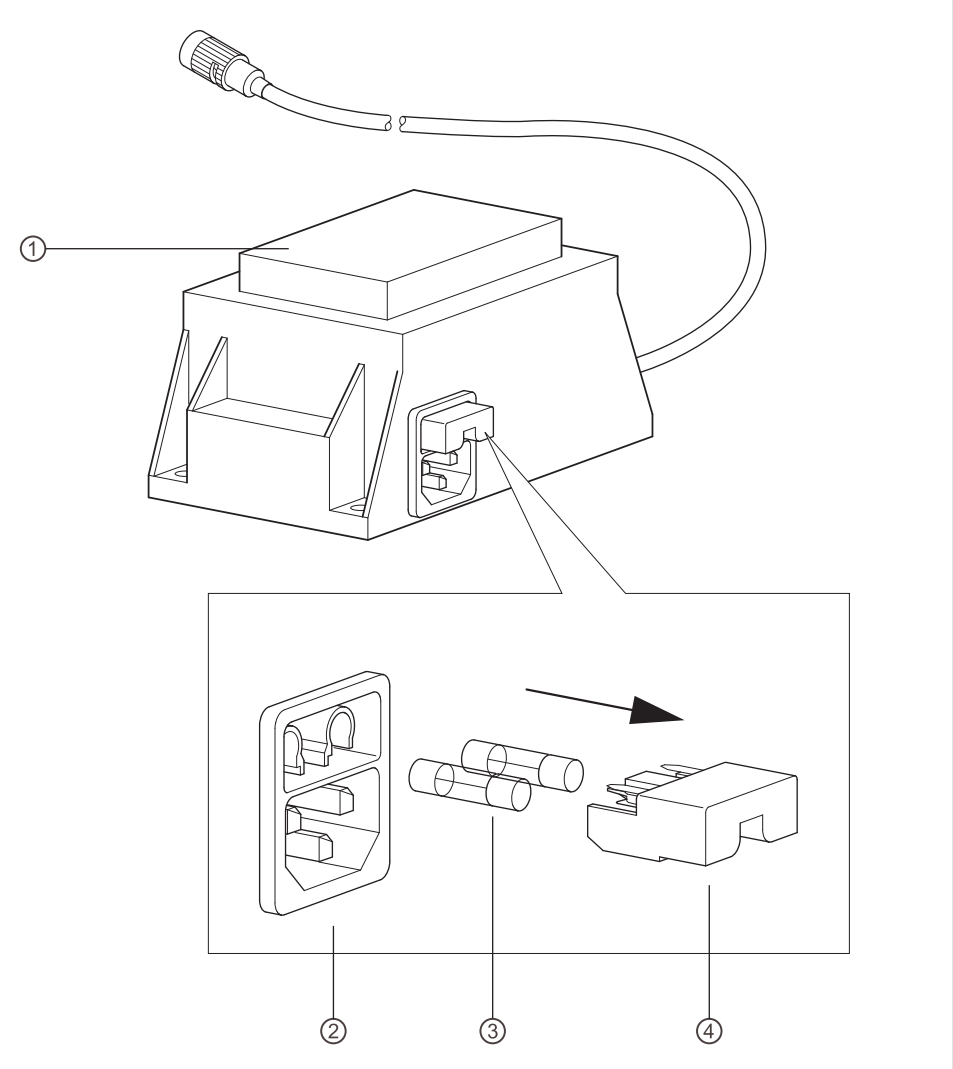


ELECTROtorque 4892 rating plate

Type	ELECTROtorque 4892
SN	Year - serial number
REF	Material number
IP 40	Protection class
0.5 9	Mode: intermittent operation The operating time is 0.5 minutes, and the pause time is 9 minutes. These nominal values serve purposes of standardisation. Both values are significantly lower in practical application.

	Follow the Instructions for Use
	Application part type B
	For disposal information, please refer to Purpose - Proper use
	VDE mark
	The CSA mark with a suffix of "C" and "US" indicates that the product is certified for both the US and the Canadian market.
	CE mark according to 93/42/EEC guideline for medical devices
	GOST R certification

3.5 Transformer 4881



Transformer 4881 (**Mat. no. 1.003.8542**)

① Rating plate
② Power input module
③ Fuses
④ Fuse holder

3.6 Technical specifications of the transformer 4881

Dimensions and weight

Width	87 mm / 3.42"
Height	71 mm / 2.80"
Depth	147 mm / 5.89"
Weight	1.4 kg / 49.4 ounces

Ambient conditions during transport

Permissible ambient temperature range	-20°C to +70°C / -4°F to +158°F
Permissible at a maximal relative humidity of up to	95 %, no condensation

Ambient conditions in operation

Permissible ambient temperature range	+5°C to +40°C / 41°F to 104°F
Permissible up to a maximal relative humidity of	80 %
Permissible to a maximum	2 000 m above sea level
Air pressure	700 hPa to 1060 hPa

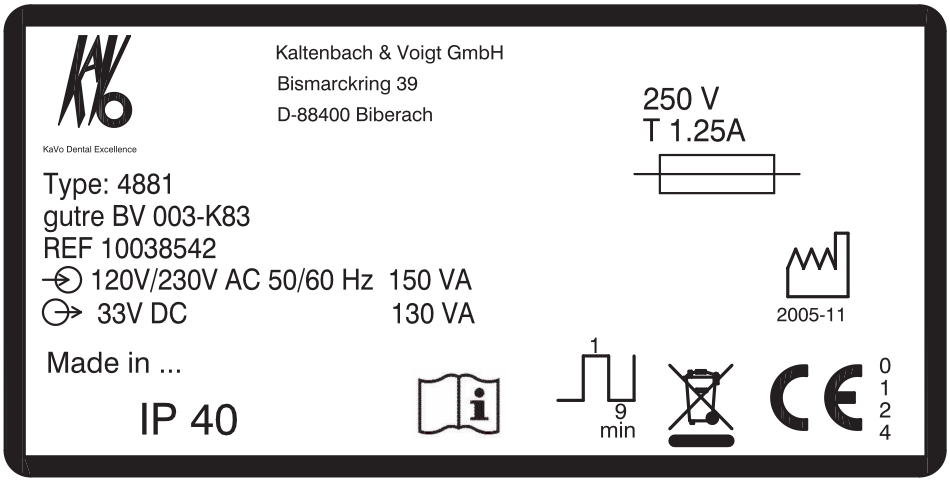
Connected loads

Nominal voltage	33 V DC
Power	150 VA

Requirements

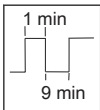
Class of protection	I
Protection class	IP 40

3.7 Transformer 4881 rating plate



Transformer 4881 rating plate

Type	4881
SN	Year - serial number
REF	Material number
IP 40	Protection class

	Mode: intermittent operation The operating time is 1 minute, and the pause time is 9 minutes These nominal values serve purposes of standardisation. Both values are significantly lower in practical application.
	Follow the Instructions for Use
	For disposal information, please refer to Purpose - Proper use
	CE mark according to 93/42/EEC guideline for medical devices

4 First use

4.1 Connection

4.1.1 Connection conditions

⚠ CAUTION

Damage due to improper pressure.
Defective motor or handpiece.

- ▸ Set the pressures according to the technical data!

⚠ CAUTION

Damage due to bad media.
Defective motor or handpiece.

- ▸ The compressed air must be dry and free of dirt and oil according to EN ISO 7494-2!
- ▸ The pH of the water must be between 7.2 and 7.8.

Note
Use filters, water separators or air dryers according to need.

Air and water requirements according to DIN EN 7494-2

The compressed air must be free of oil, dirt, and contamination. If needed:
- Use a compressor with a dry air system.
- Include an upstream air filter (on the compressor), if applicable.
- Blow out the lines before connecting them.

Measuring the amount of cooling air at the motor coupling

See also: 4.1.4 Measuring the amount of cooling air at the motor coupling, Page 26

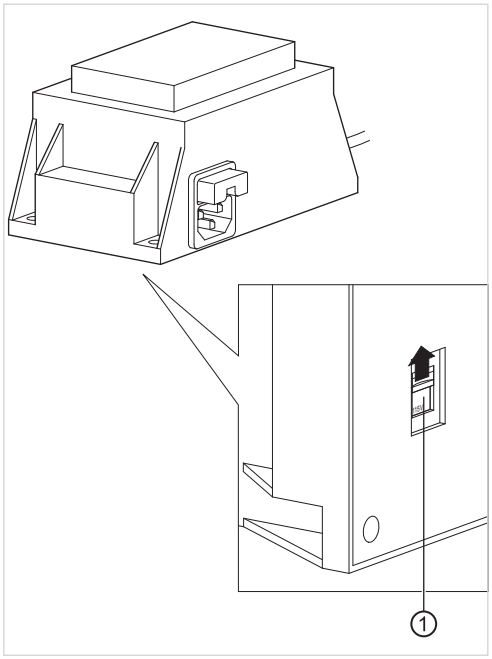
4.1.2 Setting the voltage on the transformer

⚠ DANGER

Electrical power.
Risk of fatal injury.

- ▸ Have the electrical part of the device repaired and serviced only by professionals or persons trained at the factory who have been advised of the safety instructions.
- ▸ Before opening any housing parts, pull the power plug to turn off the power.

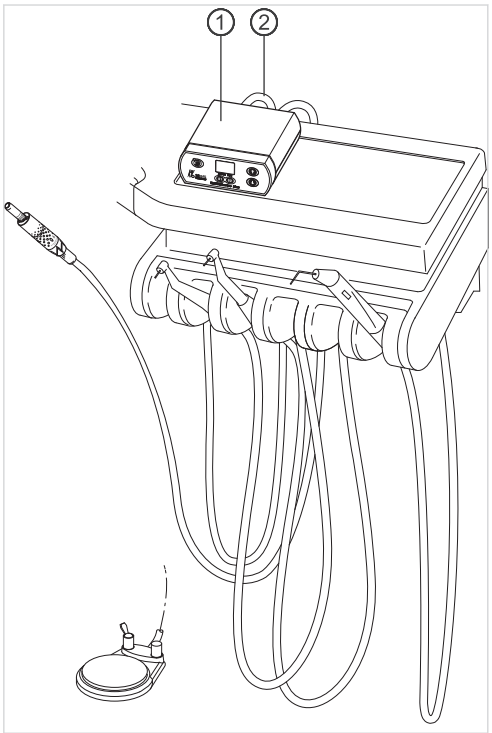
Setting the voltage on transformer 4881



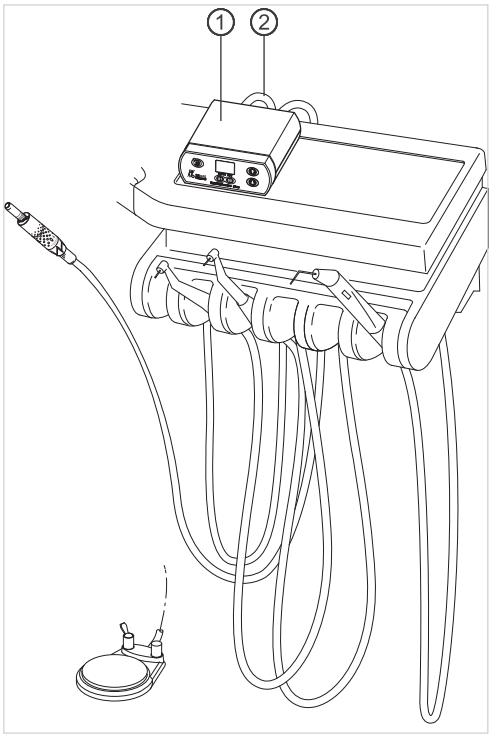
- Set the bridge ① such that the required voltage, 115 V or 230 V, can be read.

4.1.3 Installation site

- Place the product ① in an easily accessible place on or at the dental unit.



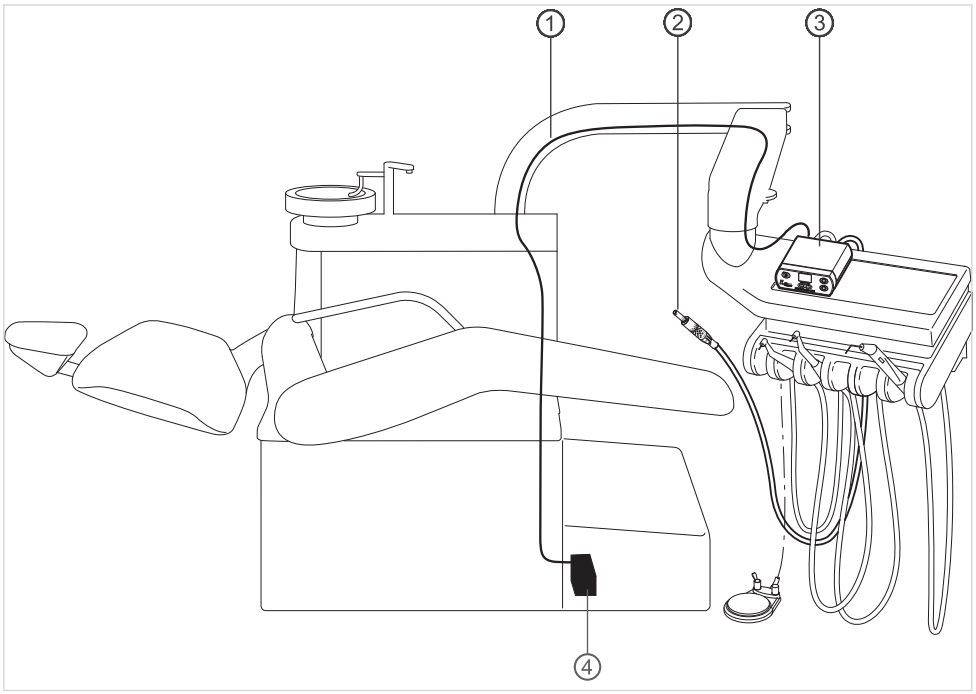
- Select the installation site appropriately such that the turbine or pneumatic motor hose ② used previously can still be used to connect the product ① and the terminal on the device assuring that a good view onto the control and display panel is afforded.



Note

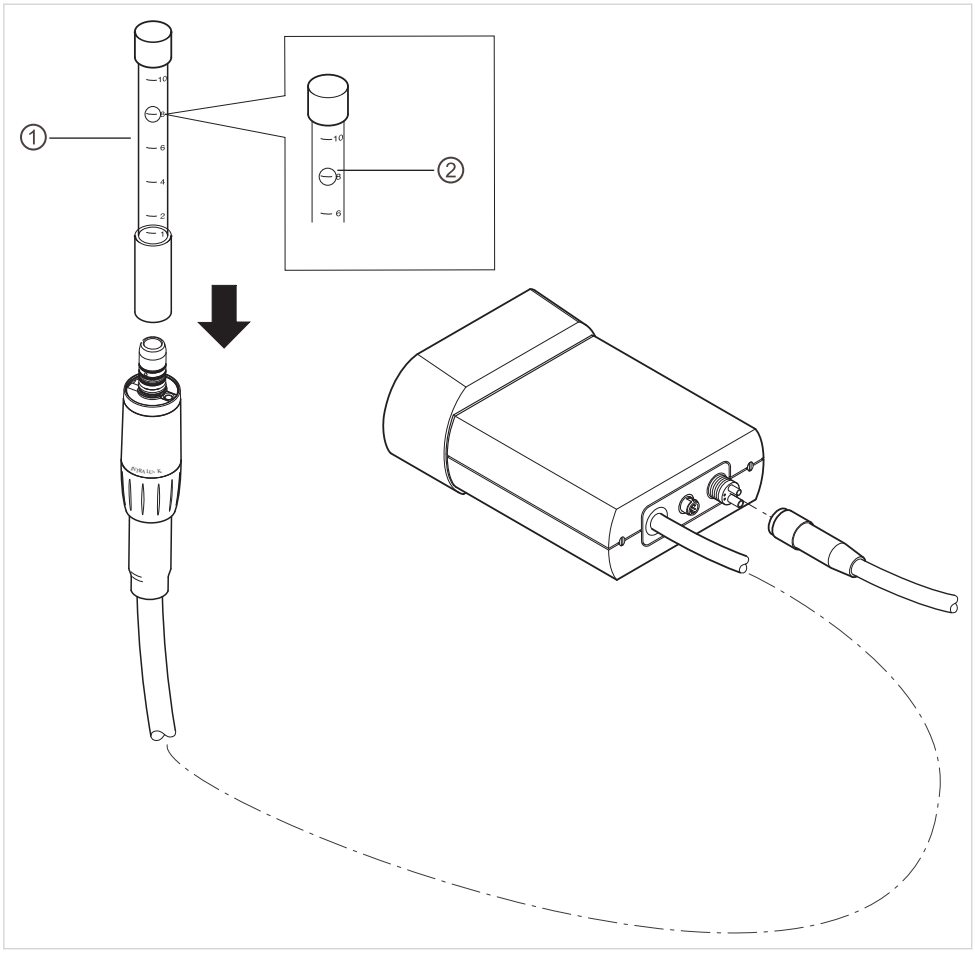
If the solenoid valve ventilation is defective, a small amount of spray water can leak from the vent.
The solenoid valve ventilation should be checked regularly for leaking spray water.

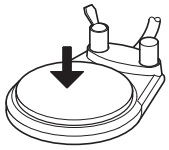
Circuit diagram



① Line 4.5 m / 177.2“
② Motor and hose
③ ELECTROtorque plus 4892
④ Transformer

4.1.4 Measuring the amount of cooling air at the motor coupling



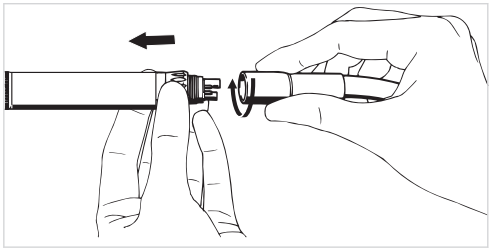


- Place the airflow measuring tube ① (**Mat. no. 0.411.4441**) on the motor.
- Press the foot control to start the motor.

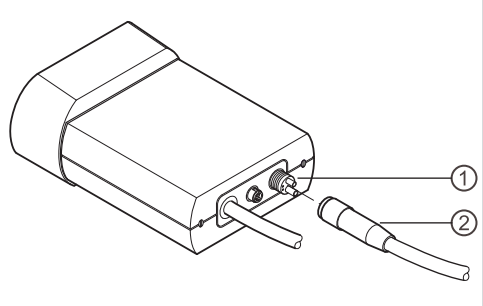
  With the motor running, the value must be in the range from 6 to 10 Nl/min. (top edge of ball ②).

4.1.5 Connecting the ELECTROtorque

- Take the turbine or pneumatic motor used thus far off the hose.



- Connect the four hole, five hole or six hole hose ② to the four hole connection ① of the ELECTROtorque.



4.1.6 Connecting the transformer

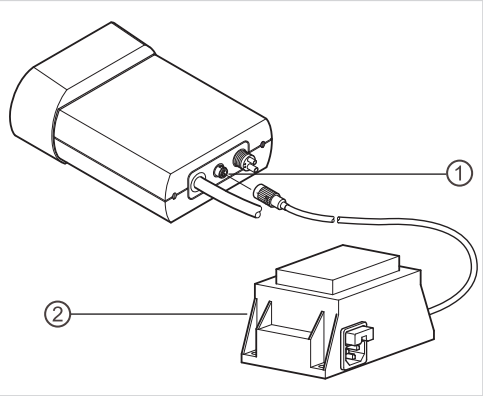
Note

The transformer connection must correspond to the country-specific regulations and requirements for medical devices.

Note

The transformer 4881 is delivered set for operation at 115 V line voltage.

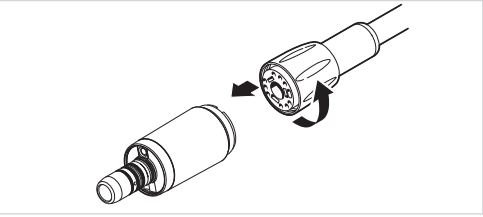
- Connect transformer ② to socket ①.



4.1.7 Connecting the motor

- Slightly wet the O-rings on the connection hose with KAVOspray.
- Connect the motor to the supply hose and twist.

  The correct attachment position is attained automatically.



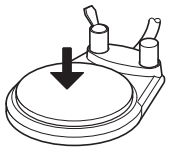
- Screw tight the hose-side union nut proceeding in the direction of the arrow.

4.2 Calibrating the foot control

:Automatic calibration of the foot control

The calibration of the foot control to maximal system pressure proceeds automatically in the background (automatic calibration of the foot control).

Minor pressure fluctuations are balanced automatically by this measure.

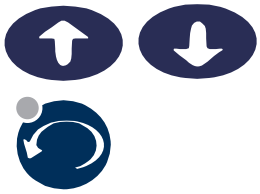


- Press the foot control down once as far as it will go (maximal pressure) in order to calibrate the foot control.

This starts up the motor and the system calibrates automatically to the existing system pressure.

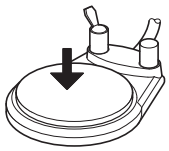
Re-adjustment:

If the system pressure changes dramatically within a short time (e.g. in a new installation), this can lead to the fact that the set maximum speed will no longer be attained. In this case, carry out the following steps:



- Press the "REVERSE", "UP", and "DOWN" keys simultaneously for more than one second.

  Be aware that this re-sets all user settings.
  A successful reset of the user settings is indicated by showing "EI" on the display.



- Press the foot control down once as far as it will go (maximal pressure) in order to calibrate the foot control.

This starts up the motor and the system calibrates automatically to the existing system pressure.

4.3 Motor start pressure

The pressure value for motor start is 1 bar.

The minimal operating pressure at 40,000 rpm is 1.8 bar.

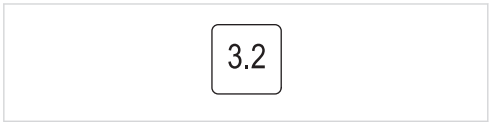
4.4 Setting the lamp voltage

The lamp voltage can be changed in the range from 3.0 V to 3.6 V (measured at the housing connector) while the motor is off. The factory setting at the time of delivery is 3.2 V.

- Press both the "UP" and the "REVERSE" key for more than 1 second.

  This calls up the "Settings - lamp voltage" sub-routine.

The display shows the most recently saved value (in Volt).



- Press the "UP" or "DOWN" key to set the lamp voltage.

- Briefly press the "REVERSE" key.

  This terminates the sub-routine and saves the set value.

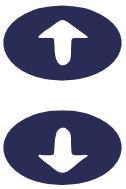
4.5 Setting the lamp afterglow time

The lamp afterglow time indicates how long the lamp continues to glow after the motor is switched off.

The lamp afterglow can be set in increments of seconds from 0 to 30 seconds. The factory setting is 3 seconds.

- Press both the "S2" and the "REVERSE" key for more than 1 second.

  This calls up the "Afterglow time - lamp voltage" sub-routine.
  The display shows the most recently saved value.

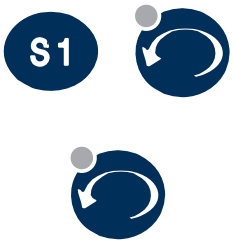


- Press the "UP" or "DOWN" key to change the value in one-second increments.

- Briefly press the "REVERSE" key.

  This terminates the sub-routine and saves the set value.

4.6 Checking the device connection pressure



- In order to display the measured pressure on the display, press both the "REVERSE" and S1 keys for more than one second.

  This starts the "Check pressure" sub-routine. The display shows the current value in units of "bar" (depending on the foot control).

- Briefly press the "REVERSE" key.

This closes the sub-routine.

5 Operation

⚠ CAUTION

Unsuitable speed.
Damage to the product.
Problems processing selected material

- Check the speed setting each time you turn on the unit!

⚠ CAUTION

Lack of cooling air.
Premature motor wear and tear.

- Do not operate the ELECTROtorque in the absence of cooling air.

⚠ CAUTION

Contaminated or moist compressed air.
Premature motor wear and tear.

- Make sure that the compressed air is dry, clean, and uncontaminated.

⚠ CAUTION

Germ formation
Infections

- Before treating a patient, let the spray air and spray water exit for at least 20 seconds.
- Before start-up and after the device has not been used for a while (week-ends, holidays, vacations, etc.), rinse or purge the air and water lines.
- The ELECTROtorque must to be sterilised through the treatment centre.

For disinfection, KaVo recommends KaVo Oxygenal 6 made by KaVo Dental GmbH www.kavo.com and BluTab made by ConFirm Monitoring Systems Inc www.blutab.com. Use according to manufacturer's instructions.

Note

The transformer connection must correspond to the country-specific regulations and requirements for medical devices.

Note

Please note the transmission/reducing ratio of the attachment handpieces.

- Turn the product on.

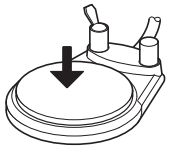
  The display shows the software version of the front panel and of the control one after the other for several seconds each.

Subsequently, the set speed (in 1,000 rpm) is displayed during the preparation.

The product is ready for use once the calibration of the foot control is completed.

See also: 4.2 Calibrating the foot control, Page 28

5.1 Starting-up the motor

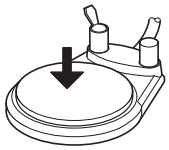


- Press the foot control until the motor starting pressure (1 bar, 14.5 PSI) is exceeded.

  The motor starts.

The drive air pressure can be used to vary the speed between 100 and 40,000 rpm even while the motor is running.

Change speed

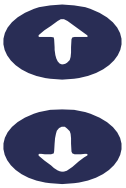


- Completely depress the foot control.

  The set maximum speed (max. 40,000 rpm) is reached.

The display shows the set speed limit in rpm (x 1,000).

If the motor is running, the decimal point in the display flashes and the current speed is displayed.



- Press the "UP" or "DOWN" key to change the set speed even while the motor is running.

5.2 Changing the direction of motor rotation

Note
Pressing the "REVERSE" key for more than 1 second activates/inactivates the SAFEdrive function.

See also: 5.6 SAFEdrive protection function, Page 35

- Briefly press the "REVERSE" key.

  This changes the direction of motor rotation.

In counterclockwise rotation, the yellow indicator of the "REVERSE" key is on.

5.3 Changing the speed setting

The user can define two speed settings and recall them by pressing S1 or S2.
The factory settings are 40,000 rpm for S1 and 5,000 rpm for S2.

- Briefly press the "S1" or "S2" key.

This starts up the "User speed 1" or "User speed 2" sub-routine.
The display shows the most recently saved value (speed in rpm x 1,000).

The most recently saved value can be changed in the following increments:
100 rpm for values between 100 rpm and 1,000 rpm
1,000 rpm for values between 1,000 rpm and 40,000 rpm

- Press the "UP" or "DOWN" key to change one of the saved values.

- Press the "S1" or "S2" key for more than 1 second to complete the setting.

The right decimal point shown on the display lights up briefly.
The set value is being saved.

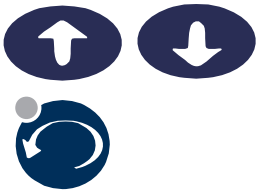
5.4 Turning on the LUX lamp

Note
When the motor is not running, the LUX lamp can be turned on manually.

- Press the "REVERSE" and the "DOWN" keys for more than 1 second.

  This turns on the LUX lamp, which goes dark automatically after 30 seconds.
- In order to turn off the LUX lamp right away, briefly press the "REVERSE" key.

5.5 Resetting user values to factory setting



- In order to reset the settings to factory settings, press the "REVERSE", "UP", and "DOWN" keys simultaneously for more than one second.

A successful reset of the user settings is indicated by showing "EI" on the display.

The following user values are changed to the factory setting.

User values	Default (factory setting)
Starting pressure	1 bar / 14.5 psi
Calibration pressure	1.8 bar / 26 psi
Lamp voltage	3.2 V
Lamp afterglow time	3 seconds
Speed setting S1	40,000 rpm
Speed setting S2	5,000 rpm

5.6 SAFEdrive protection function

⚠ WARNING

Use of incorrect straight and contra-angle handpieces.
Risk of burn injury or overheating.

- Use original straight and contra-angle handpieces of the KaVo 25LP/25LPA/ 25LPR/ 25LCA series only.

⚠ WARNING

Inactivation of SAFEdrive.
Increases the probability or severity of overheating of defective or poorly maintained handpieces.

- KaVo recommends to activate the SAFEdrive function during the dental treatment.

Note

The SAFEdrive function is a monitoring function for detection of defective straight and contra-angle handpieces. These can heat up strongly due to additional friction and possibly cause burn injuries. KaVo recommends to activate the SAFEdrive function during treatments inside the oral cavity in order to reduce the risk of burn injuries caused by defective straight and contra-angle handpieces.

Note

Factory setting is SAFEdrive function activated in normal mode.

SAFEdrive reduces the probability or severity of overheating of defective or poorly maintained handpieces and thus minimising the risk of burns to the patient. Possible defects can be detected by continuous monitoring of the idling properties of the handpiece during its use.
If the protective function is triggered, the SAFEdrive initially reduces the motor speed and then stops the motor altogether if the excessive load persists.

Note

SAFEdrive works only with KaVo straight and contra-angle handpieces of the 25LP/25LPA/25LPR/25LCA series. Inadvertent triggering of the SAFEdrive function cannot be excluded if handpieces made by other manufacturers are used.

Using SAFEdrive

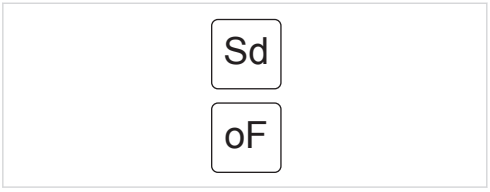
The SAFEdrive function can be turned on or off by the user.

- Keep the "REVERSE" key pressed for more than 1 second to activate/inactivate the SAFEdrive function.

  This settings is then saved.

Note

If SAFEdrive is turned off, the display alternately shows the message, "Sd - oF" and the display of the maximal speed, while the motor is idle.

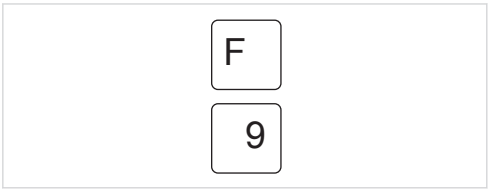


If the handpiece head overheats while SAFEdrive is activated, the "OVERHEAT WARNING" stage is activated initially:

- The motor power is reduced (may reduce the motor speed).
- The LUX light starts to pulse.
- The speed display starts to flash.

If the load persists for more than 5 seconds, the "OVERHEAT ERROR" stage is activated:

- The motor is stopped automatically.
- The display shows an error message.



- If the "OVERHEAT WARNING" stage is signaled, relieve the handpiece of load for at least 2 seconds.
- You can continue working as usual once the "OVERHEAT WARNING" stage is over.
- If the "OVERHEAT WARNING" stage is signaled by the motor being stopped automatically, take the handpiece from the mouth of the patient and proceed as follows:
- Carefully check the handpiece head for:
  - Temperature
  - Damage
  - Ability to rotate the bur
- If there is no damage and no overheating, the motor can be re-started. For this purpose, release the foot pedal and then press it again.
- If damage or overheating is evident, replace the handpiece or have it repaired.

6 Reprocessing methods adapted from DIN EN ISO 17664

⚠ CAUTION

Damage due to penetrated liquids.
Malfunctions from penetrated liquids.

- Do not let any liquids enter the device!

⚠ CAUTION

Product damage due to improper disinfection.
Malfunctions.

- Use disinfectant in accordance with the manufacturer's instructions.
- Only disinfect by wiping!
- Do not immerse product in liquids!

Note

For information about the cleaning and care of the electrical motors, straight and contra-angle handpieces that are used, please refer to the respective Instructions for Use.

6.1 Cleaning

Note

The cleaning and care processes for KL motors are described in the respective Instructions for Use.

Note

Do not use solvents or aggressive chemicals.

6.1.1 Preparations at the site of use

- Unplug the unit from the mains.
- Decontaminate as soon as possible after application.
- Extreme contamination must be removed right after it is generated.

6.1.2 Manual external cleaning

Note

Do not use scouring cleansers.

- Make sure that the device is disconnected from the mains.
- Dampen a soft cloth with tap water or a mild cleaning solution (weak soapy water).
- Wipe-off all external surfaces of the ELECTROtorque housing and the external surfaces of the motor hose using the dampened cloth.

6.1.3 Manual internal cleaning

There is no specific cleaning of the inside of the unit.

For protection from infection, it is recommended to rinse the water and air ducts (cooling media) for at least 20 second before treating a patient.

6.1.4 Automated external and internal cleaning

Not applicable.

6.2 Disinfection

Note
The unit must be disinfected manually only.

Damage to the paint surfaces as well as plastics can arise from the wide variety of medicines and chemicals used in the dentist's office.
Tests have shown that there is no surface protection available that works with all commercially available agents.
As damage to the surface by these agents is very much dependent on the exposure time, it is essential to wipe the affected areas using a moist cloth.
Any residue arising from disinfectants can be cleaned to a certain degree on painted and plastic surfaces using neutral, nonabrasive rinses and cleansers.
New painted surfaces that still cause water to bead can be cleaned with water and nonabrasive, mild cleansers.

6.2.1 Manual external disinfection

KaVo recommends the following products based on material compatibility. The microbiological efficacy must be ensured by the disinfectant manufacturer.

- CaviCide made by Metrex / Kerr TotalCare

Consumables required:
Cloths for wiping off the medical device.

- ▸ Spray the disinfectant on a cloth, then wipe down the medical device and allow the disinfectant to act according to the instructions of the disinfectant manufacturer.

Note
Follow the instructions for use of the disinfectant.

6.2.2 Manual internal disinfection

The disinfection of the ELECTROtorque must be conducted through the treatment centre.

- Connect the ELECTROtorque to the treatment centre.
- Follow the instructions for disinfection of the treatment centre.

The product should be used according to the instructions of the manufacturer and the Instructions for Use of the treatment centre.

6.2.3 Automated external and internal disinfection

The exterior and interior of this product are not designed for automated disinfection.

6.3 Packaging

Not applicable.

6.4 Sterilisation

Not applicable.

6.5 Storage

Prepared products must be stored, protected from germs (as far as possible) and dust, in a dry, dark, cool room.

Note

Comply with the expiry date of the sterilised items.

7 Service

KaVo recommends the sole use of **original KaVo parts®** for operation and repairs as these have been tested extensively for safety, functioning and specific suitability.

Authorized to repair and service the KaVo products:
- technicians of KaVo branches throughout the world.
- technicians of authorised dealers specially trained by KaVo.
- independent technicians specially trained by KaVo.

7.1 Visual inspection and functional check

- ▸ Check the surface for damage.
- ▸ Check hoses for defects.
- ▸ Connect the device to the mains supply.

  The display shows the following (in sequence):
  – Software version of Front.
  – Software version of Control.
  – Set speed limit.

See also: 8 Troubleshooting, Page 42

7.2 Servicing aging paint

Aging paint can be identified by the reduced gloss, brightness, and clarity of the colour.

Note
Only use conventional paint care products and cleansers to service the paint.

- ▸ Clean the painted surface.

See also: 6.1.2 Manual external cleaning, Page 37

- ▸ To preserve the paint, apply the paint care product with a lint-free cloth in a circular motion.
- ▸ Repolish with a pad or cloth until the surface becomes shiny.

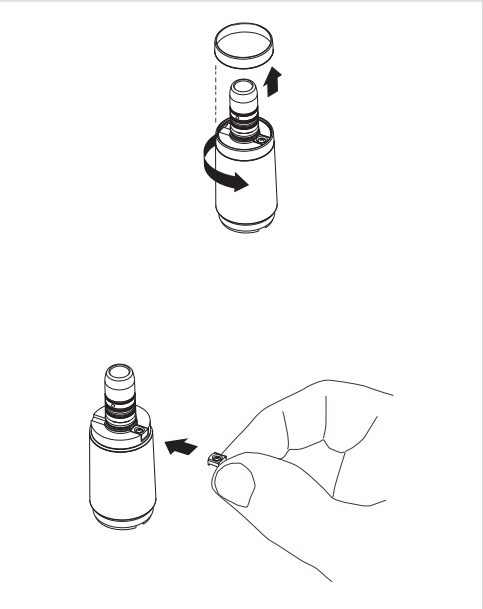
7.3 Replacing the KaVo Mini LED lamp of the KL 703 motor

⚠ CAUTION

Danger due to hot bulb.
Burning hazard.
- ▸ Do not touch the bulb after it has been used. Let the lamp cool off.

- ▸ Pull the sleeve off while twisting slightly.

- ▸ Push the old KaVo Mini LED lamp out of the mount with your fingernail and remove it.
- ▸ Inset the new KaVo Mini LED lamp into the recess such that the contact surface corresponds to that of the mount. Slide the lamp into the mount. Place the sleeve on the motor and pull up.



Note

The KaVo Mini LED lamp is a semiconductor element and must be operated with direct current only. The lamp must be inserted with the poles in the correct orientation for the lamp to work properly.

Case 1: KaVo Mini LED lamp is on

Case 2: The KaVo Mini LED lamp is faint
- Increase the cold light intensity on the unit until the desired light intensity is reached.

Case 3: KaVo Mini LED lamp is red or off
- Insert KaVo Mini LED lamp after rotating it 180° about its axis.

- ▸ Put the sleeve on while twisting slightly.

8 Troubleshooting

Note

This product displays error messages and/or instructions optically on its display.
Error numbers can be between 1 and 30.
The motor is shut off upon any malfunction.

In the presence of an error, the display alternatives between showing "F" and the error number.

The following persons are authorised to repair and service KaVo products:
- technicians of KaVo branches throughout the world.
- technicians of authorised dealers specially trained by KaVo.
- independent technicians specially trained by KaVo.

Malfunction	Cause	Remedy
Device malfunctions (no display).	No voltage supply.	▸ Check/reestablish correct voltage supply and correct connection.
	Defective fuse.	▸ Change the fuses. **See also:** 3.5 Transformer 4881, Page 19
Maximum speed not reached.	Supply pressure changed strongly.	▸ Re-calibrate foot control. **See also:** 4.2 Calibrating the foot control, Page 28
	Kink or leak in supply hose.	▸ Remove the kink and check for damage! ▸ Replace the supply hose if there is any damage/leakage.
	Motor and/or handpiece are sluggish.	▸ Replace or repair handpiece.
LUX light fails to light up (or lights up red).	LED: incorrect LED poles.	▸ Rotate LED or replace it, if applicable.
	LED: Defective LED	▸ Replace the LED.
	High-pressure lamp:	▸ Replace the lamp.
	Open circuit/short-circuit.	▸ Contact service.
F1	Thermal overloading of the motor.	▸ Relieve the load and allow the motor to cool, stop and start on the foot control.
F2	Motor blocked.	▸ Remedy the blockade, stop and start on the foot control.

Malfunction	Cause	Remedy
F3	No motor attached.	▸ Connect the motor.
F4	Line breakage on motor.	▸ Establish connection, re-start the device.
F5	Low transformer voltage.	▸ Check voltage selector on the transformer. **See also:** 4.1 Connection, Page 22
F9 SAFEdrive error	Defective, damaged or poorly serviced handpiece.	▸ Carefully check if the handpiece head is hot or if any damage is visible. ▸ Replace the handpiece / return it for checking, if applicable.
	Long motor load without pause.	▸ Briefly relieve the motor of its load during the treatment, at the latest if the SAFEdrive warning, "OVERHEAT WARNING" is displayed.
F24	System pressure outside the permissible range.	▸ Set the system pressure such that it is within the permissible range. **See also:** 3.3 Technical specifications of the ELECTROtorque plus 4892, Page 15
F26	Depressed foot control during power-on.	▸ Release the foot control.

9 Accessories and replacement parts

Bezeichnung	Material number
Airflow measuring tube	0.411.4441
Adaptor for the airflow measuring tube	1.005.1702
KaVo Mini LED lamp	1.007.8474
INTRA LUX motor KL 703	1.007.0150

10 Information about electromagnetic compatibility

10.1 Guidelines and manufacturer's declaration - electromagnetic emission

The ELECTROtorque plus 4892 is designed to be operated in an electromagnetic environment that meets the description below. The customer or user of the ELECTROtorque plus 4892 needs to ensure that the device is used in the specified type of environment.

Measurements of emitted interference	Conformance	Electromagnetic environment - Guidelines
HF emissions according to CISPR 11	Group 1	The ELECTROtorque plus 4892 uses HF energy only for its internal operation. Therefore, the HF emission of the device is very low and interference with adjacent electronic devices is unlikely.
Interference voltage emissions according to EN 55011	Class B	The ELECTROtorque plus 4892 is suitable for use in all facilities including residential facilities and facilities that are directly connected to a public power supply that also supplies power to residential buildings.
Harmonics in accordance with IEC 61000-3-2	Class A	The ELECTROtorque plus 4892 is suitable for use in all facilities including residential facilities and facilities that are directly connected to a public power supply that also supplies power to residential buildings.
Voltage fluctuations/flicker according to IEC 61000-3-3	complies	The ELECTROtorque plus 4892 is suitable for use in all facilities including residential facilities and facilities that are directly connected to a public power supply that also supplies power to residential buildings.

The ELECTROtorque plus 4892 must not be used while it is stacked right next to other devices. If operation of the unit stacked right next to other devices is indispensable, the ELECTROtorque plus 4892 must be monitored to check proper operation of the unit in this arrangement.

The immunity test levels required in IEC 60601 are met.

10.2 Guidelines and manufacturer's statement - Electromagnetic immunity

The ELECTROtorque plus 4892 is designed to be operated in an environment that meets the description below. The customer or user of the ELECTROtorque plus 4892 should ensure that it is used in an environment as specified.

Interference immunity tests	IEC 60601 test levels	Compliance level	Electromagnetic environment - Guidelines
Electrostatic discharge (ESD) according to IEC 61000-4-2	± 6 kV contact discharge (indirect) ± 8 kV atmospheric discharge	± 6 kV contact discharge ± 8 kV atmospheric discharge	Floors should be made of wood or concrete or be fitted with ceramic tiles. If the floor is fitted with synthetic material, the relative humidity must be at least 30%.
Fast transient electrical interference / bursts according to IEC 61000-4-4	± 2 kV for power lines ± 1 kV for input and output lines	± 2 kV for power lines ± 1 kV for input and output lines	The quality of the supply voltage should correspond to that of a typical business or hospital environment.
Surges according to IEC 61000-4-5	± 1 kV symmetrical test voltage ± 2 kV asymmetrical test voltage	± 1 kV symmetrical test voltage ± 2 kV asymmetrical test voltage	The quality of the supply voltage should correspond to that of a typical business or hospital environment.
Voltage interruptions, short-term interruptions, and fluctuations of the supply voltage according to IEC 61000-4-11	40 % of U_T (interruption U_T for 5 periods) 70 % U_T (interruption of U_T for 25 periods) Voltage interruption for 10 ms Voltage interruption for 5 ms	40 % U_T (interruption of U_T for 5 periods) 70 % U_T (interruption of U_T for 25 periods) Voltage interruption for 10 ms Voltage interruption for 5 ms	The quality of the supply voltage should correspond to that of a typical business or hospital environment. If the user of the ELECTROtorque plus 4892 needs continued operability even if the power supply is interrupted, it is recommended to supply the ELECTROtorque plus 4892 from an uninterruptible power supply or a battery.
Magnetic field at a supply frequency (50/60 Hz) according to IEC 61000-4-8	3 A/m	3 A/m	Magnetic fields at the mains frequency should correspond to the typical values in a business and hospital environment.

Note: U_T is the alternating mains voltage before the test level is used.

10.3 Guidelines and manufacturer's statement - Electromagnetic immunity

The ELECTROtorque plus 4892 is designed to be operated in an environment that meets the description below. The customer or user of the ELECTROtorque plus 4892 has to ensure that it is used in an environment as specified.

Interference immunity tests	IEC 60601 test levels	Compliance level	Electromagnetic environment - Guidelines
Wire-based HF interference according to IEC 61000-4-6 ---------- Wireless HF interference according to IEC 61000-4-3	3 V_{eff} 150 kHz to 80 MHz outside ISM bands[a] ---------- 3 V/m 80 MHz to 2.5 GHz	3 V_{eff} ---------- 3 V/m	Portable and mobile radio devices must not be used closer to the ELECTROtorque Plus type 4892 (including the electrical lines) than the recommenced safe distance calculated using the equation for the transmission frequency. Recommended safe distance: $d = 1.17\sqrt{P}$ $d = 0.35\sqrt{P}$ for 80 MHz to 800 MHz $d = 0.70\sqrt{P}$ for 800 MHz to 2.5 GHz where P is the nominal power of the transmitter in watts (W) as specified by the transmitter manufacturer and d is the recommended safe clearance in metres (m). [b]The field strength of stationary radio transmitters should be [c]less than the conformance level at all frequencies in an on-site check. [d] Interference is possible close to devices that bear the following symbol:

Note 1: At 80 MHz and 800 MHz, the higher frequency range applies.
Note 2: These guidelines may not be applicable in every case. The propagation of electromagnetic waves is subject to absorption and reflection by buildings, objects, and people.

[a] The ISM frequency bands (for industrial, scientific and medical applications) between 150 kHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHZ to 27.283 MHz and 40.66 MHz to 40.70 MHz.
[b] The conformance levels in the ISM frequency bands between 150 kHz and 80 MHz and the frequency range of 80 MHz and 2.5 GHz are intended to reduce the probability that mobile and portable communications equipment will produce disturbances when they are unintentionally brought near the patient. For this reason, the additional factor of 10/3 is applied in the calculation of the recommended safe clearances in these ranges of frequencies.
[c]The field strength of stationary transmitters, such as, e.g. base stations of mobile phones and mobile terrestrial radio devices, amateur radio stations, AM and FM radio and television transmitters, cannot be determined exactly based on theoretical considerations. A site study should be considered to determine the electromagnetic environment in terms of stationary transmitters. If the field strength

measured at the site at which the ELECTROtorque plus 4892 is used exceeds the above conformance levels, the ELECTROtorque plus 4892 should be monitored to demonstrate proper function. If unusual performance features are observed, additional measures may be necessary such as re-orienting or moving the ELECTROtorque plus 4892 to a different site.

[d] In the frequency range of 150 kHz to 80 MHz, the field strength should be less than $3V_{eff}$ V/m.

10.4 Recommended safe distances between portable and mobile HF telecommunications equipment and the ELECTROtorque plus 4892

The table shows the necessary safe distance as a function of the transmission frequency in m:

Rated power of the transmitter in W	150 kHz to 80 MHz $d=1.12\sqrt{P}$	80 MHz to 800 MHz $d=1.12\sqrt{P}$	800 MHz to 2.5 GHz $d=2.30\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.70	3.70	7.37
100	11.70	11.70	23.30

For transmitters whose maximum rated power is not included in the above table, the recommended safe distance d in metres (m) can be calculated using the equation for the respective column, where P is the maximum rated power of the transmitter in Watts (W) as specified by the manufacturer.

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

Note 2: These guidelines may not be applicable in every case. The propagation of electromagnetic waves is subject to absorption and reflection by buildings, objects, and people.

The ELECTROtorque plus 4892 is designed for use in an electromagnetic environment in which the HF interference is under control. The customer or the user of the ELECTROtorque plus 4892 can prevent electromagnetic interference by maintaining the minimum distance between portable and mobile HF telecommunications devices (transmitters) and the ELECTROtorque plus 4892 depending on the output power of the communication device as indicated.

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