Instructions for use

elements e-motion
Dental Motor

KAVO Kerr

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1 User instructions

1.1 User guide

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

Requirement
If other language versions are required, they can be requested from the corresponding Kerr branch. Prior approval from Kerr 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
IEC	International Electrotechnical Commission
RI	Repair instructions
RK	Retrofitting kit
AS	Assembly kit
CK	Conversion kit
EP	Enclosed parts
EMC	Electromagnetic compatibility
PI	Processing instructions

1.1.2 General marks and symbols

	General Warning
	Important information for users and technicians
	CE mark (European Conformity mark)
▶	Action required

Hazard levels

The warning and safety notes in this document must be observed to prevent personal injury and material damage. The warning notes are designated as shown below:

⚠ DANGER

In cases which – if not prevented – directly lead to death or severe injury.

⚠ WARNING

In cases which – if not prevented – can lead to death or severe injury.

⚠ CAUTION

In cases which – if not prevented – can lead to minor or moderate injury.

NOTICE

In cases which – if not prevented – can lead to material damage.

1.2 Target group

This document is for dental professionals, dental office staff and service staff.

1.3 Service

Note
Send the product in for a service check every two years.

In this service check, the safety checks are performed according to IEC 62353 - VDE 0751-1.

Kerr Customer Care
For repairs, please contact your local dealer or Kerr Customer Care directly:
Toll-free: +1-800-KERR-123
Homepage: www.kerrdental.com
Email: KerrCustCare@kavokerr.com

1.4 Terms and conditions of warranty

Within the scope of the applicable Kerr delivery and payment conditions, Kerr guarantees proper function, absence of defects in material and workmanship for the following periods:
Control Unit and all not specified parts: 12 months
KL 703 LED motor: 36 months
from the date of purchase as confirmed by the salesperson.

In case of justified complaints, Kerr 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 or chemical or electrical influences deemed abnormal or impermissible in accordance with factory specifications.
The warranty does not usually cover lamps, optical fibres 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 Kerr 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.

1.5 Transport and storage

1.5.1 Damage in transit

Note
Kerr shall not be held liable for damage arising from transportation.
The shipment must be checked on arrival.

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 on delivery, proceed as follows:
1. Report any damage to the shipping company immediately and 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.

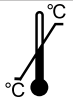
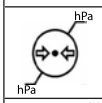
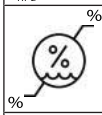
Note
If the recipient fails to comply with any of the above-mentioned obligations, the damage will be considered to have arisen following delivery
(in accordance with CMR law, Chapter 5, Art. 30).

1.5.2 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:

	Follow instructions for use
	Please note the instructions for use

	Caution
	Temperature limitation
	Atmospheric pressure limitation
	Humidity limitation
Rx only	Caution: Federal (USA) law restricts device to sale by or on the order of a dental professional.
	MET mark
	VDE mark
	CE mark (European Conformity mark)
	Medical device, labelling of medical devices
	Importer
	Transport upright with the arrows pointing upwards!
	Fragile, handle with care!
	Stacking limit by number
	Keep dry!
	Do not dispose this product into the ordinary municipal waste or garbage system
	Properly dispose of non-corrugated fiberboard (paperboard)
	Properly dispose of low-density polyethylene
	Properly dispose of all other plastics such as Polycarbonate (PC), polyamide (PA), styrene acrylonitrile (SAN), acrylic plastics/polyacrylonitrile (PAN), bioplastics

1.6 Disposal

Note

Any waste which is generated must be recycled or disposed of in strict compliance with all applicable national regulations in a manner which is safe both for people and the environment.

If you have any questions regarding proper disposal of the Kerr product, please contact the Kerr branch.

1.7 Disposal of electronic and electrical devices

Note

According to the general WEEE Directive (Waste Electrical and Electronic Equipment) and EU Directive 2012/19 concerning waste electrical and electronic equipment, we wish to point out that this product is subject to the aforementioned Directive and must be subjected to special disposal within Europe.

For more information, please visit www.kavo.com or contact your specialised dental dealers.

For final disposal:

In Germany

To return an electrical device, you need to proceed as follows:

1. On the homepage www.enretec.de of enretec GmbH, you can download a form for a disposal order under the menu item, eom. Download the disposal order or complete it as an online order.
2. Enter the corresponding information to complete the order, and submit it as an online order or by fax +49 (0)3304 3919 590 to enretec GmbH.
   The following contact options are also available for questions and for initiating a disposal order:
   Phone: +49 (0) 3304 3919-500
   Email: eom@enretec.de and
   Postal address: enretec GmbH, Geschäftsbereich eomRECYCLING®
   Kanalstraße 17
   D-16727 Velten
3. A unit that is not permanently installed will be picked up at the office.
   A permanently installed unit will be picked up at the curb at your address on the agreed date.
   The owner or user of the device will have to bear the cost of disassembly, transportation and packaging.

International

For country-specific information on disposal, contact your specialised dealers.

2 Safety

Note
All serious events occurring in relation to the product must be reported to the manufacturer and the competent authority of the member state, in which the user and/or patient resides.

The instructions for use are a component of the product and must be read carefully prior to use and be accessible at all times.
The device may only be used in accordance with the intended use, any other type of use is not permitted.

2.1 Infection hazard

Patients, users or third parties could be infected by contaminated medical devices.

- Take suitable personal protective measures.
- Follow the instructions for use of the components.
- Before initial startup and after each use, reprocess the product and accessories appropriately.
- Carry out the reprocessing as described in the instructions for use. The procedure has been validated by the manufacturer.
- If you deviate from this procedure, it is essential to make sure that the reprocessing is effective.
- Reprocess the product and accessories appropriately before disposal.

2.2 Explosion hazard area

Electrical sparks in the product can lead to explosion or fire.

- Do not use product in explosion hazard areas.
- Do not operate the product in an oxygen-enriched atmosphere.
- Do not use the product in the vicinity of flammable gases.

2.3 Technical condition

A damaged device or components could injure patients, users and third parties.
A damaged power cable or missing protective conductor can lead to electrical shock.

- Only operate devices or components if they are undamaged on the outside.
- Check the power cable before use.
- Connect only to sockets with a protective contact that meet the respective national regulations.
- Check the proper working order and proper condition of product and accessories before each use.
- Have parts with sites of breakage or surface changes checked by the Service.
- Safety checks may only be performed by trained service personnel.
- Perform a test run with the handpiece before each use.
- If any of the following defects on the product or accessories occurs, stop working and have the service personnel carry out repair work:

- Malfunctions
- Damage
- Irregular running noise
- Excessive vibration
- Overheating
- Endodontic files are not seated firmly in the handpiece

Careless setup/installation of the product or accessories can cause injury to patients, users and third parties. Power supplies and/or cords/hoses on the floor can cause slipping or tripping.

- Power supply and cord/hoses need to be set-up/routed appropriately such that they are not on the floor.

2.4 Ingress of liquids

Use of the product in moist or electrically conductive environments can lead to electrical shock and injury to patient, user and third parties.

- Use the product in dry environments exclusively.
- Use the product only in environments that are not electrically conductive.
- Protect openings of the product from any ingress of liquids.
- Do not place the product in a trough-like container.
- If any liquid is detected on the device, disconnect the power cable from the supply mains right away and do not touch the product.
- Make sure that the surface of the product is absolutely dry before plugging the power cable back in the socket.
- After interventions on and repairs of the device and before re-use, have the service personnel perform safety checks on the device.

2.5 Accessories and combination with other equipment

Use of un-authorised accessories or un-authorised modifications of the device could lead to injury.

- Only use accessories that have been approved for combination with the product by the manufacturer.
- Only use accessories that are equipped with standardised interfaces.
- Do not make any modifications to the device unless these have been approved by the manufacturer of the product.

Improper use of handpieces can cause injuries.

You need to comply with the following guidelines to ensure the safe use of the electrically-driven handpieces:

- Follow the instructions for use of the respective handpiece.
- Check the speed setting each time you turn on the device.
- Comply with the permissible maximal speed and maximal contact pressure of the tools as specified by the tool manufacturer.
- Comply with the servicing instructions for handpieces as specified in the respective instructions for use.
- Never press the push-button during operation of the device.
- Never use the push-button to lift the cheek or tongue.

If the transmission ratio selected on the device differs from the transmission ratio of the dental instrument, the files may rotate too fast and cause injury.

- Make sure that the handpiece you use and the setting of the transmission ratio are consistent.

Improper use of tools, e.g. wrong files, can cause injuries.

- Follow manufacturer's instructions (mode of operation, speed, torque levels, torsion resistance, etc.), and use the files according to their intended use.

Some file systems are designed for use with certain contra-angle handpieces. They must not be used with other contra-angle handpieces as this may lead to injury.

- Only use the Kerr TF Adaptive file system with the Kerr elements 8:1 or KaVo SMARTmatic 8:1 handpiece.
- Use hand files with the Kerr M4 contra-angle handpiece exclusively.

2.6 Qualification of personnel

Application of the product by users without the appropriate medical training could injure the patients, the users or third parties.

- Make sure that the user has read and understood the instructions for use.
- Only employ the device if the user has the appropriate medical training.
- Observe national and regional regulations.

The bluish LED light of the motors can damage the cornea or lens of the eye.

- Do not gaze into the lamp when it is in operation.
- Use adequate shielding for eye protection.

2.7 Service and repair

Servicing work that is described in the "Servicing" chapter of the present Instructions for Use can be performed by the operator/user.

Repairs and safety checks may only be performed by trained service personnel. The following persons are authorised to do this:

- Service technicians of Kerr branches after the appropriate product training
- Service technicians of Kerr authorised dealers after the appropriate product training
- Independent service technicians after the appropriate product training

Observe all the following items during servicing work:

- Have the service and testing tasks carried out according to the Medical Device Operator Ordinance.
- After interventions on and repairs of the device and before re-use, have the service personnel perform safety checks on the device.
- The device should be serviced, cleaned, and stored in a dry location, and should be disconnected from the mains, according to instructions, if it is not to be used for extended periods.

Note
Kerr provides wiring diagrams, component lists, descriptions, calibration instructions or other information on request to support the service personnel during repair work.

2.8 Electromagnetic fields

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

Medical electrical devices are subject to special precautions regarding electromagnetic compatibility and must be installed and operated in accordance with the tables of electromagnetic compatibility.

See also:

12 Information about electromagnetic compatibility, Page 53

High-frequency communications devices may interfere with medical electrical devices.

- Ask patients if they have a cardiac pacemaker or other system implanted before you start the treatment.
- Comply with the tables of electromagnetic compatibility during installation and commissioning.
- If the device needs to be used in the immediate vicinity of other equipment, monitor the device or system for malfunctions.

3 Product description

The elements e-motion is a dental treatment unit for endodontic treatments. The elements e-motion consists of the control unit, power supply, power cable, foot control, motor cord, motor, instrument tray, and the elements 8:1 hand-piece.

See also:
3.2 Scope of delivery, Page 15

3.1 Intended use

Indications for use:

The medical device is intended to drive a dental motor for operation of electrically-driven dental handpieces. This device is intended for use by a trained professional in the field of general dentistry.

Proper use:

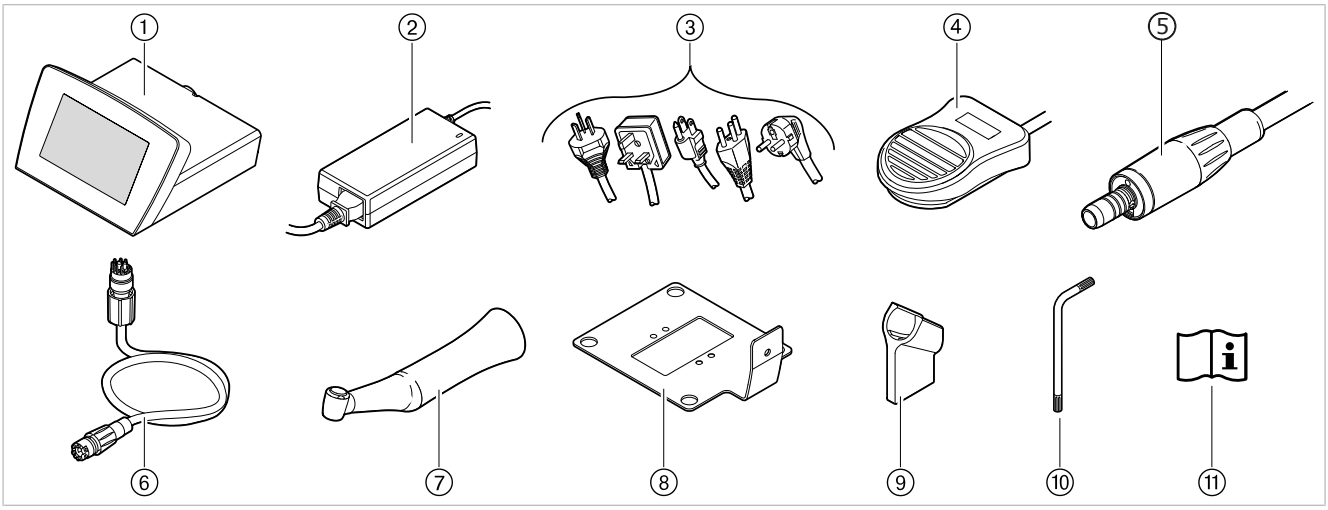
The overarching guidelines and/or national laws, national regulations and the rules of technology applicable to medical devices for startup and use of the KaVo product for the intended indications for use must be applied and followed.

Definition (indications for use)	Explanation
Main function	Dental treatment for endodontics
Application	For dental treatment of humans - root canal treatment

KaVo shall not be responsible for damage caused by:

- External factors or faulty installation
- The use of incorrect information
- Repair work carried out incorrectly
- If the 2-year service check have not been done

3.2 Scope of delivery



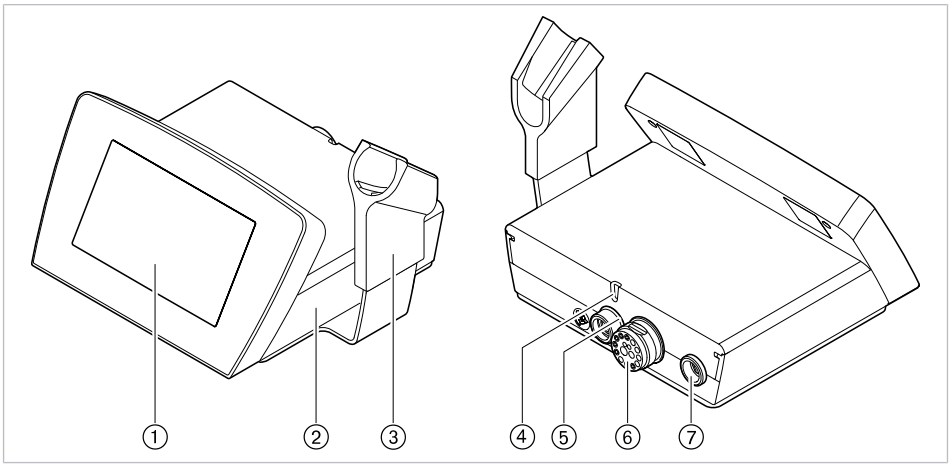
Scope of delivery of the elements e-motion:

① Control unit
② Power supply
③ Power cable (country-specific)
④ Foot control
⑤ INTRA LUX Motor KL 703 LED
⑥ Motor cord
⑦ elements 8:1 handpiece
⑧ Instrument tray, base plate (preinstalled)
⑨ Attachment for instrument tray
⑩ Offset screwdriver Torx T20
⑪ Instructions for use

Note
Use exclusively the power cables and mains plugs approved in the specific country. Use exclusively the power cables and mains plugs with the electrical nominal data as listed in the following table.

Power cable	Power plug	IEC coupler
▪ H05 VV F 3G C131.00 ▪ 250 VAC ▪ 10 A ▪ black	▪ 250 VAC ▪ 16 A ▪ black	▪ EN 60320 / C13 ▪ 10 A ▪ 250 VAC ▪ black

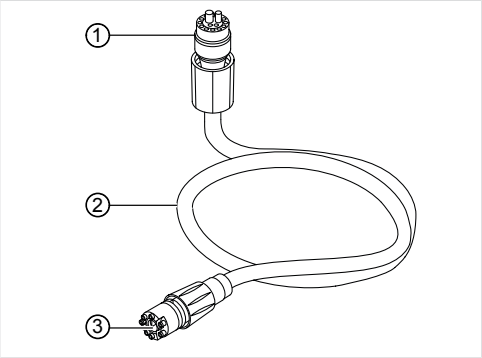
3.3 Overview of elements e-motion



Front and rear of the elements e-motion

① Control panel
② Control unit
③ Instrument tray
④ Inspection window status LED
⑤ Power supply connector
⑥ Motor cord connector
⑦ Foot control connector

3.4 Motor cord



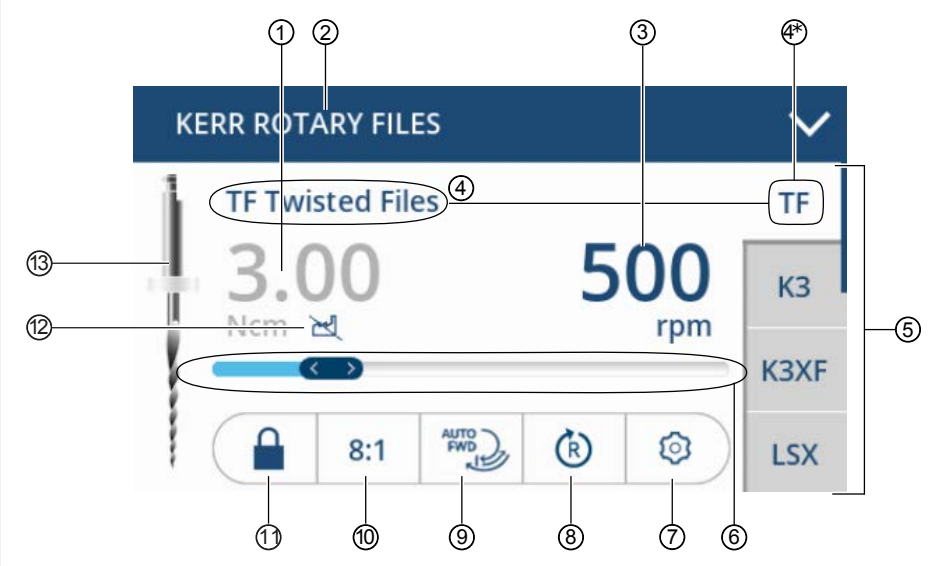
① Connector for elements e-motion
② Motor cord
③ Connector for motor

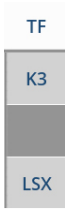
3.5 Control panel

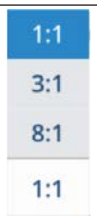
The device is operated by means of a touch display. The control elements on the touch display are either toggle switches or show a selection list when touched.

- Values/figures shown with a blue background are active
- Values/figures shown with a grey background are deactivated
- Speed/file shown with a white background is activated/selected

Example, display information



Pos. no.	Description	active/deactivated	Presentation
①	Display/toggle switch "Speed"/"Torque"*	Torque is deactivated = 3.00 Ncm	grey font color
②	Selection list "File sequence"	KERR ROTARY FILES	blue background
③	Display/toggle switch "Speed"/"Torque"*	Speed is active = 500 rpm (min^{-1})	blue font color
④	Displays the selected File System	File system "Twisted Files" is selected	white background
④*	Displays specific file within a file system (when applicable)	Specific file "TF" is selected	white background
⑤	Selection list "Files" (up to 10 files can be pre-set) Selection list can be shifted vertically by touching it	File TF is selected	white background = file is selected grey background = file is not selected dark grey = file is deactivated 
⑥	Slider for speed/ torque*	Speed is active	Slider shows the position within the available range by the blue bar.

Pos. no.	Description	active/deactivated	Presentation
⑦	Menu "Settings"	deactivated	Menu "Settings"  **See also:** 5.2 Changing the device settings, Page 28
⑧	Toggle switch "Direction of motor rotation"	Clockwise rotation is active (is preset)	
⑨	Selection list "Torque mode"	Autorev / Forward is active	
⑩	Selection list "Instrument transmission ratio"	1:1 is active	
⑪	Toggle switch "Lock"	Lock is locked (is preset)	
⑫	Speed/torque are inconsistent with the data from the file database (file manufacturer's recommended settings)	active	
⑬	File representation Rotary files or hand files (only shown for "M4 Safety")	Rotary File is displayed	

3.6 Technical specifications of the elements e-motion

Dimensions of the package

Length	525 mm / 20.67"
Width	230 mm / 9.06"
Altitude	255 mm / 10.04"

Dimensions and weight of control unit including instrument tray base plate

Width	168 mm / 6.61"
Depth	148 mm / 5.83"
Altitude	81 mm / 3.19"
Weight of the elements e-motion	ca. 680 g / 23.99 ounces

Requirements

Protection class control unit	IP 31
Protection class for the footswitch	IP X8

Ambient conditions

Permissible installation sites	Indoor use
Permissible ambient temperature range	+10°C to +26°C / +50°F to +79°F
Maximum relative humidity	80 % at 31 °C / 88 °F
Maximum relative humidity	linearly decreasing 50 % at 40 ° / 104 °F
Pollution degree	2
Permissible up to	3,000 m / 9843 feet altitude
Atmospheric pressure limitation	700 to 1060 hPa

Transportation and storage conditions

Permissible ambient temperature range	-20°C to +50°C / -4°F to +122°F
Permissible up to a maximum humidity of	5% to 90% non-condensing
Atmospheric pressure limitation	700 to 1060 hPa

Mode: intermittent operation

Operating time	0.5 minutes
Pause time	9 minutes

- Do not exceed the threshold load of the motor of 0.5 minutes operating time / 9 minutes pause.

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 dental professional.

Speed

Speed range of the Motor KL 703	100 - 20,000 rpm (min^{-1})

Motor torque

Maximum torque of the Motor KL 703	2 Ncm
Torque of the Motor KL 703 minimum	0.1 Ncm

Electrical ratings

Input voltage	24 V DC
Power	max. 65 W

Motor cords

Length of connection cord	2.00 m / 78.74"

3.7 Symbols on product and rating plate

The rating plates are affixed to the underside of the unit.

Accompanying documents

	Caution
	Follow instructions for use
	Consult instructions for use
	Please note the electronic instructions for use

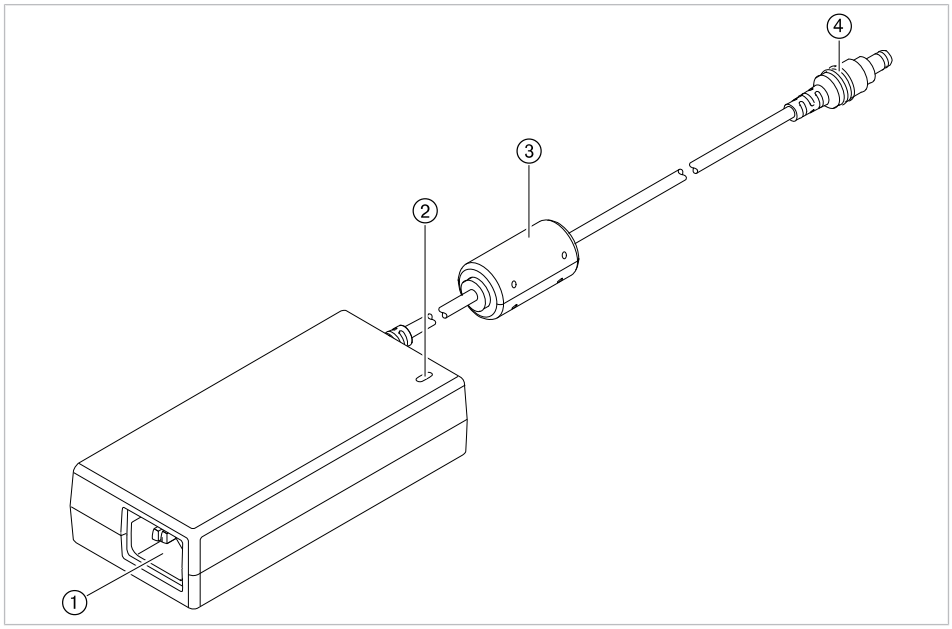
Certification

	CE mark (Communauté Européenne)
	VDE mark
	MET mark

Product characteristics

	Manufacturer
Type	Device type
SN	Serial number
REF	Material number
	Type B applied part
	Supply voltage
	Operating mode: continuous operation with intermittent load
	Class II equipment
	Do not dispose this product into the ordinary municipal waste or garbage system

3.8 Power supply



① Mains connection
② Standby LED display
③ Connection cord
④ DC connector for elements e-motion

3.9 Technical specifications of the power supply 1.013.4796

Note
The connection of the power supply must comply with the country-specific regulations and requirements for medical devices.

Dimensions and weight

Width	129 mm / 5.08"
Altitude	32 mm / 1.26"
Depth	59 mm / 2.32"
Weight	333 g / 11.75 ounces
Length of connection cord	2.00 m / 78.74"

Electrical ratings

Supply voltage	100 to 240 V AC, 50 to 60 Hz
Output voltage	24 V DC
Power	65 W
Current	2.71 A
Overvoltage category	II
Line voltage fluctuations	± 10 %

Requirements

Class of protection	II with functional earthing
Protection class	IP 40

Ambient conditions

Permissible installation sites	Indoor use
Permissible ambient temperature range	+10°C to +26°C / +50°F to +79°F
Maximum relative humidity	80 % at 31 °C / 88 °F
Maximum relative humidity	linearly decreasing 50 % at 40 ° / 104 °F
Pollution degree	2
Permissible up to	3,000 m / 9843 feet altitude
Atmospheric pressure limitation	700 to 1060 hPa

3.10 Symbols on the nameplate of the power supply

The nameplate is located on the underside of the device.

Certification

Symbol	Meaning
	TÜV Rheinland mark
	UL mark for components for USA/Canada
	CE mark (European Conformity mark)

Product characteristics

Symbol	Meaning
Model NO	Device type
REF	Catalog number
AC INPUT:	Input data: voltage, frequency, current
DC OUTPUT:	Output data: power, voltage, current
S/N:	Serial number
P/N:	Part#
	Do not dispose this product into the ordinary municipal waste or garbage system.

4 Installation

4.1 Location

⚠ CAUTION

Power supply and cords/hoses are on the floor.

Slipping and tripping.

- Power supply and cord/hoses need to be set-up/routed appropriately such that they are not on the floor.

Note

To completely disconnect the device from the mains, the mains plug must be pulled. For this reason, the unit must be set-up appropriately such that the mains plug and the electrical outlet are easily accessible.

Note

Mind the electrical cord of the power supply! Route all cords appropriately such that they do not get squashed, clamped or have a chair rolling over them.

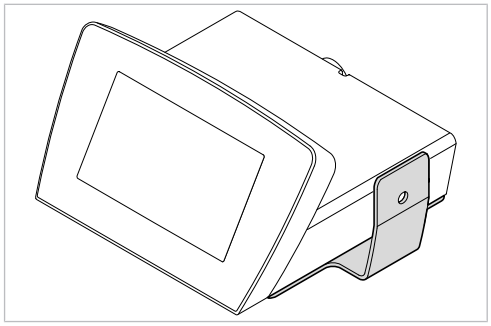
Note

Use the power supply in dry environments exclusively. Make sure that the power supply is protected from the ingress of liquids.

- Place the product in an easily accessible place and visible for diagnostic purposes.

4.2 Installing the instrument tray

The base plate of the instrument tray is preinstalled already on the right side of the unit at the time of delivery. Optionally, the base plate can just as well be installed on the left side of the unit.

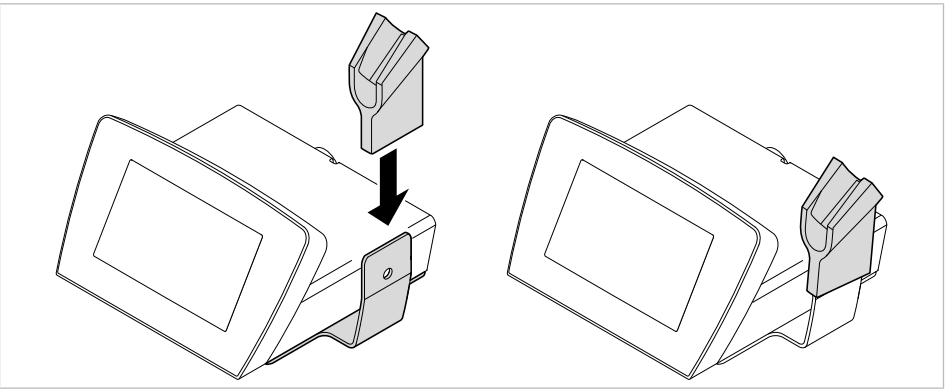


elements e-motion with preinstalled base plate

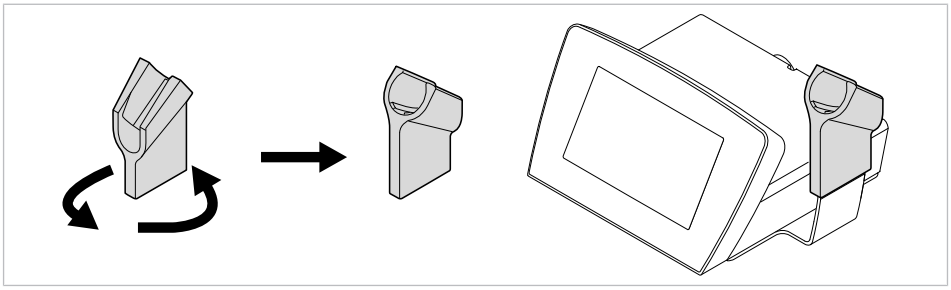
To be able to use the instrument tray, the attachment for the instrument tray needs to be installed. The attachment can be plugged on in either direction onto the metal bracket of the base plate.

Installing the attachment for the instrument tray

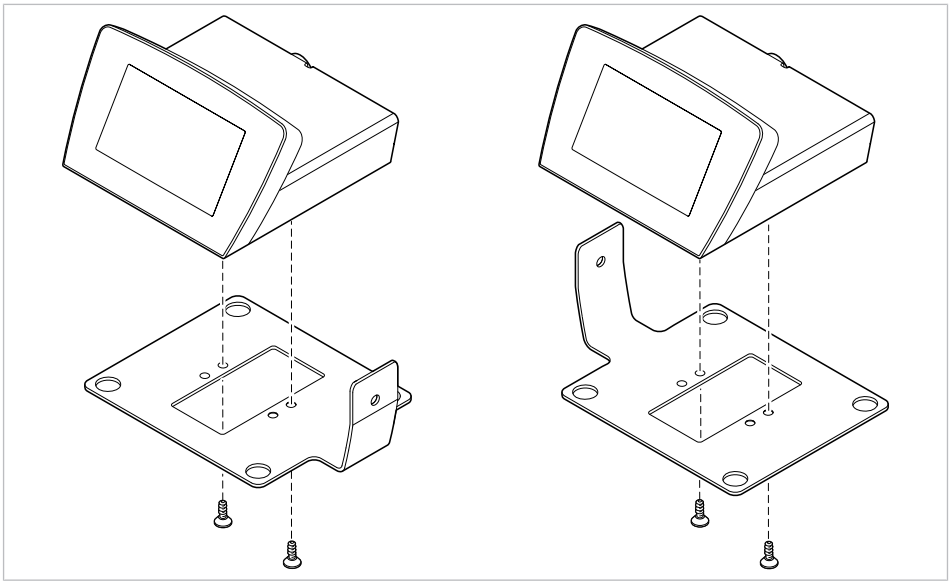
- Plug the attachment onto the metal bracket of the base plate.



- If preferred, twist the attachment and plug it on.



Rotate the base plate



- Undo the two screws on the underside of the unit using the Torx T20 offset screwdriver.
- Rotate the base plate and re-tighten the two screws with the Torx T20 offset screwdriver.
- Plug the attachment in the desired direction onto the metal bracket of the base plate.

5 Startup

⚠ WARNING

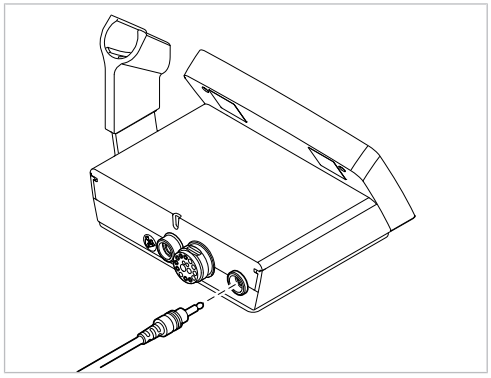
Accessible parts.
Risk of injury.
- Do not touch the foot control jack or the motor cord connector and the patient simultaneously.

Note
The elements e-motion must be operated exclusively with the INTRAmatic LUX KL703 motor and the power supply (Mat. no. 1.013.4796).

5.1 Connector

5.1.1 Connecting the foot control

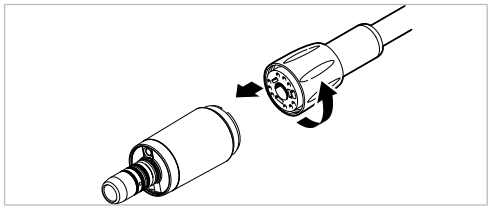
- Plug the jack of the foot control into the elements e-motion.



5.1.2 Connecting the motor

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

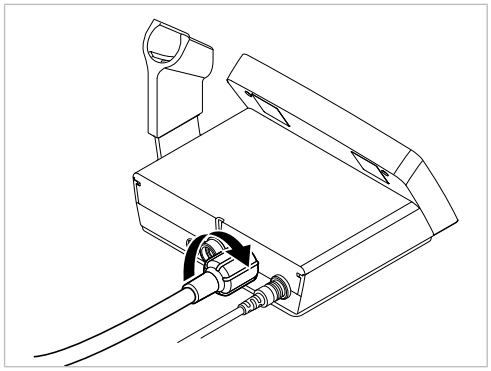
⇨ The correct attachment position is attained automatically.



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

5.1.3 Connect the motor cord

- Plug the motor cord onto the motor cord connector on the rear of the elements e-motion and screw it tight.



5.1.4 Connect the power supply

⚠ CAUTION

Power supply and cords/hoses are on the floor.

Slipping and tripping.

- Power supply and cord/hoses need to be set-up/routed appropriately such that they are not on the floor.

NOTICE

Property damage from non-approved power supply.

Property damage to the product.

- Operate the product with the power supply (Mat. no. 1.013.4796) exclusively.

Note

The connection of the power supply must comply with the country-specific regulations and requirements for medical devices.

Note

The power supply automatically adjusts to the available mains voltage.

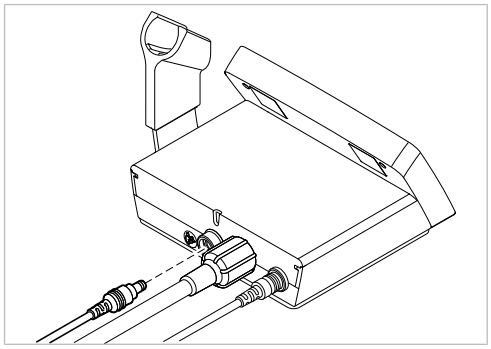
Note

The protective earth conductor is used as functional earthing (FE) rather than as protective earthing (PE).

Note

Use the power supply in dry environments exclusively. Make sure that the power supply is protected from the ingress of liquids.

- Plug the power supply into the socket of the elements e-motion.



- Connect the power cable first to the power supply and then to the supply mains socket.
- Route the cords appropriately such that there is no kinking.
- Affix the cord with cord ties and/or cord tape.

5.2 Changing the device settings

- Tap the "Lock" control element to unlock settings.

- If the settings are unlocked, press the control element, "Settings", to start the "Settings" menu.

- Press the arrow control keys to select the various parameters.

- Press the Plus control element to increase a value.

or

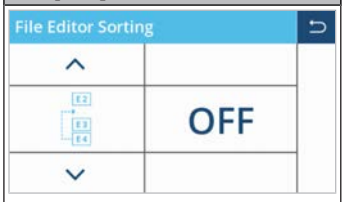
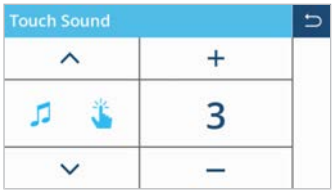
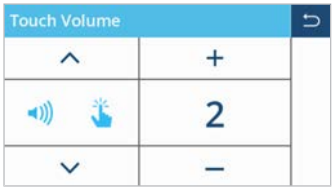
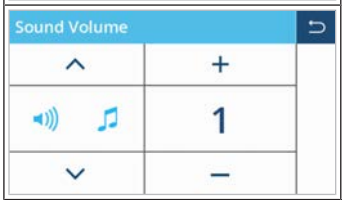
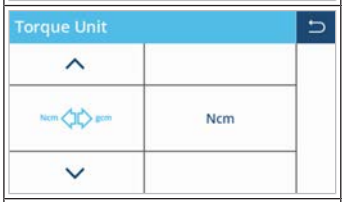
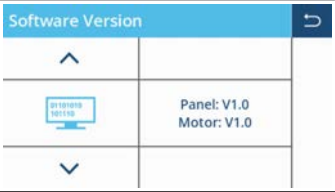
- Press the Minus control element to decrease a value.

⇨ The settings are always saved instantaneously.

- Press the "Back" control element to exit from the "Settings" menu.

The following device settings can be changed according to need and/or displayed when the device is being put into service.

Display information	Setting
	The LUX brightness can be adjusted between 0 and 4. "0" means that the LUX light is switched off. Default (factory setting) = 0
	The LUX afterglow time of the straight or contra-angle handpiece can be adjusted between 0 and 9 seconds. "0" means that the LUX light does not afterglow.

Display information	Setting
	The shifting of the files in the file editor can be switched on or off. Press the "ON/OFF" control element to switch the shifting of files in the file editor on or off. In the default setting, the shifting of files is switched off (OFF). **See also:** 6.4.7 Defining/changing file sequences in the file editor, Page 36
	You can select from 3 different kinds of key tones upon touching a control element.
	The volume of the tone when you touch a control element can be adjusted between 1 and 3.
	The volume of the notifying signal can be adjusted between 1 and 3.
	The torque display can be selected to be in units of Ncm or gcm. To switch the unit, press the displayed unit.
	Reset the device to factory settings. Restores the condition of the device at the time of delivery. Press the "Factory settings" control element to reset the device to factory settings. The reset needs to be confirmed in an additional step. Defined file sequences are deleted and reset.
	Display of the software versions of the panel and motor.

6 Operation

NOTICE

Incorrectly set input values.

Property damage from incorrect input values.

- ▸ Check the following input values on the display before use:

- Speeds
- Transmission ratios
- Torque
- Direction of motor rotation
- Settings
- Own settings

Note

Please note the transmission/reduction ratio of the attached handpieces as these have an impact on the displayed speed and the display torque of the clamped tool.

Note

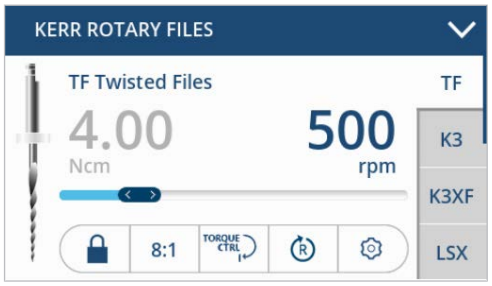
If the foot control is pressed continuously without interruption, e.g. when something is lying on the foot control, both the LUX light and the motor are automatically switched off after approx. 10 minutes.

6.1 Switching the elements e-motion on/off

The unit is ready for operation as soon as it is connected.

- ▸ To switch the product on, connect the device to the power circuit.

⇨ The display of the elements e-motion shows the input values:



Display elements e-motion

- ▸ To switch the device off, unplug the unit from the mains.

Note

The power consumption on idling is so low that the device does not need to be disconnected.

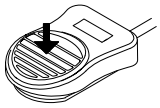
6.2 Stand-by mode

The device switches to a screen saver mode if it is not used for a period of 10 minutes.

The display is switched off to save power if the device is not used for a period of 30 minutes.

- ▸ To reactivate the display, touch the display or press the foot control.

6.3 Starting-up the motor



- Press the foot control to start the motor.

⇨ The motor rotates at the speed and motion set on the display.

6.4 Operating the elements e-motion

Note
Please note the transmission/reduction ratio of the attached handpieces as these have an impact on the displayed speed and the display torque of the clamped tool.

⚠ WARNING

The transmission ratio selected on the device is inconsistent with the transmission ratio of the handpiece.
Risk of injury from files rotating too fast.
- Make sure that the handpiece you use and the setting of the transmission ratio are consistent.

Note
The control of the device is matched to the efficiency of the following handpieces. Speed and torque can be assured only with the following handpieces.

8:1 handpieces	KaVo contra-angle handpieces 1:1	KaVo 1:1 shanks	KaVo 1:1 heads	KaVo 3:1 heads
KaVo SMARTmatic ENDO S81 (Mat. no. 1.011.6780)	SMARTmatic S20 (Mat. no. 1.011.6750)	INTRAmatic LUX shank 20 LH (Mat. no. 0.534.5850)	INTRA LUX head 68 LU (Mat. no. 1.003.7191)	INTRA LUX head 66 LU (Mat. no. 1.004.4587)
Kerr elements 8:1 (Mat. no. 1.011.6786)	SMARTmatic S20 S (Mat. no. 1.011.6752)	GENTLEpower LUX shank 20 LP (Mat. no. 1.001.7453)	INTRA Head L68 B (Mat. no. 1.008.1834)	INTRA Head L66 B (Mat. no. 1.008.1831)
		MASTERmatic LUX shank M20 L (Mat. no. 1.009.3620)		

Note
The INTRA LUX KL 703 LED motor has a torque range from 0.1 Ncm to 2 Ncm. If the torque is in excess of 2.0 Ncm, KaVo recommends using a reducing contra-angle handpiece 3:1 or 8:1 in order to reduce the load on and heating of the motor.
The reducing contra-angle handpiece should be selected appropriately such that the torques specified by the file manufacturer are within the recommended torque range (middle column):

Reduction ratio of contra-angle handpieces	Torque of the file	Minimum/maximum attainable torques
1:1 (M20 L with L68 B) 1:1 (S20) 1:1 (S20 S)	0.1 – 2.0 Ncm	0.1/2.0 Ncm
3:1 (M20 L with L66 B)	0.5 – 5.0 Ncm	0.45/5.0 Ncm
8:1 (ENDO S81)	1.5 – 6.0 Ncm	1.2/6.0 Ncm

Activated values are shown with a blue background and can be changed.
Deactivated values are shown with a grey background.

- To change a value with a grey background, activate the value by touching it.
- Once the value is activated, use the slider to set the value.

6.4.1 Setting the speed

Note
Changes of speed or torque are not saved permanently and are available only until the user exits from the view. In order to save the speed or torque permanently, the speed or torque need to be set in the file editor.

See also:
6.4.7 Defining/changing file sequences in the file editor, Page 36

File "TF" has, e.g., speed 500 rpm (min^{-1}) assigned to it.

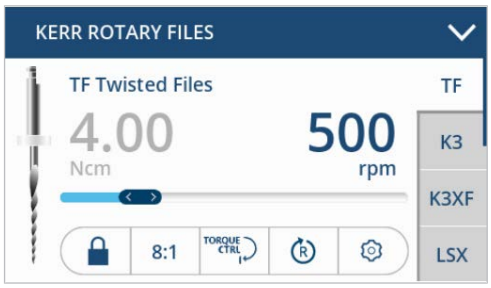
- If the torque is active, activate the speed by touching the speed value.
- Tap the "Lock" control element to unlock settings.
- If the settings are unlocked, pull the slider to the right or left to change the speed.

If the set speed differs from the recommended value of this file, a crossed-out factory symbol is shown.

6.4.2 Setting the torque

Note
Changes of speed or torque are not saved permanently and are available only until the user exits from the view. In order to save the speed or torque permanently, the speed or torque need to be set in the file editor.

See also:
6.4.7 Defining/changing file sequences in the file editor, Page 36



This file has a torque of, e.g., 4.00 Ncm assigned to it.

- If the speed is active, activate the torque by touching the torque value.
- Tap the "Lock" control element to unlock settings.
- If the settings are unlocked, pull the slider to the right or left to change the torque.

The torque is limited to the set value.

Note
A notice signal is issued once a level of 90% of the set torque is reached.

If the set torque of the file differs from the recommended value of this file, a crossed-out factory symbol is shown.

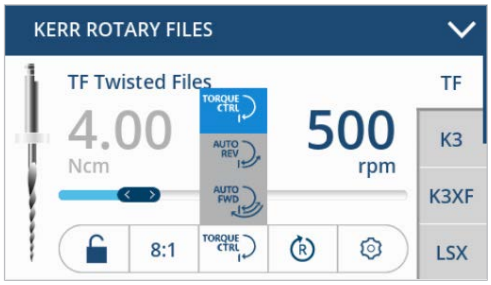
6.4.3 Selecting torque mode

Note
The torque mode is deactivated in the TF Adaptive Motion.

There are three different torque modes:

- Autorev/Forward
- Auto-reverse
- Torque Control

- Tap the "Lock" control element to unlock settings.
- If the settings are unlocked, press the "Torque mode" control element to display a selection list.



- Select the torque mode from the selection list.

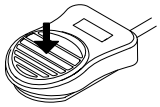
⇨ The torque mode is shown on the display.

⇨ The displayed torque mode is saved.

Autorev / Forward function

Note
Autorev / Forward function is the default torque mode for all rotary files.

Autorev / Forward is active.

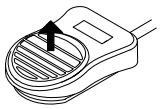


- Press the foot control.

⇨ The motor starts.

Once 90% of the set torque value are reached, a notifying beep is issued and the light starts to pulse. Once the set torque is reached, the motor stops and then automatically starts at the same speed in counterclockwise direction.

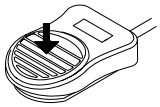
In Autorev/Forward mode, the motor automatically returns to clockwise rotation after 1 second such that the user does not have to stop it with the foot control.



- To stop this release the foot control.

Autoreverse function

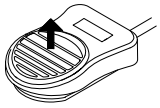
Autoreverse is active.



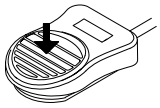
- Press the foot control.

⇨ The motor starts.

Once 90% of the set torque value are reached, a notifying beep is issued and the light starts to pulse. Once the set torque is reached, the motor stops and then automatically starts at the same speed in counterclockwise direction.

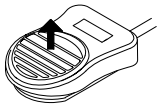


- To stop this release the foot control.



- Press the foot control.

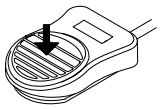
⇨ The motor rotates clockwise again.



- To stop this release the foot control.

Torque Control function

Torque Control is active.



▸ Press the foot control.

⇨ The motor starts.

The torque is limited to the set threshold.
Once the limit is reached, the rotation stops, while the torque is being maintained.
Once some load is taken off the motor, the rotation continues.
Once 90% of the set torque value are reached, a notifying beep is issued and the light starts to pulse.

See also:
6.4.2 Setting the torque, Page 32

Note
A notice signal is issued once a level of 90% of the set torque is reached.

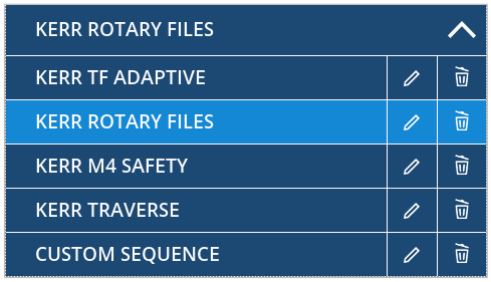
6.4.4 File database

The elements e-motion possesses an integrated file database. It is necessary to check if the file data are up-to-date by comparing them to the respective manufacturer information. Speed and torque of the files in the file database correspond to the maximum permissible values of the respective manufacturer.
The file database includes data on the following file systems and manufacturers:

Manufacturer	File system	Manufacturer	File system
COLTENE	▪ HyFlex™ EDM ▪ HyFlex™ CM	Dentsply	▪ ProFile® ▪ ProTaper® Universal ▪ ProTaper Next ▪ ProFile® GT ▪ PathFile™ ▪ GT Series X® ▪ ProFile® Vortex® ▪ Protaper Gold ▪ Vortex Blue ▪ TRUShape
FKG	▪ BioRace		
KOMET	▪ F360		
MICRO-MEGA	▪ Hero 642® ▪ Revo-S™		
Kerr Endodontics (SybronEndo)	▪ K3™ ▪ K3XF ▪ Traverse ▪ LightSpeed ▪ TF™ Twisted Files ▪ TF Adaptive		
VDW	▪ Mtwo®		

6.4.5 Selecting a file sequence

- Select the file sequence using the "File sequence" selection list by pressing the desired file sequence (presently KERR ROTARY FILES).

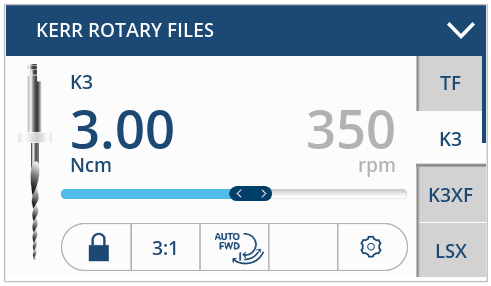


⇨ The display shows the selected file sequence.

6.4.6 Selecting files

Each file sequence has up to 10 files (1 to 10) assigned to it. Usually, these 10 files are used in sequence proceeding from 1 to 10 depending on the indication.

- To select a file, press the short name (or geometry) of the file on the right selection list and move the selection list up or down, if needed.



⇨ The selected file is shown with a white background, presently: K3.

6.4.7 Defining/changing file sequences in the file editor

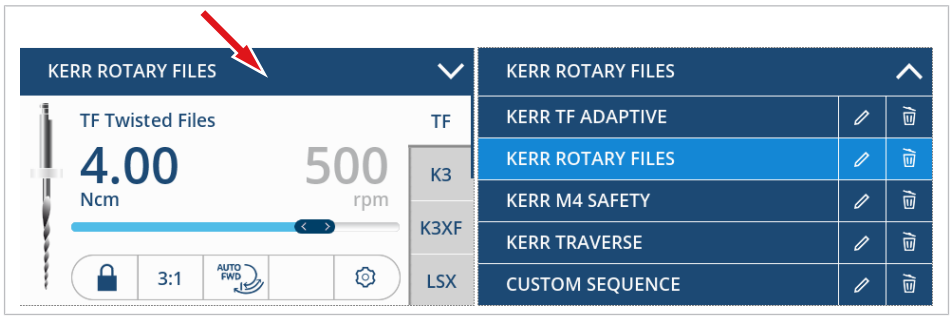
The user can compile individual workflows by defining file sequences in the file editor. Up to 5 different file sequences with 10 files each can be defined. Files from different file systems can be combined in a file sequence.

The device contains a total of 5 sequences, 4 are pre-configured sequences and 1 sequence is not configured. All of the 5 sequences can be adapted by the user.

The following sequences are pre-configured:

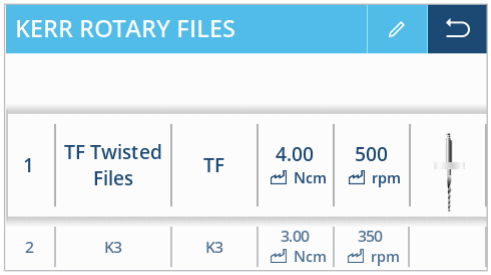
- Kerr TF Adaptive
- Kerr Rotary Files
- Kerr M4 Safety
- Kerr Traverse

- To open the file editor, tap one of the file sequences to display the selection list of the file sequences.



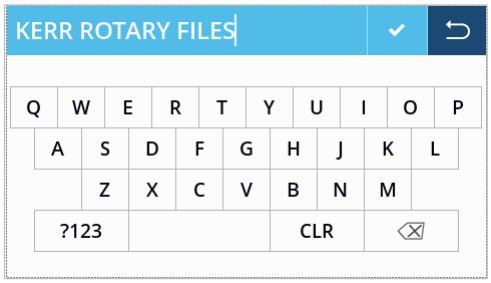
- Tap the "Pen" control element to edit the sequence.

⇨ The display shows file sequence "KERR ROTARY FILES" in editing mode.

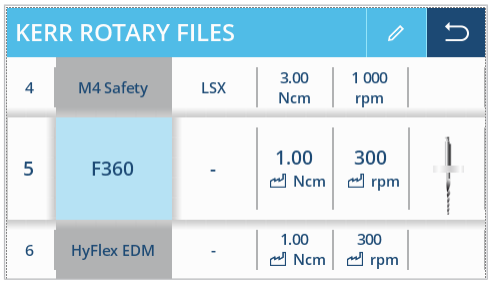


- Tap the "Pen" control element again to edit the sequence name.

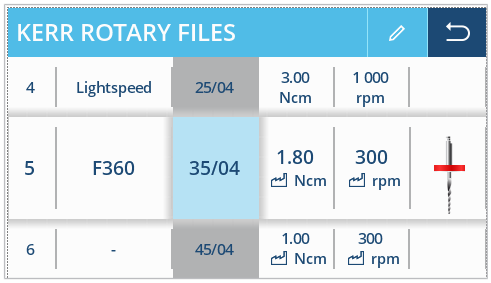
⇨ The display shows a keyboard.



- Edit "KERR ROTARY FILES" with the keyboard and confirm the input made with the "Checkmark" control element.
- Tap the second column "File system" and shift the column vertically in order to select the file system (e.g. F360).



- Tap the third column "File geometry" and shift the column vertically in order to select the file geometry.



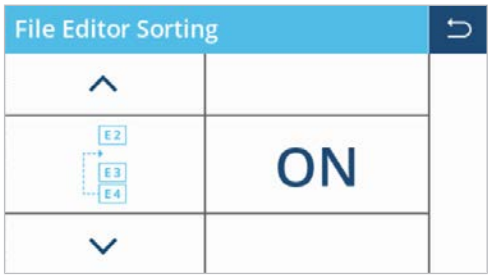
⇨ Once the file system and file geometry have been selected, the columns "Torque", "Speed" and "Colour bar" are assigned automatically except for the user-defined files.

⇨ The data concerning the file systems and file geometries are stored in a file database, except for the user-defined files.

Speed and torque of the files from the file database can be changed. The data recommended by the manufacturer of the file are indicated by a factory symbol.

Changing the file position in the sequence

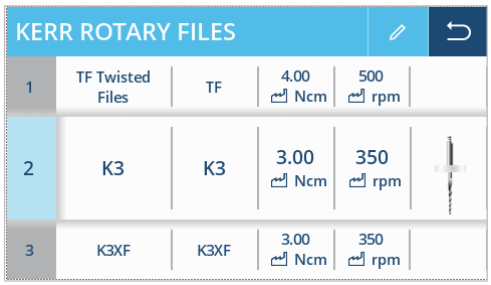
Requirement
File shifting is activated in the device settings (ON).



- Activate the "File Editor Sorting" setting of the device, if applicable.

See also:
5.2 Changing the device settings, Page 28

- Tap the first column "File position" and shift the column vertically in order to shift the position of the selected file in the sequence (presently: position 1).



- Tap the "Back" control element to terminate the processing of file sequences.

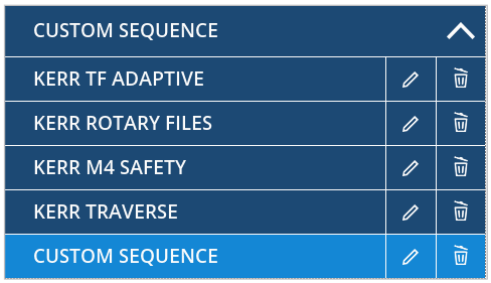
⇨ The set data are saved.

Defining/changing user-defined files

By selecting and adapting the data of user-defined files, the user can insert a file system that is not stored in the database into a sequence.

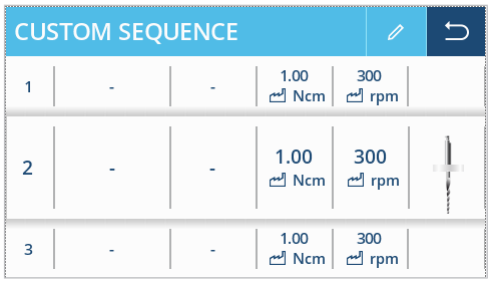
In order to define a user-defined file, the "FILE" entry in the second column "File system" of the file editor must be selected.

- Open the file editor, then tap file sequence "CUSTOM SEQUENCE" to display the selection list of the file sequences.



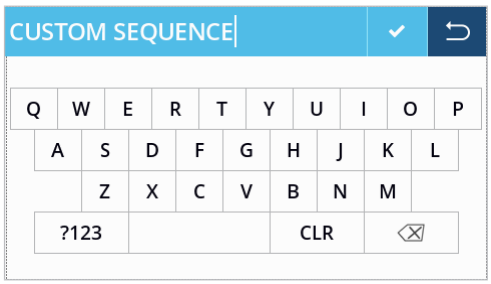
- Tap the "Pen" control element to edit the sequence.

⇨ The display shows file sequence "CUSTOM SEQUENCE" in editing mode.

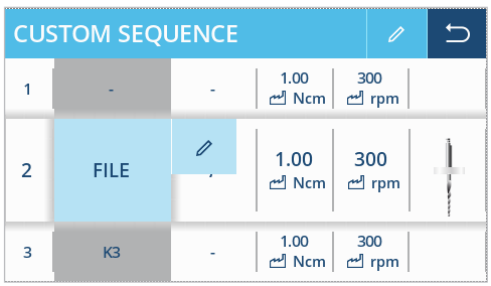


- Tap the "Pen" control element again to edit the sequence name.

⇨ The display shows a keyboard.



- Edit "CUSTOM SEQUENCE" with the keyboard and confirm the input made with the "Checkmark" control element.
- In order to define user-defined files, tap the second column "File system" and shift the column vertically until "FILE" is shown with a blue background.



- Tap the "Pen" control element again to edit the file name.

⇨ All other data need to be selected manually by the user.

- Assign all other data in accordance with the specifications of the file manufacturer. For this purpose, tap the respective column and shift it until the data value is shown with a blue background.

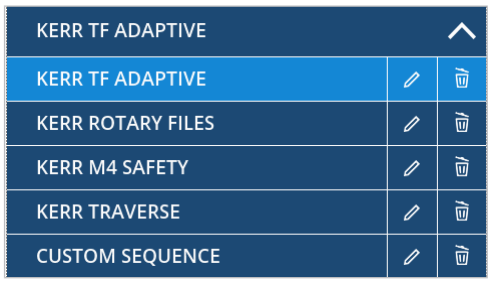
- Tap the "Back" control element to terminate the processing of file sequences.

⇨ The set data are saved.

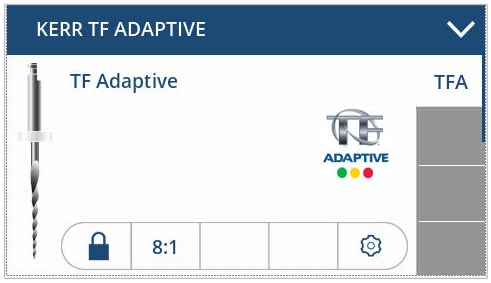
TF Adaptive

Kerr recommends the Adaptive Motion for TF Adaptive files.

- To use the TF Adaptive, select the sequence "KERR TF ADAPTIVE"



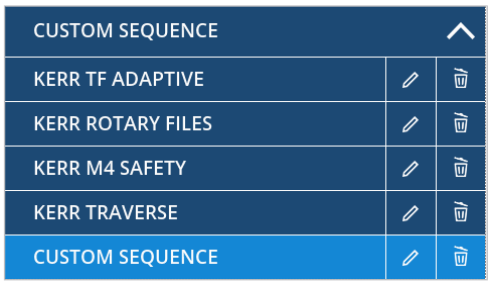
- Select the "TFA" file, if applicable.



Note

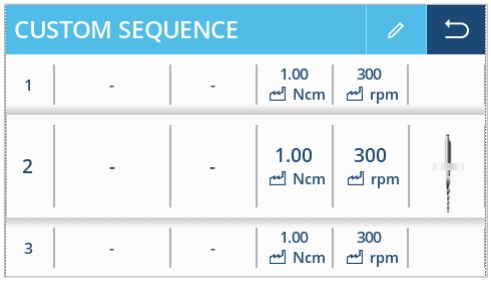
The sequence "KERR TF ADAPTIVE" contains the "TFA" file, both are pre-installed as the first sequence and first file. These configuration can be changed by the user.

- To add the TF Adaptive file to another sequences, proceed as follows:
- Open the file editor, then tap file sequence "CUSTOM SEQUENCE" to display the selection list of the file sequences.

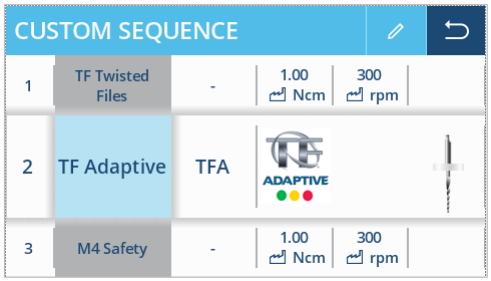


- Tap the "Pen" control element to edit the sequence.

⇨ The display shows file sequence "CUSTOM SEQUENCE" in editing mode.



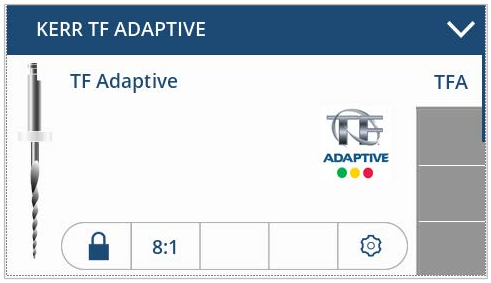
- Tap the second column "File system" and shift the column vertically until "TF Adaptive" is shown with a blue background.



- Tap the "Back" control element to terminate the processing of file sequences.

⇨ The set data are saved.

When the TF Adaptive file is selected, the display shows the following:

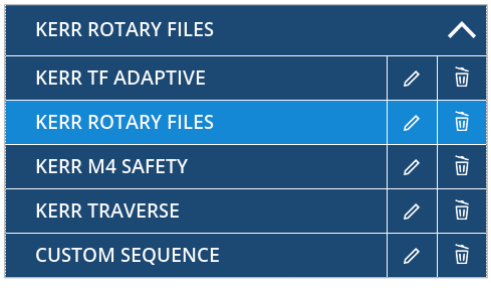


Note
The TF Adaptive file and the TF Adaptive Motion can only be used with the 8:1 handpiece. The speed, torque and motion for the TF Adaptive file and TF Adaptive Motion are defined and cannot be changed by the user.

Deactivating file from file sequence

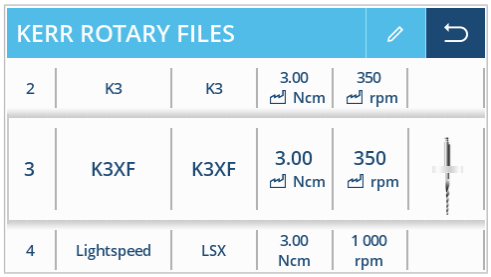
If the user does not need all 10 files of the file sequence for treatment, he or she can deactivate files in the sequence.

- Open the file editor, tap file sequence (for example, "KERR ROTARY FILES") to display the selection list of the file sequences.

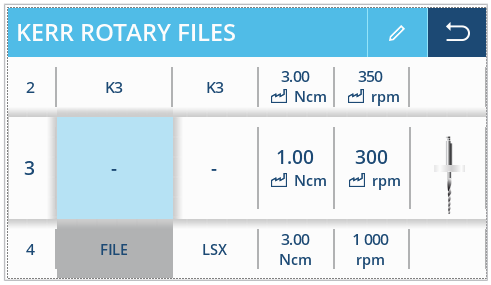


- Tap the "Pen" control element to edit the sequence.

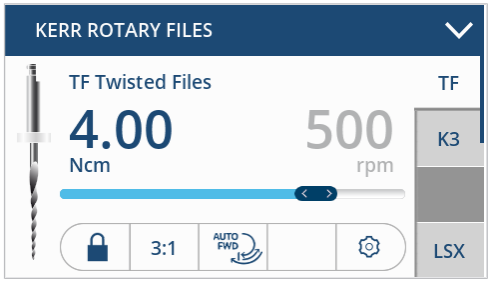
⇨ The display shows file sequence "KERR ROTARY FILES" in editing mode.



- Select the file to be deactivated.
- Tap the second column "File system" and shift the column vertically until the symbol for deactivated "-" is selected.



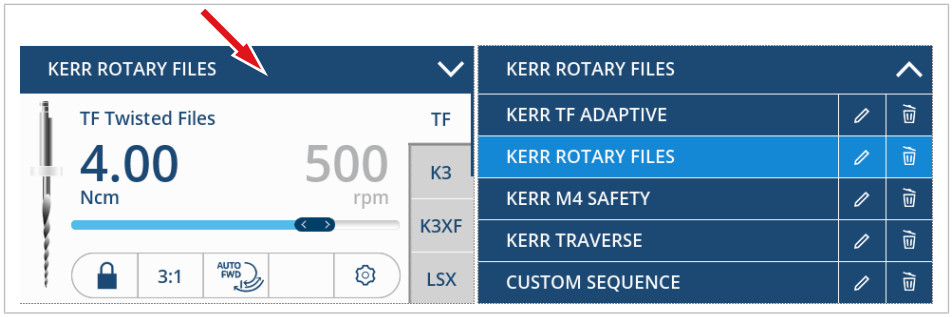
If a file is deactivated, it is shown in a darker grey, presently file "3". Since a deactivated file cannot be selected, the data of the selected file "1" are displayed in the figure below.



6.4.8 Deleting a file sequence

Requirement
File sequence is selected.

- Tap the file sequence to display the selection list of the file sequences.



- Select the file sequence and tap on the waste bin symbol, to delete the file sequence.

- ▸ Confirm the command.

⇨ File sequence with all associated files will be deleted.

Note

This command deletes the file sequence completely, with name and all files associated with the sequence.

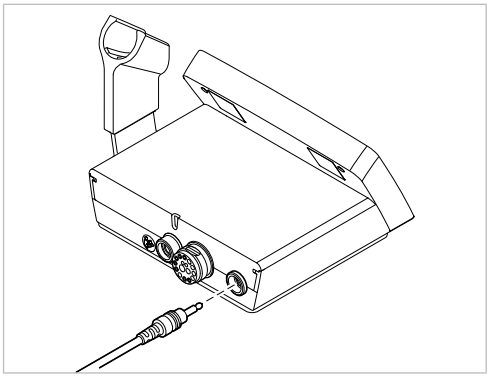
7 Decommissioning

7.1 Disconnecting the electrical connection

- To disconnect the power cable from the mains, unplug the connector of the power supply from the supply mains socket.
- Unplug the power cable from the device.

7.2 Disconnecting the foot control

- Unplug the jack of the foot control from the elements e-motion.



7.3 Unplugging the motor

- Unscrew the plug of the motor cord from the connector on the device. Make sure to grasp the plug as close to the device as possible.

Note
Cleaning and disinfecting the motor connected with the motor cord.

See also:
Instructions for use INTRA LUX KL 703 LED

8 Reprocessing steps in accordance with ISO 17664

Note
The reprocessing steps for the motor and the straight and contra-angle handpieces are described in the corresponding instructions for use.

NOTICE

Improper disinfection.
Property damage to the product.
- Do not immerse product in liquids.
- Use disinfectant in accordance with the instructions of the manufacturer.
- Do not use spray disinfection.
- Only disinfect by wiping.
- Never use chlorine-containing disinfectants.

Note
The reprocessing instructions have been validated by the manufacturer. Any departure from the instructions provided must be checked by the reprocessing entity for efficacy and possible detrimental consequences.

8.1 Cleaning

Note
Do not use solvents or aggressive chemicals.

8.1.1 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.

8.1.2 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 all external surfaces of the elements e-motion housing and the external surfaces of the motor cord with the lightly dampened cloth.

8.1.3 Manual internal cleaning

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

8.1.4 Automated external and internal cleaning

The following parts of the unit are released for machine-based cleaning:

- elements 8:1 handpiece
- INTRA LUX Motor KL 703 LED

Note
The reprocessing steps for the elements 8:1 handpiece or the INTRA LUX motor KL 703 LED are described in the corresponding Instructions for use.

8.2 Disinfection

Note
The unit must be disinfected manually only.

8.2.1 Manual external disinfection

- Use a soft disposable cloth and an approved disinfectant for disinfection by wiping down all visible surfaces of the unit, foot control surfaces, and connecting cords. Make sure that all surfaces are fully wetted.
- Let the disinfectant act for the prescribed time.
- Dry the surfaces.

Permissible disinfectants (application range in accordance with the available manufacturer's instructions for use and national guidelines. Please note material safety data sheets.) KaVo recommends the following products based on the compatibility of the materials. The microbiological efficacy must be confirmed by the disinfectant manufacturer.

- FD 322 (Dürr)
- Microcide AF Liquid (Schülke & Mayr)
- CaviCide (Metrex)
- CaviWipes (Kerr)

Note
Follow the instructions for use of the disinfectant.

8.2.2 Automated external and internal disinfection

The following parts of the unit are released for machine-based disinfection:

- elements 8:1 handpiece
- INTRA LUX Motor KL 703 LED

Note
The reprocessing steps for the elements 8:1 handpiece or the INTRA LUX motor KL 703 LED are described in the corresponding Instructions for use.

8.3 Packaging

Not applicable.

8.4 Sterilisation

The following parts are released for sterilisation:

- elements 8:1 handpiece
- INTRA LUX Motor KL 703 LED

Note
The reprocessing steps for the elements 8:1 handpiece or the INTRA LUX motor KL 703 LED are described in the corresponding Instructions for use.

8.5 Storage

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

8.6 Service, inspection and testing after preparation

Note
It is essential to comply with the hygiene requirements (sterility) during the test after reprocessing. If sites of fracture and clear changes of the surface are visible, the parts need to be checked by the Service.

Check for cleanliness, intactness, servicing, and repair as described in the following:

- Check the adjustable functions of the unit and the motor function.
- Check the control commands on the foot control.

9 Servicing

Kerr recommends to use original parts for operation and repair only, since their safety, function, and specific suitability have been tested in extensive tests.

Note
Kerr grants no guarantee of function and Kerr accepts no liability unless original replacement parts and operating materials are used exclusively.

Note
The device must not be serviced or repaired during operation/use.

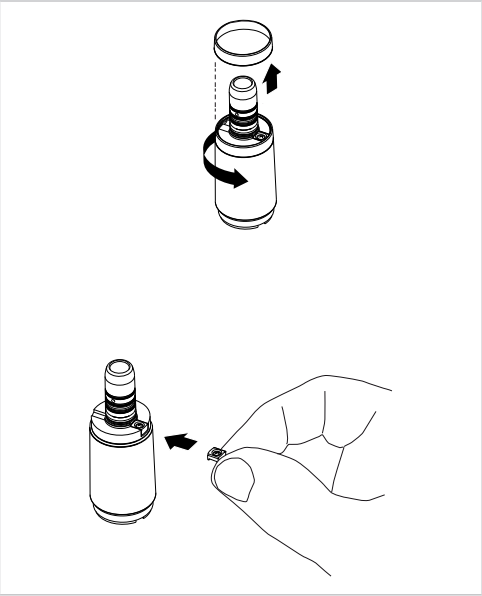
Servicing work described in the following can be performed by the operator/ user.

9.1 Replacing the LED lamp of the KL 703 motor

⚠ CAUTION

Danger from hot lamp.
Risk of burn injury.
- Do not touch lamp after previous operation. Let the lamp cool off.

- Pull the sleeve off while twisting it 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 surfaces align with those of the mount. Slide the lamp into the mount. Place the sleeve on the motor and pull it 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.

NOTICE

LED lamp inserted in wrong position/with wrong polarity.
Damage to or bending of the contacts.
- ▸ Make sure that position and polarity are correct.

Case 1: KaVo Mini LED lamp is on.

Case 2: The KaVo Mini LED lamp is faint
- Increase the cold light intensity in the Settings menu on the unit or the LUX brightness in the device settings 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.

9.2 Replacing the motor cord

- ▸ If the motor cord is defective, disconnect the motor cord from the motor and unscrew it and pull it off the rear of the elements e-motion device.
- ▸ Connect a new motor cord to the device and the motor.

See also:
5.1.3 Connect the motor cord, Page 27
5.1.2 Connecting the motor, Page 26

- ▸ Dispose of the defective motor cord in appropriate manner.

10 Troubleshooting

Note
This product displays error messages and/or instructions optically on its display.
The motor is shut off in any case of malfunction.

- If the error message does not disappear or the error is reported again, contact Service.
- Restart the unit with all the other error messages.

Malfunction	Cause	Remedy
Device malfunctions (no display, the LED on the rear of the device does not flash).	No voltage supply.	▸ Check/restore correct voltage supply and correct connection. ⇨ The standby LED on the power supply is on. **See also:** 3.8 Power supply, Page 22 ▸ If the standby LED on the power supply is not on, have the power supply be replaced. ▸ If error persists, notify the service engineer.
Device malfunctions (no display, the LED on the rear of the device flashes).	No voltage supply on the control panel. No connection to the control panel.	▸ Have the correct connection be checked/restored. ▸ Have the connection cord to the control panel be replaced. ▸ Have the control panel be replaced. ▸ If error persists, notify the service engineer.
Motor fails to start up.	Foot control is not plugged in or is defective.	▸ Unplug the foot control and then plug it in again. ▸ If error persists, notify the service engineer.
Maximum speed not reached.	Motor and/or handpiece are sluggish.	▸ Have the handpiece be replaced or repaired. ▸ If error persists, notify the service engineer.
LUX light is not on.	LUX light is deactivated in the device settings.	▸ Check if a LUX brightness > 0 is selected in the device settings. **See also:** 5.2 Changing the device settings, Page 28
	LED defective.	▸ Replace the LED. ▸ If error persists, notify the service engineer.
	Motor cord is defective.	▸ Have the motor cord be replaced.
	Device is defective.	▸ Have the control unit be replaced. ▸ If error persists, notify the service engineer.
Event E2	Foot control is being actuated during start-up.	▸ Do not actuate the foot control during start-up.
Event E3	No motor attached.	▸ Connect the motor.
Event E4	Motor blocked.	▸ Relieve the motor, stop and start on foot control.

Malfunction	Cause	Remedy
Event E5	Automatic light and motor shut-off during continuous operation of the motor.	▸ Comply with defined operating mode.
Event E8	Saved data or settings have been reset to starting value.	▸ Confirm message and check or correct the program settings. ▸ If error persists, notify the service engineer.
Event E12	No connection to motor.	▸ Check/restore correct connection. ▸ Have the motor cord be replaced. ▸ If error persists, notify the service engineer.
Event E14	Motor overload.	▸ Relieve the motor, stop and start on foot control.
All other events	Internal system error.	▸ Turn the unit off and on. ▸ If error persists, notify the service engineer.

11 Accessories and consumables

Description	Material number
Motor INTRA LUX KL 703 LED	1.007.0150*
Motor cord	815-1722
Mini LED for INTRA LUX KL 703 LED motor	1.007.8474*
O-ring set 8.3x0.68 for INTRAmatic	0.200.6120*
O-ring 17x1 (KL motor)	1.003.5822*
O-ring 17x0.8 (KL motor)	1.003.5656*
Foot control	815-1720
Attachment for instrument tray	1.013.5169*
KaVo contra-angle handpieces	See KaVo INTRAmatic Handpiece Programme
elements 8:1 handpiece	815-1655
Kerr M4 handpiece	Please contact your dealer or Kerr directly

* KaVo catalog number

Note
To order accessories and consumables or for more information, please contact Kerr Customer Service.

Kerr Customer Care
For repairs, please contact your local dealer or Kerr Customer Care directly:
Toll-free: +1-800-KERR-123
Homepage: www.kerrdental.com
Email: KerrCustCare@kavokerr.com

12 Information about electromagnetic compatibility

12.1 Guidelines and manufacturer's declaration - electromagnetic emission

The elements e-motion is intended for use in an environment of the kind specified below. The customer or user of the elements e-motion should make sure that the device is used in an environment of the specified type.

Measurements of emitted interference	**Conformance**	**Electromagnetic environment - Guidelines**
HF emissions according to EN 55011 (CISPR 11)	Group 1	The elements e-motion uses HF energy exclusively for its internal functions. Therefore, the HF emission of the device is very low and interference with adjacent electronic devices is unlikely.
HF emissions according to EN 55011 (CISPR 11)	Class B	The elements e-motion is suitable for use in all facilities, including residential facilities, and areas that are directly connected to a public supply mains that also supplies buildings used for residential purposes.
Emission of harmonics according to IEC 61000-3-2	Class A	The elements e-motion is suitable for use in all facilities, including residential facilities, and areas that are directly connected to a public supply mains that also supplies buildings used for residential purposes.
Emission of voltage fluctuations/ flicker according to IEC 61000-3-3	In conformance	The elements e-motion is suitable for use in all facilities, including residential facilities, and areas that are directly connected to a public supply mains that also supplies buildings used for residential purposes.

12.2 Guidelines and manufacturer's statement - Electromagnetic immunity

The elements e-motion is intended for use in an environment of the kind specified below. The customer or user of the elements e-motion should make sure that the device is used in an environment of the specified type.

Interference immunity tests	IEC 60601 test levels	Compliance level	Electromagnetic environment - Guidelines
Electrostatic discharge (ESD) according to IEC 61000-4-2	± 8 kV contact discharge ± 15 kV atmospheric discharge	± 8 kV contact discharge ± 15 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 ± 2 kV for input and output lines	± 2 kV for power lines and 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 push-pull voltage ± 2 kV common mode voltage	± 1 kV push-pull voltage ± 2 kV common mode 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	0 % / 0.5 cycles at 0º to 315º in 45º increments 0 % / 1 cycle 70 % / 25 cycles 0 % / 250 cycles	0 % / 0.5 cycles at 0º to 315º in 45º increments 0 % / 1 cycle 70 % / 25 cycles 0 % / 250 cycles	The quality of the supply voltage should correspond to that of a typical business or hospital environment.
Magnetic field at a supply frequency (50/60 Hz) according to IEC 61000-4-8	30 A/m	30 A/m	Magnetic fields at the mains frequency should correspond to the typical values in a business and hospital environment.

12.3 Guidelines and manufacturer's statement - Electromagnetic immunity

The elements e-motion is intended for use in an environment of the kind specified below. The customer or user of the elements e-motion should make sure that the device is used in an environment of the specified type.

Interference immunity tests	IEC 60601 test levels	Compliance level	Electromagnetic environment - Guidelines
Wire-based HF interference according to IEC 61000-4-6	3 V_{eff} 150 kHz to 80 MHz outside ISM bands[a]	3 V_{eff}	Handheld and mobile wireless devices should not be used at a shorter distance from the elements e-motion including cords than the recommended safe clearance calculated using the appropriate equation for the emission 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 maximal 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 wireless radio transmitters as measured locally[c] should be lower than the conformance level at all frequencies. [d]Interference is possible in the vicinity of devices bearing the following icon.
Wireless HF interference according to IEC 61000-4-3	3 V/m 80 MHz to 2700 MHz	3 V/m	

[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 base stations of mobile telephones and land mobile radio devices, amateur radio stations, AM and FM, radio and television broadcasters cannot be theoretically predetermined. A site study should be considered to determine the electromagnetic environment in terms of stationary transmitters. If the measured field strength at the site, at which the elements e-motion is used, exceeds the compliance levels shown above, the elements e-motion should be monitored to demonstrate proper function. If any uncommon performance characteristics are observed, additional measures may be required, such as, e.g., changing the orientation or using a different location for the elements e-motion

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

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.

12.4 Recommended safe distance between portable and mobile HF telecommunications equipment and the elements e-motion

The elements e-motion is intended for use in an electromagnetic environment in which the HF interference parameters are controlled. The customer or user of the elements e-motion can help prevent electromagnetic interference by maintaining the minimum clearance between portable and mobile HF telecommunication devices (transmitters) and the elements e-motion depending on the output of the communication device as indicated below.

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

Rated maximum output power of transmitter in W	**150 kHz to 80 MHz** $d=1.17\sqrt{P}$	**80 MHz to 800 MHz** $d=0.35\sqrt{P}$	**800 MHz to 2.5 GHz** $d=0.70\sqrt{P}$
0.01	0.12	0.04	0.07
0.1	0.37	0.11	0.22
1	1.17	0.35	0.70
10	3.70	1.11	2.21
100	11.70	3.5	7.0

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 spread of electromagnetic waves is absorbed and reflected by buildings, objects and people.

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