Operating instructions
DIAGNOdent pen
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1 User notes

1.1 User guidelines

Prerequisite
Please read these instructions before using the product to avoid operator error and damage.

1.1.1 Abbreviations

<table>
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<th>Abbreviation</th>
<th>Meaning</th>
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<tr>
<td>UI</td>
<td>User Instructions</td>
</tr>
<tr>
<td>CI</td>
<td>Care Instructions</td>
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<td>AI</td>
<td>Assembly Instructions</td>
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<tr>
<td>ITI</td>
<td>Service Technician’s instructions</td>
</tr>
<tr>
<td>SFC</td>
<td>Safety checks</td>
</tr>
<tr>
<td>IEC</td>
<td>International Electrotechnical Commission</td>
</tr>
<tr>
<td>IF</td>
<td>Repair instructions</td>
</tr>
<tr>
<td>EMC</td>
<td>Electromagnetic compatibility</td>
</tr>
</tbody>
</table>

1.1.2 Symbols

- See Safety/Hazard Warning Symbol chapter
- Important information for users and Service Technicians
- Thermally disinfectable
- Sterilisable up to 135°C
- CE (Communauté Européenne) marking. Products bearing this marking conform to the requirements of the pertinent EC directives (applicable European standards).
- Action prompt
- Laser hazard warning sign
- Laser sign

1.1.3 Intended users

This document is intended for use by dentists and other dental practice employees.
1.2 Technical customer service

Technical service for KaVo equipment is provided primarily by the KaVo agent. The technicians employed by the KaVo agent and the KaVo customer service technicians continuously participate in general and special training courses at the factory, and are familiar with the entire KaVo product line. KaVo equipment should be serviced at the recommended intervals in order to guarantee continued operability and maintain the value of the equipment. Please contact KaVo America with any inquiries. Always specify the equipment type and serial number with your inquiries.
1.3 Provisions of guarantee

The KaVo end-user customer guarantee for the product named in the completion certificate guarantees that the product functions correctly and that there are no faults in the material or workmanship for a duration of 12 months following the purchase date, according to the following conditions:

Following a reasonable complaint relating to defects or short delivery, KaVo guarantee to provide a replacement or perform repairs, whichever they deem most suitable. Claims of any other nature, damages in particular, are excluded. In case of default and gross negligence or intent, the latter only applies if there are no compelling legal provisions opposing it.

KaVo shall not be liable for defects and their consequences, which occur as a result of normal wear and tear, or of improper cleaning and maintenance, non-observance of the operating, maintenance or connection regulations, calcination or corrosion, a contaminated air or water supply, or chemical or electrical effects, which are non-standard or not permitted according to company regulations.

As a general rule, this guarantee does not apply to lamps, glassware, rubber parts or the colour durability of synthetic materials.

KaVo shall not be liable for defects or their consequences if they are likely to be a direct result of actions or modifications by a customer or third party.

Any claims arising from this guarantee can only be lodged if the completion certificate (carbon copy) has been sent in to KaVo and the operator/user is able to produce the original.
1.4 Transport and storage

1.4.1 The German packaging ordinance, 28 August 1998

Note
Applies only to the Federal Republic of Germany.

KalVo transport packaging is disposed of and recycled by local waste management and recycling companies under Germany's Dual System. For more information about waste management and recycling, and for up-to-date lists of local waste management and recycling companies, visit the following sites: http://www.umwelt-datenbank.de http://www.quality.de

Any KalVo transport packaging that customers return to KalVo, at the customer's own expense, shall be forwarded to the appropriate recycling companies at no extra cost and with no reimbursement.

1.4.2 Damage in transit

Within Germany

If the outer packaging is noticeably damaged upon delivery, you must proceed as follows:
1. The recipient must record the loss or damage on the notice of receipt. The recipient and transport company employee delivering the product must both sign the notice of receipt.
2. Leave the product and packaging in the condition they arrived in.
3. Do not use the product.
4. Report the damage to the transport company.
5. Report the damage to KalVo.
6. Under no circumstances should you return the damaged product to KalVo without prior consultation.
7. Send the signed notice of receipt to KalVo.

If the product is damaged without there being any noticeable damage to the packaging upon delivery, you must proceed as follows:
1. Report the damage to the transport company as soon as possible within 7 days of delivery.
2. Report the damage to KalVo.
3. Leave the product and packaging in the condition they arrived in.
4. Do not use the damaged product.

Note
If the recipient fails to adhere to any of the procedures mentioned above, the damage shall be considered as having arisen after delivery (pursuant to Germany's General Terms and Conditions for Carriers (AGSp.), Article 28).
Outside Germany

**Note**
KaVo shall not be liable for damage caused in transit.
Check the shipment immediately upon delivery!

If the outer packaging is noticeably damaged upon delivery, you must proceed as follows:
1. The recipient must record the loss or damage on the notice of receipt. The recipient and transport company employee delivering the product must both sign the notice of receipt.
2. The recipient may claim damages against the transport company only on the basis of these recorded facts.
3. Leave the product and packaging in the condition they arrived in.
4. Do not use the product.

If the product is damaged without there being any noticeable damage to the packaging upon delivery, you must proceed as follows:
1. Report the damage to the transport company as soon as possible within 7 days of delivery.
2. Leave the product and packaging in the condition they arrived in.
3. Do not use the damaged product.

**Note**
If the recipient fails to adhere to any of the procedures mentioned above, the damage shall be considered as having arisen after delivery (pursuant to the Convention on the Contract for the International Carriage of Goods by Road (CMR) Chapter V Article 30).

1.4.3 Storage

**Note**
Save packaging in case product requires sending away for servicing or repairs.

The symbols printed on the outer packaging apply to transportation and storage; their meanings are as follows:

- Keep upright in transit, this way up!
- Handle with care
- Keep dry
- Stacking limitation.
- Temperature limitations.
2 Safety

2.1 Description of safety instructions

2.1.1 Hazard warning symbol

![Hazard warning symbol]

2.1.2 Structure

The introduction describes the type and source of the danger.
This section shows what could happen if the instructions are not followed.
- The optional action shows what measures to take to avoid danger.

2.1.3 Explanation of different levels of hazard

To avoid personal and material injury, safety instructions within this document are classified into three levels of hazard.

- **CAUTION**
  Indicates a potentially dangerous situation which could result in material damage, minor personal injury or non-severe personal injury.

- **WARNING**
  Indicates a potentially dangerous situation which could result in fatal injury or severe personal injury.

- **DANGER**
  This is the highest level of hazard. It indicates an imminently dangerous situation which could result in fatal injury or severe personal injury.
2.2 Intended purpose

2.2.1 General

The appropriate, comprehensive guidelines for this product and/or national laws, national regulations and technological rules for starting up and operating have to be applied and fulfilled in line with the specified, intended purpose of the KaVo product.

This KaVo product is intended for use exclusively within dentistry. Any form of misuse is prohibited. Use according to the product's "intended purpose" also includes consulting all information within the user instructions, and complying with all inspection and maintenance activities.

The operator is required to make sure that the equipment is in a fully functional and safe condition before commencing use.

During use, the handler must comply with legal stipulations; in particular:
• The industrial safety regulations that are in place.
• The regulations that are in place for the prevention of industrial accidents.

The handler is required to:
• Only use appliances that do not have any faults.
• Protect themselves, patients and third parties from hazards.
• Avoid contamination from the product.

In Germany, it is mandatory for all operators, equipment supervisors and handlers to operate equipment in compliance with the stipulations of the German Medical Devices Act.

Maintenance services incorporate all the testing activities prescribed by the MDD (Medical Device Directive) 93/42 EEC / VDE 6751.

Electromagnetic compatibility

Note
In accordance with legal stipulations governing electromagnetic compatibility (EMC - DIN EN 60601-1-2, of October 2002), we must point out that:
• Electrical medical devices are subject to special EMC safety measures and, as a result, the KaVo Assembly instructions must be closely adhered to.
• Portable and mobile high-frequency electronic communications equipment may interfere with electrical medical devices.
• Further information about technical electromagnetic compatibility requirements can be provided upon request.
Disposal

Note
Dispose of or recycle the waste materials produced without endangering human health or the environment and under observance of the applicable national regulations that are in place.
Should you have any questions relating to the proper disposal of the KaVo product, please contact your nearest KaVo office.

Directive on Waste Electrical and Electronic Equipment (WEEE)

Note
Please note that the EC Directive on waste electrical and electronic equipment applies to this product. Within Europe therefore, this product must undergo special disposal.
For more detailed information about this, please contact KaVo or your specialist dental supplier.

2.2.2 Product-specific

DIAGNOdent pen is intended for use solely within the field of dentistry, for the purposes of dental treatment. It must not be used in areas where there is a risk of explosion. It is intended for use in dental practices or clinics.

The KaVo DIAGNOdent pen is intended for use as an aid in the accurate diagnosis of caries on thoroughly cleaned teeth.

DIAGNOdent pen works with a laser, which is directed onto the tooth substance, causing it to fluoresce. This fluorescence is simultaneously detected by DIAGNOdent pen, which shows the difference in fluorescence between healthy and diseased tooth substance.


DIAGNOdent pen is a class Ia medical device according to EC Directive 93/42/ECC and fulfills all the electromagnetic compatibility (EMC) requirements of Directive 89/336/EEC.

Use AA alkaline batteries only.
No safety checks are required.
2.3 Safety instructions

2.3.1 Product-specific

**Class I laser product. Visible laser radiation. Laser aperture at handpiece.**
- Eye injury:
  - Do not look directly into laser beam!
  - Do not open case!

**Injury/damage caused by battery leakage.**
- Damage to health and equipment.
  - Use leak-proof batteries.
  - Remove batteries if device is not in use for an extended period.
  - Dispose of the batteries in an approved manner.
  - Do not use rechargeable batteries.

**Risk of injury due to electric shock**
- Electric shock
  - Do not use power packs.
  - Only supply the device with the voltage stipulated.

**Hazard resulting from improper use.**
- Injury/damage.
  - The device may only be used by personnel who have been instructed on its use.

**Radiation caused by electromagnetic fields**
- Electromagnetic fields may interfere with the function of implanted systems (such as pacemakers).
  - Consult the patient before treatment!

**Inhalation of tip.**
- Risk of suffocation.
  - Make sure that the tip is positioned securely in DIAGNOdent pen by giving it a gentle tug.

**Leaky LCD.**
- Damage to health.
  - If the LCD becomes damaged, stop use immediately!
  - Avoid coming into contact with leaking fluid!
  - If you come into contact with this fluid, rinse off immediately with water.
  - Consult a doctor at the first sign of any symptoms!

**Caution**

This medical device is a class 1 laser, and hence, according to EC directives, does not require protective clothing to be worn.
3 Product description

3.1 DIAGNODent pen 2190

• Ring switch
• On/off button
• Hazard warning sign: Caution laser
• Save/Enter button
• Minus button
• Plus button
• Menu button

• LCD display
• Laser sign
• Battery compartment
• Specification plate
• Grip sleeve
• Fissure tip
Operating Instructions DIAGNOdent pen

3 Product description  3.1 DIAGNOdent pen 2190
3.2 Rating plate

<table>
<thead>
<tr>
<th>CE mark</th>
<th>CSA mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application part type B</td>
<td></td>
</tr>
</tbody>
</table>

Read and note the content of accompanying documents.

<table>
<thead>
<tr>
<th>mm</th>
<th>Month manufactured</th>
</tr>
</thead>
<tbody>
<tr>
<td>vvvv</td>
<td>Year manufactured</td>
</tr>
<tr>
<td>SN:</td>
<td>Serial number</td>
</tr>
<tr>
<td>REF:</td>
<td>Material number</td>
</tr>
<tr>
<td>Type:</td>
<td>Device type</td>
</tr>
</tbody>
</table>

For disposal information, see use in accordance with intended purpose.
## 3.2 Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Approx. 230 mm</td>
</tr>
<tr>
<td>Diameter</td>
<td>Approx. 32 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>110 g</td>
</tr>
<tr>
<td>Voltage</td>
<td>1.5 V</td>
</tr>
<tr>
<td>1 good quality Alkaline LR6 battery</td>
<td></td>
</tr>
<tr>
<td>Light output of the laser diode</td>
<td>&lt;1 mW</td>
</tr>
<tr>
<td>Wavelength of the laser diode</td>
<td>655 nm</td>
</tr>
<tr>
<td>Beam strength of the infrared diode</td>
<td>&lt;140mW/mW/cm</td>
</tr>
<tr>
<td>Wavelength of the infrared diode</td>
<td>850 nm - 950 nm</td>
</tr>
<tr>
<td>Protection category covered</td>
<td>IP44</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>+10°C to +30°C</td>
</tr>
<tr>
<td>Calibration temperature</td>
<td>+22°C ±2°C</td>
</tr>
<tr>
<td>relative humidity</td>
<td>30% RH to 75% RH</td>
</tr>
</tbody>
</table>

### Transportation and storage conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation and storage temperature</td>
<td>-10°C to +55°C</td>
</tr>
<tr>
<td>relative humidity</td>
<td>5 % RH to 90 % RH</td>
</tr>
<tr>
<td>Air pressure</td>
<td>700 hPa to 1060 hPa</td>
</tr>
</tbody>
</table>
4 Start-up

4.1 Insert battery

**CAUTION**

- Injury/damage caused by battery leakage.
- Damage to health and equipment.
- Use leak-proof batteries.
- Remove batteries if device is not in use for an extended period.
- Dispose of the batteries in an approved manner.
- Do not use rechargeable batteries.

**CAUTION**

- Damage to product as a result of operator error.
- Damage to contacts.
- Do not squeeze ring switch ① when removing and sliding on grip sleeve ②.

- Remove grip sleeve

- Insert the standard AA battery, observing correct polarity ③.
Slide on grip sleeve
5 Operation

5.1 Inserting Tip

**CAUTION**

Inhalation of tip. Risk of suffocation.

- Make sure that the tip is positioned securely in DIAGNOdent pen by giving it a gentle tug.

- Insert tip, making sure that it snaps into place.
5.2 Turning on and off

5.2.1 Turning on

- Hold down the start button ① for approximately 1 second until you hear a tone and the display appears.

5.2.2 Turning off

**Note**
The DIAGNODent pen automatically turns off after 90 seconds idle time.

- Hold down the start button ① for approximately 5 seconds until DIAGNODent pen turns off.
5.3 Menu

If no selection is made in the menu for 3 seconds, the device returns to display mode.

5.3.1 Tip calibration with calibration standard

Wear and tear of the tip can result in a display difference.

Calibration allows:
- DIAGNOdent pen values to be monitored over a long period of time.
- The DIAGNOdent pen values of a variety of DIAGNOdent pen devices to be compared.
- Different tips to be used with individual values.

Calibration is necessary if the display value deviates from the calibration standard value by more than + 0.1 or - 0.3 when gently placed against the calibration standard (do not apply force).

**Note**
During the measurement, the ceramic reference must have an ambient temperature of 22°C ± 2°C / 72°F ± 2°F.

**Note**
The intactness of the tip must be checked before and after each use. The tip may only be used in connection with the DIAGNOdent pen and may only be used at the tip storage location that was set during calibration. Avoid to scratch the fibers using scalpel, tips, scaler, tweezers or similar, as this will promote breaking of the fibers. Do not drop the tip!

- Press the menu button.
  The calibration icon appears.

- Hold the tip away from direct light sources and reflective surfaces.

- Press save/enter button.
  The calibration procedure starts.

- When you hear a tone, gently place the distal end of the tip vertically into the depression at the center of the ceramic reference. Inconsistent readings will result if the tips are not at 90° in all planes to the surface of the ceramic reference. When the tone ceases, calibration is complete. Calibration is deemed successful if the MOMENT display matches the ceramic reference value ± 3.
5 Operation | 5.3 Menu

5.3.2 Select tip storage location

You can select a dedicated storage location (1 to 4) for the tips.

- Press the menu button twice. The tip icon and tip storage location that has been set (e.g. 2) appear onscreen.

- Use the plus or minus button to set the new desired value.

- Press the save/enter button to save the new value that has been set.

After 3 seconds, without the save button being pressed, the set value is saved automatically and the device returns to display mode.
5.3.3 Set volume

There are three volume settings (off, 1 and 2).

- Press the menu button three times. The volume icon appears.

- Use the plus or minus button to set the new desired value.

Possible settings: off, 1, 2

- Press the save/enter button to save the new value that has been set.
5.3.4 Check/set ceramic reference value

The ceramic reference provided as standard has its reference value (e.g. C 58) engraved into its upper surface. This value is the default factory value. A new ceramic reference value can be set on the device should a replacement reference standard ever have to be purchased.

In case a replacement is needed, it is necessary to order a reference with the same letter (e.g. C) than the one used for this DIAGNOdent pen unit. A number (e.g. 58) different from the one which was used is acceptable.

- Press the menu button five times.
  The ceramic reference value icon shows the value that has been set (e.g. C 58).

- Use the plus or minus button to set the new desired value.

- Press the save/enter button to save the new value that has been set.

**Note**
Press the save button within 3 seconds, otherwise an error message will appear and the old value will remain unchanged.

5.3.5 Turning infrared data transmission on and off

The infrared data transmission can be turned on and off (ON, OFF).

- Press the menu button four times.
  The infrared data transmission symbol appears.

- Use the plus or minus button to turn the infrared data transmission ON or OFF.

- Use the save button to save the set value.
  The device returns to display mode.

**Note**
If the DIAGNOdent display 2191 is not used, please turn the data transmission OFF to decrease power consumption.
5.4 Clinical use

5.4.1 Procedure

Using the instrument in conjunction with minimally invasive treatment brings the greatest benefits. You use it to detect and treat the smallest changes, which are invisible to the eye, to a depth of 2mm into the tooth substance.

The values provided by DIAGNODent pen is not a traffic light. It is important when interpreting the values that you also take into consideration other caries risk factors, such as: history of caries, frequency of sugar consumption, presence of caries bacteria and production of saliva.

Many clinical trials have published concordant DIAGNODent pen threshold values that correlate significantly with caries amounts on the teeth. The table shown is based on the following publication: Lussi et al., Quintessenz 10/2003. These values are based on an initial zero baseline reading being taken at a healthy coronal position.

<table>
<thead>
<tr>
<th>DIAGNODent pen Values</th>
<th>Diagnosis - Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to ~13</td>
<td>Healthy tooth – professional teeth clean (PTC)</td>
</tr>
<tr>
<td>~14 to ~20</td>
<td>Enamel caries - intensive PTC with fluoride treatment etc.</td>
</tr>
<tr>
<td>~21 to ~29</td>
<td>Deep enamel caries - intensive PTC with fluoride treatment and monitoring - minimally invasive restorations - take note of caries risk factors</td>
</tr>
<tr>
<td>~30</td>
<td>Dentine caries - minimally invasive restorations and intensive PTC</td>
</tr>
</tbody>
</table>

Only a diagnosis based on the DIAGNODent pen values in conjunction with caries risk factors leads to a reliable result in terms of sensitivity, i.e. the timely detection of existing caries, and specificity, i.e. the accurate detection of healthy tooth substance. In view of the fact that DIAGNODent pen is perfect for check-ups, it is advisable in many cases - where no definitive diagnosis can be made, to first perform a non-invasive treatment, such as a fluoride treatment, together with the patient, agree on a regular recall procedure.

Before performing an examination with DIAGNODent pen, the teeth must be clean and dry. KaVo recommends the following procedure:
1. During professional cleaning of the dentition by the hygienist or other dental care personnel, scan the teeth after the cleaning stage, prior to applying any fluoride treatment.
2. Before scanning, dry the teeth and interdental recesses fully because saliva, particularly in the interdental space, can alter prism deflection.
3. The dentist should diagnose any teeth with elevated values.
4. The dentist plans a suitable course of treatment for these teeth.

When interpreting the DIAGNODent pen values, it is possible that false-positive results may be given if the following points are ignored:
- General staining.
- Composite fillings (which have fluorescent properties).
- Stained composite margins.
- Presence of tartar/dental calculus.
5. Operation 

- Food remnants in the fissures (organic plugs).
- Prophylactic pastes (which may have fluorescent properties).
- Remineralised caries (which may have taken up deep stains).
- High level of natural fluorescence.

### 5.2 Patient Specific zero Baseline

Due to tolerances in peoples' healthy tooth structure, a patient-specific baseline reading must be set for each patient before the exam begins. Therefore, it is both necessary and possible to adjust the DIAGNODent pen starting point (zero point) to each individual patient. (This also has the effect of eliminating individual tooth coloration.)

- Place the light tip against a healthy unrestored mid facial tooth surface.
5.4.3 Scan the surface of the tooth

Fissure tip (blue ring) for scanning smooth surfaces and fissures.

Note
Extraneous light sources can lead to interference with the detection system by illuminating the fiber tips. Varied moment values are an indication of this. If necessary, the extraneous cause should be identified and eliminated. Substances used for disclosing plaque can generate an elevated fluorescence signal; therefore, make sure you clean these substances off carefully beforehand. Fluoride varnish and prophyl paste can alter the fluorescence values; therefore, perform the fluorescence measurement before applying such substances. Always investigate suspect readings with these possible effects in mind. Sealants, amalgam and composite fillings can alter the fluorescence signal.
Scan the tooth surface

- Hold down the start button \( \bullet \) for approximately 1 second until you hear a tone and the display appears.

The device is turned on and the display should read 0.

- Calibrate.
  See also: 5.3.1 Tip calibration with calibration standard , Page 20

- Establish patient specific zero base line

- Move the DIAGNOdent pen tip over the surface of the tooth – while maintaining light contact with the tooth surface. However, do not exert too much pressure. As you scan the tooth, slowly rock the tip in a pendular motion.

Note
Without exerting any force, gently move the tip over the surface of the tooth, maintaining light contact with the tooth’s surface, do not press it!
5 Operation | 5.4 Clinical use

The moment value is the “real time”, current value. The PEAK value is the highest value recorded since the ring switch was last pressed.

A tone is emitted when the moment display reaches 09 or above. The higher the value (from 09 to 99), the higher the frequency of the tone.

To reset the PEAK value, simply depress the ring switch.
6 Preparation methods in accordance with DIN EN ISO 17664

**CAUTION**

*Damage to product as a result of incorrect disinfection:
- Malfunctions
- When using disinfectants, adhere to the manufacturer's instructions!
- When disinfecting, wipe only.
- Do not immerse product in water or other fluids.*

**CAUTION**

*Damage caused by penetrating fluids.
- Malfunctions caused by fluid that has penetrated the product.
- Do not allow fluid to penetrate the interior workings of the device!*

**CAUTION**

*Damage to product as a result of incorrect sterilization.
- Damage to the sterilized product.
- Do not sterilize using hot air sterilization, chemical cold sterilization or ethylene oxide!*

**CAUTION**

*Moisture
- Non-sterility
- Make sure everything remains dry. Autoclaves with post-vacuum ensure dryness.*

6.1 Cleaning

6.1.1 Manual cleaning

**Note**

*Do not use solvents or aggressive chemicals!*

- Switch off DIAGNODent pen.
  *See also: 6.2 Turning off, Page 19*
- Clean all exterior surfaces with a soft cloth and a mild cleaning fluid.
- Remove tip and grip sleeve.
- Clean the inlet and outlet with isopropanol (1) and cotton swabs.

![Image of DIAGNODent pen being cleaned](image-url)
Operating Instructions DIAGNODent pen

6 Preparation methods in accordance with DIN EN ISO 17664 | 6.1 Cleaning

Cleaning the tips

Note
To avoid build-up and caking of tissue residues, the tips should be thoroughly cleaned prior to sterilization and each time after use.

- For external cleaning, use a clean cotton cloth soaked in propanol until dirt residues are no longer visible.
- If the coupling side of the tip is dirty, clean it with the aid of a cotton wool bud soaked in propanol.
- Remove any fluid present by means of dry air with the aid of an air syringe.

Note
The cassette can be used for tip sterilization.

6.1.2 Automatic cleaning

Not applicable.
6.2 Disinfection

**Note**
Disinfect instrument without sleeve after each use.

6.2.1 Manual disinfection

- Switch off DIAGNOdent pen.
  *See also*: 5.2.2 Turning off, Page 19
- Using a soft cloth impregnated with disinfectant, wipe the surface to disinfect.

The following disinfectant is permitted:
- Isopropanol 70%

6.2.2 Automatic disinfection

Not applicable.
6.3 Sterilization

**Note**
Sterilize tip and sleeve before each use.

You can only sterilize the grip sleeve, the calibration standard and the tips. Tips are subject to wear and tear.

- Insert the tips into the sterilization cassette in the correct tip storage location.
- Sterilize in the autoclave for at least 3 minutes at 135°C.
6.4 Inspect light tips

- Hold the tip under a bright light source. The end surfaces must shine brightly. The different geometric design of the tips results in different shadows. If the surface at the light emitting side is scratched, replace the tip.
7 Troubleshooting

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The device cannot be switched on</td>
<td>No power.</td>
<td>Insert the battery properly. Replace battery with a new one.</td>
</tr>
<tr>
<td>Battery symbol on</td>
<td>Battery weak.</td>
<td>The battery needs replacing, at the latest, when “BATT” is displayed.</td>
</tr>
<tr>
<td>Display:</td>
<td>Battery has run out.</td>
<td>Replace battery with a new one.</td>
</tr>
<tr>
<td>Battery</td>
<td>Device switches to error or incorrect display.</td>
<td>Laser beam interrupted. Check that the tip is properly in place. Clean laser outlet.</td>
</tr>
<tr>
<td>Tip broken or scratched.</td>
<td>Adjustment process/sequence not adhered to.</td>
<td>Replace tip. Re-adjust.</td>
</tr>
<tr>
<td>Display: ERR1</td>
<td>Errors in check sum of program memory.</td>
<td>Switch on instrument once again. If this error occurs again, send instrument to Kalvo for repair.</td>
</tr>
<tr>
<td>Display: ERR 4</td>
<td>Current consumption of laser too high.</td>
<td>Do not switch the instrument back on. Send instrument to Kalvo for repair.</td>
</tr>
<tr>
<td>Two beeps after start tone</td>
<td>LCD display acknowledgement signal missing.</td>
<td>Send instrument to Kalvo for repair.</td>
</tr>
<tr>
<td>Product remains in “On mode”</td>
<td>Dial contacts are dirty or wet.</td>
<td>Remove and dry the grip sleeve and clean and dry the dial contacts.</td>
</tr>
</tbody>
</table>
# 8 Accessories

The following additional equipment has been authorized by KaVo:

<table>
<thead>
<tr>
<th>Diagram</th>
<th>Material description</th>
<th>Mat. no</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
<td>Sapphire fissure tip, assembled</td>
<td>1.002.6967</td>
</tr>
<tr>
<td><img src="image2.png" alt="Diagram" /></td>
<td>Grip sleeve</td>
<td>1.002.7003</td>
</tr>
<tr>
<td><img src="image3.png" alt="Diagram" /></td>
<td>DIAGNOdent pen 2190 steril cassette</td>
<td>1.002.7011</td>
</tr>
<tr>
<td><img src="image4.png" alt="Diagram" /></td>
<td>Standard C with holder</td>
<td>1.002.7020</td>
</tr>
</tbody>
</table>