Technician's instructions

KaVo Lumina

KAVO
Dental Excellence

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CE

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1 User instructions

User guide

NOTE
Read these instructions prior to first startup to avoid misuse and prevent damage. Comply with the Instructions for Use of the treatment centre.

General marks and symbols

CE	CE- mark (European Community). A product bearing this mark meets the requirements of the applicable EC directives.
▶	Action request
	Important information for users and service technicians
	See chapter on user instructions/hazard levels
	Thermodisinfectable
135 °C	**Sterilisation parameters** ▪ Steriliser with Dynamic-Air-Removal (pre-vacuum) method: – 3 minutes at 135 °C (275 °F) – Drying time: 16 min. ▪ Steriliser with gravity displacement method: – 10 minutes at 135 °C (275 °F) – Drying time: 30 min.
A→文	Original language German

Service

KaVo Technical service
If you have any technical questions or complaints, please contact the KaVo Technical service:
+49 (0) 7351 56-1000
service.einrichtungen@kavo.com or service.treatmentunits@kavo.com

Please refer to the serial number of the product in all inquiries! For further information, please visit: www.kavo.com

Target group

The present document is for service staff who have been trained by KaVo for the product.

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:

⚠ HAZARD

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.

CAUTION

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

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.

2.1 Electrical shock

Electrical power can cause death or injury from electric shock.

2.2 Use

Collisions and injuries could be caused by the large swivel range of the arms.

2.3 Service and repair

Contamination/fingerprints on the protective panel, collimator and PCBA light can lead to injury and material damage.

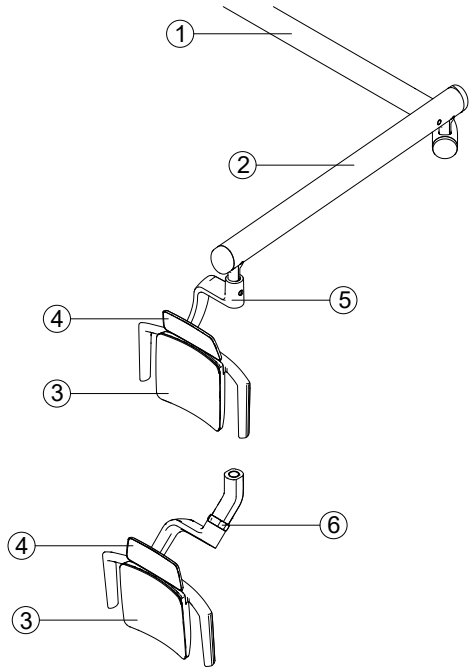
Electrostatic discharge can cause material damage to electronic components.

The gas-pressure spring is pressurised and can lead to injuries during repairs.

A hot light can lead to injury.

3 Product description

NOTE
The configuration can be changed as needed and does not have to be as shown in the figure.



① Swivel arm
② Spring arm with gas-pressure spring
③ Light head with gesture sensor
④ Assembly kit for patient mirror (optional)
⑤ Stirrup with 2D joint
⑥ Stirrup with 3D joint (optional)

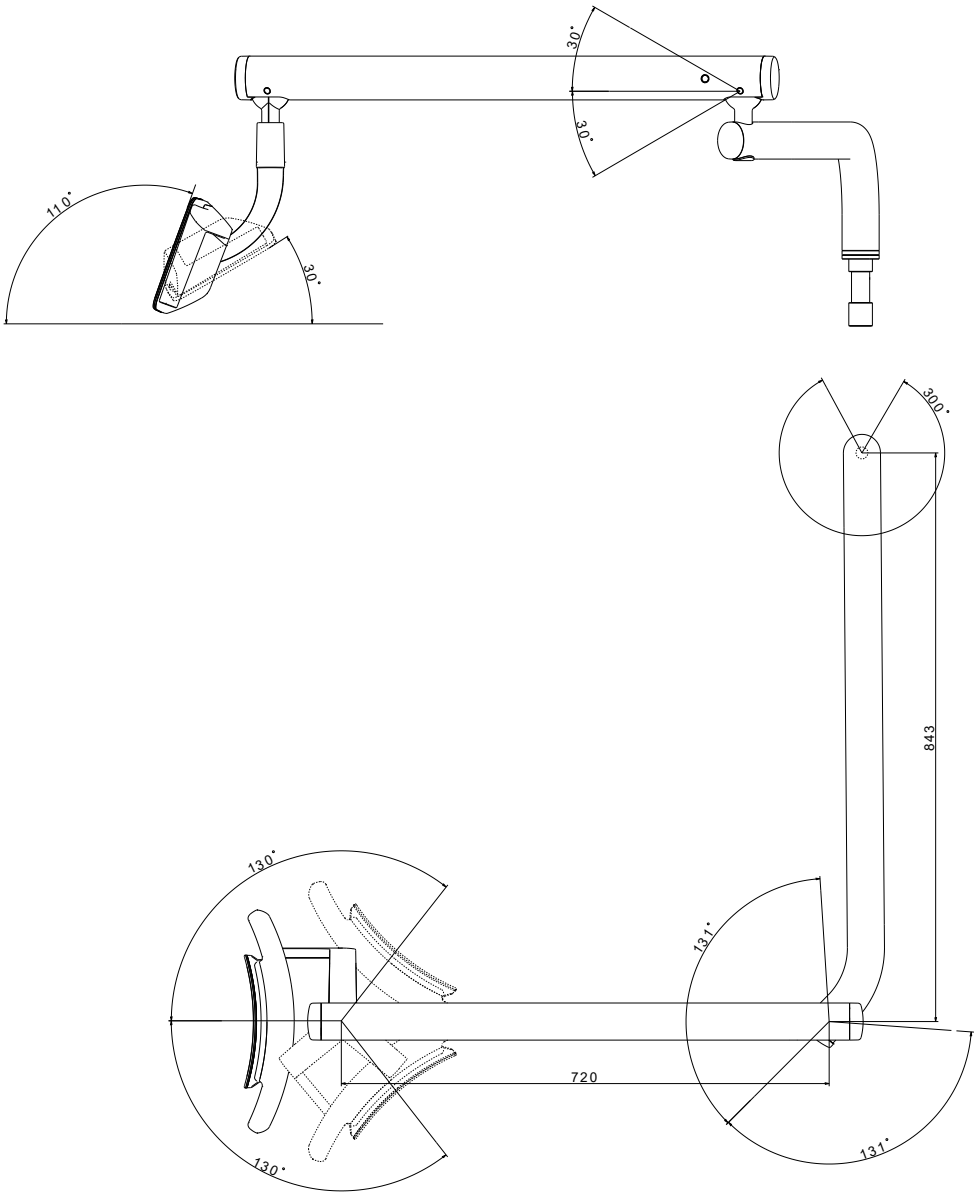
3.1 Dimensions and swing ranges

⚠ CAUTION

Collision with people or furnishings.

Collisions could be caused by the required degrees of freedom and the large swivel range.

- Always move or swivel the operating light with great care.



Dimensions and angle

3.2 Technical specifications and requirements

Photobiological safety (IEC 62471)	Risk group 1 (low risk) The products are safe under the majority of methods of application, except for the case of prolonged exposition with potentially direct eye exposure (max. = 150 s).

Electrical system

Input voltage	24 V DC - 36 V DC
Power consumption	9 VA

Electrical system for ceiling mounting

Input voltage	100-240 V AC
Frequency	50/60 Hz
Fuse	T2.5H 250V
Power consumption	30-35 VA

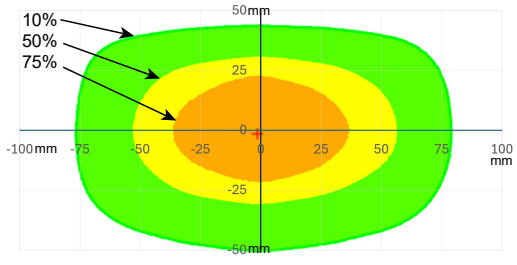
Ambient conditions

Ambient temperature	+10 to +40 °C / +50 to +104°F
Atmospheric pressure limitation	700 hPa to 1060 hPa (10 psi to 15 psi)
Humidity limitation	30% to 75% non-condensing
Max. altitude for operation	up to 3000 m

Colour reproduction and illuminance

Colour temperature normal light	approx. 5,200 Kelvin
Colour rendering value Rf	95
Normal light	approx. 24,000 to 44,000 lux; preset 36,000 lux in accordance with ISO 9680:2022 at a distance of 700mm
Dimmed light	approx. 5,000 to 15,000 lux at a distance of 700mm
COMPOshape light	approx. 5,000 to 11,000 lux at a distance of 700mm

Typical distribution of illuminance related to the maximum illuminance



Transportation and storage conditions

Ambient temperature	-20 to +55 °C / -4 to +131°F
Humidity limitation	5% to 95% non-condensing
Atmospheric pressure limitation	700 hPa to 1060 hPa (10 psi to 15 psi)

4 Function description

4.1 KaVo Lumina on the ESTETICA E70 / E80 Vision, KaVo uniQa, KaVo amiQa, Primus 1058 Life, ESTETICA E50 Life, ESTETICA E30 and DSEclinical E50 Life

The light control communicates with the treatment centre via CAN bus.

The light is operated and adjusted via the dentist element or the assistant element of the treatment centre and contact-free via the gesture sensor.

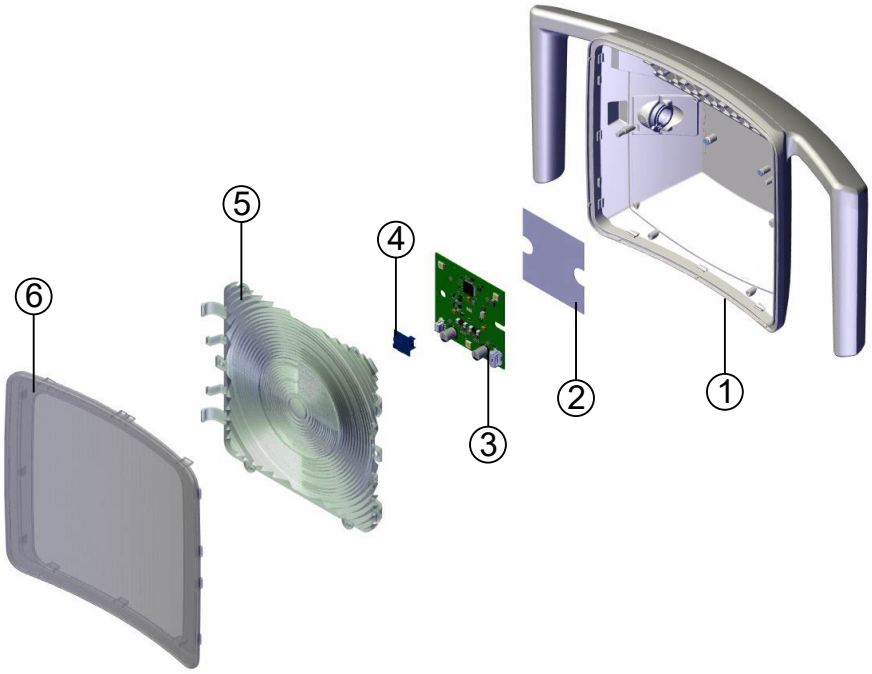
Also refer to:
Treatment centre instructions for use, chapter Operation

4.2 KaVo Lumina for ceiling mounting

The operating light operates independently.
The light is operated and adjusted contact-free via the gesture sensor.

Also refer to:
KaVo Lumina instructions for use, chapter Operation

4.3 KaVo Lumina function description



① Seal	② Heat conducting pad
③ PCBA light 4000 incl. illumination LEDs and gesture sensor	④ PCBA BLE module (optional)
⑤ Collimator	⑥ Protective panel

The KaVo Lumina light is generated by 2 LED clusters. These are situated directly on the PCBA light 4000 ②, which supplies the LEDs. The light is generated from a "warm white" and "cool white" LED cluster.
A gesture sensor is integrated on the PCBA light 4000 ②, which can be used to control the KaVo Lumina.

The PCBA BLE module ③ is a Bluetooth module that can be used for software updates, for example. The BLE module is optional and is only installed in operating lights that are not connected to the CAN bus of the treatment centre (e.g. ceiling mounting).

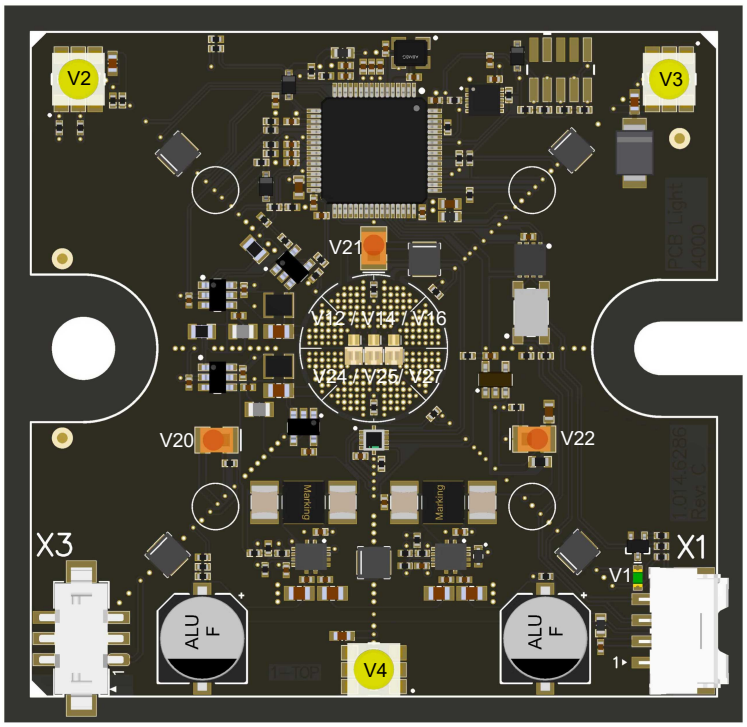
The collimator ④ concentrates the light beams.

The protective panel ⑤ shapes the light field.

5 Electrical controls

5.1 Description of circuit board

5.1.1 PCBA light 4000



- The PCBA light 4000 receives its input voltage of 36V DC from the treatment centre or from the ceiling mounting kit.
- The PCBA light 4000 is equipped with its own controller and its own firmware.
- Firmware update via CAN bus of the treatment centre or Bluetooth adapter on X3 if the KaVo Lumina is not operated on the CAN bus of a treatment centre.
- The LEDs for illumination are situated on the PCBA light 4000 and each consist of one warm white and one cool white LED cluster.
- The gesture sensor is integrated on the PCBA light 4000.
- The control is equipped with temperature sensors that protect the light via the software in case of overtemperature.
- The PCBA light 4000 communicates with the treatment centre via CAN bus.
- The SPAlight is generated via 3 RGB LEDs.

LEDs

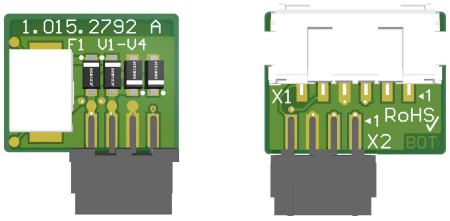
Name	Colour	Description
V1	green	▪ Boot process of the firmware: flashes at a one-second interval ▪ In stand-alone mode: for approx. 5 seconds after switching on ▪ On the treatment centre: Until CAN bus is connected
V12, V14, V16	Warm white	LED illumination unit
V24, V25, V27	Cold white	LED illumination unit
V2, V3, V4	RGB LEDs	Presentation of SPAlight

Name	Colour	Description
V20, V21, V22	Infrared	IR LED gesture sensor

Plug

Plug	Description
X1	KaVo Lumina voltage supply
	CAN connection for E70/E80 Vision, KaVo uniQa, KaVo amiQa, E50 Life, 1058 Life, E30, DSE Clinical E50 Life.
X3	Bluetooth module

5.1.2 PCBA AC/DC (X12)

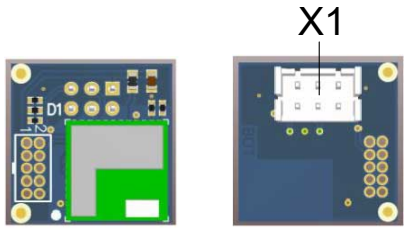


- Adapter board for connection to the KaVo Lumina to the treatment centre.
- Rectifier from 24V AC to direct voltage to supply the KaVo Lumina.
- CAN bus transfer from the treatment centre to the KaVo Lumina.
- Power limitation less than 15 watts.
- From SN x03xxxxx (E70/E80 Vision and uniQa) and amiQa with PCBA Unit 4000, the adapter board is no longer required.

Plug

Plug	Description
X1	Cable with voltage supply and CAN bus to the KaVo Lumina.
	Pin 3 = Vdd; Pin 4 = GND; Pin 5+6 = CAN L+H
X2	For connection to the PCBA Unit of the treatment centre.

5.1.3 PCBA BLE module S 1010 (Bluetooth)

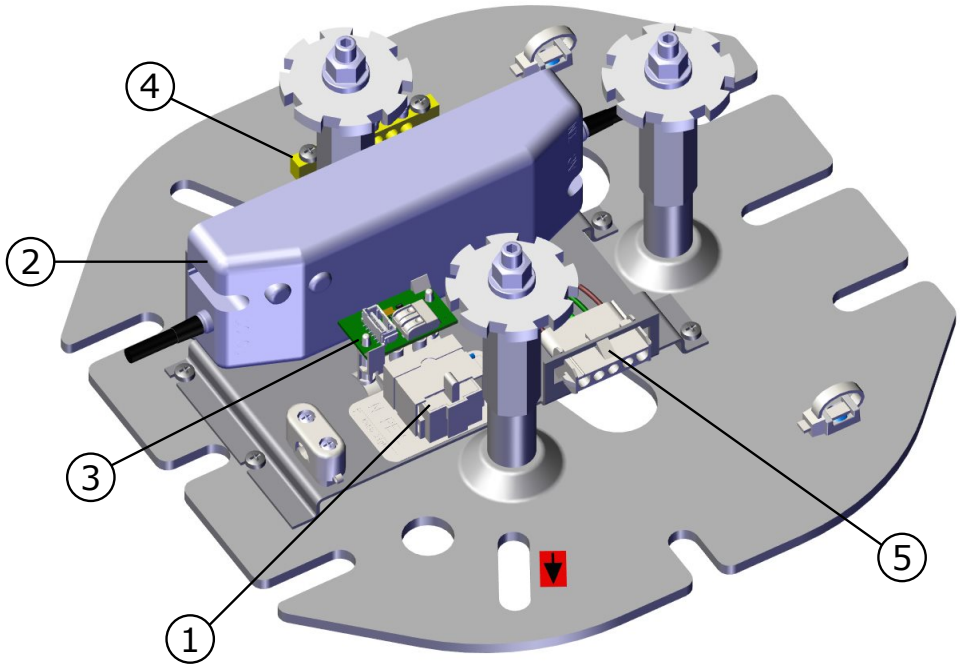


- The PCBA BLE module is a Bluetooth module that can be plugged into X3 of the PCBA light 4000.
- The Bluetooth module can be used to transfer software updates to the PCBA light or to open a KaVo Lumina service menu.
- It is only optionally installed if the KaVo Lumina is not operated on the CAN bus of the treatment centre (e.g. ceiling light).

Plug

Plug	Description
X1	Connection to the PCBA light 4000 (X3)

5.1.4 Ceiling adapter – switching power supply and PCBA 15W limiter

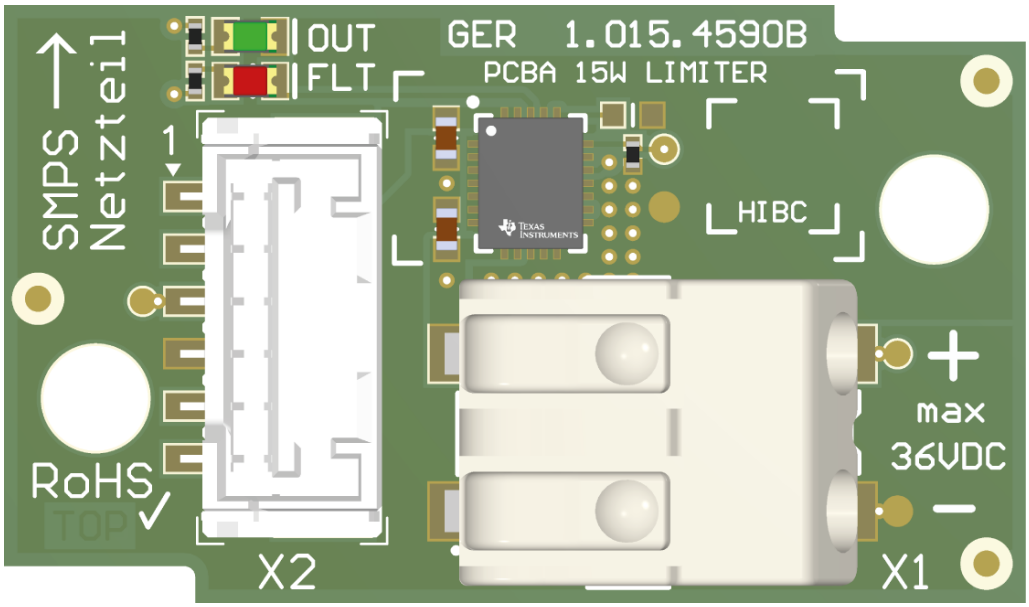


① Mains input clamp with fuse T2.5H
② Switching power supply
③ PCBA 15W limiter
④ PE terminal
⑤ Plug X2 to the main switch

Switching power supply

Input voltage:	100-240V AC
Output voltage:	36V DC

PCBA 15W limiter



LEDs

Plug	Colour	Description
V2, OUT:	green	Output voltage display
V1, FLT:	red	Error message (e.g. incorrect polarity)

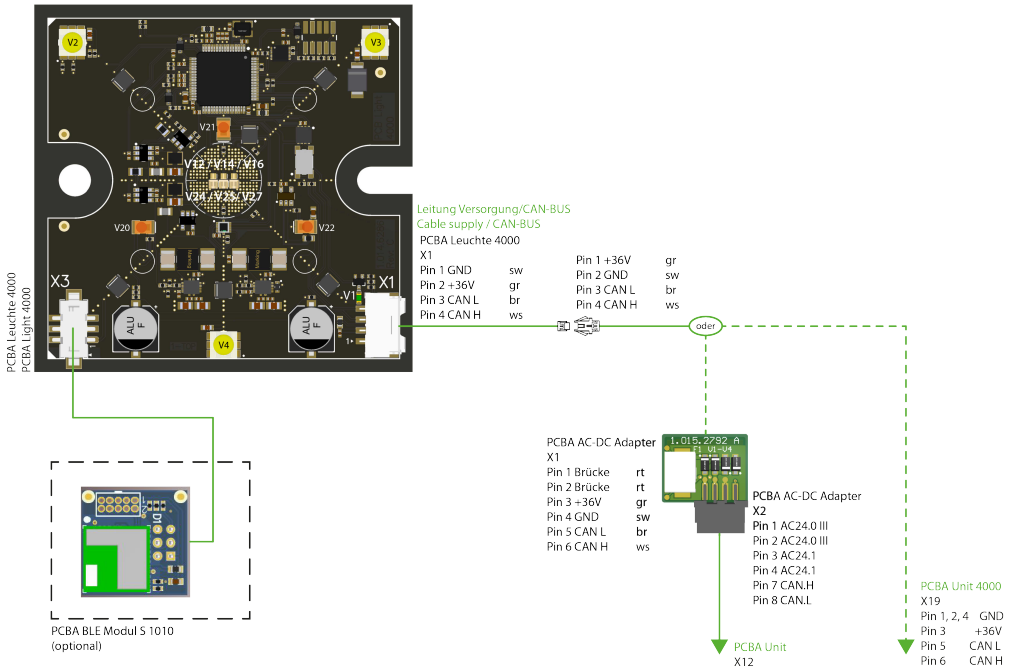
Plug

Plug	Description
X1:	Input 36V DC from switching power supply
X2:	Output for KaVo Lumina

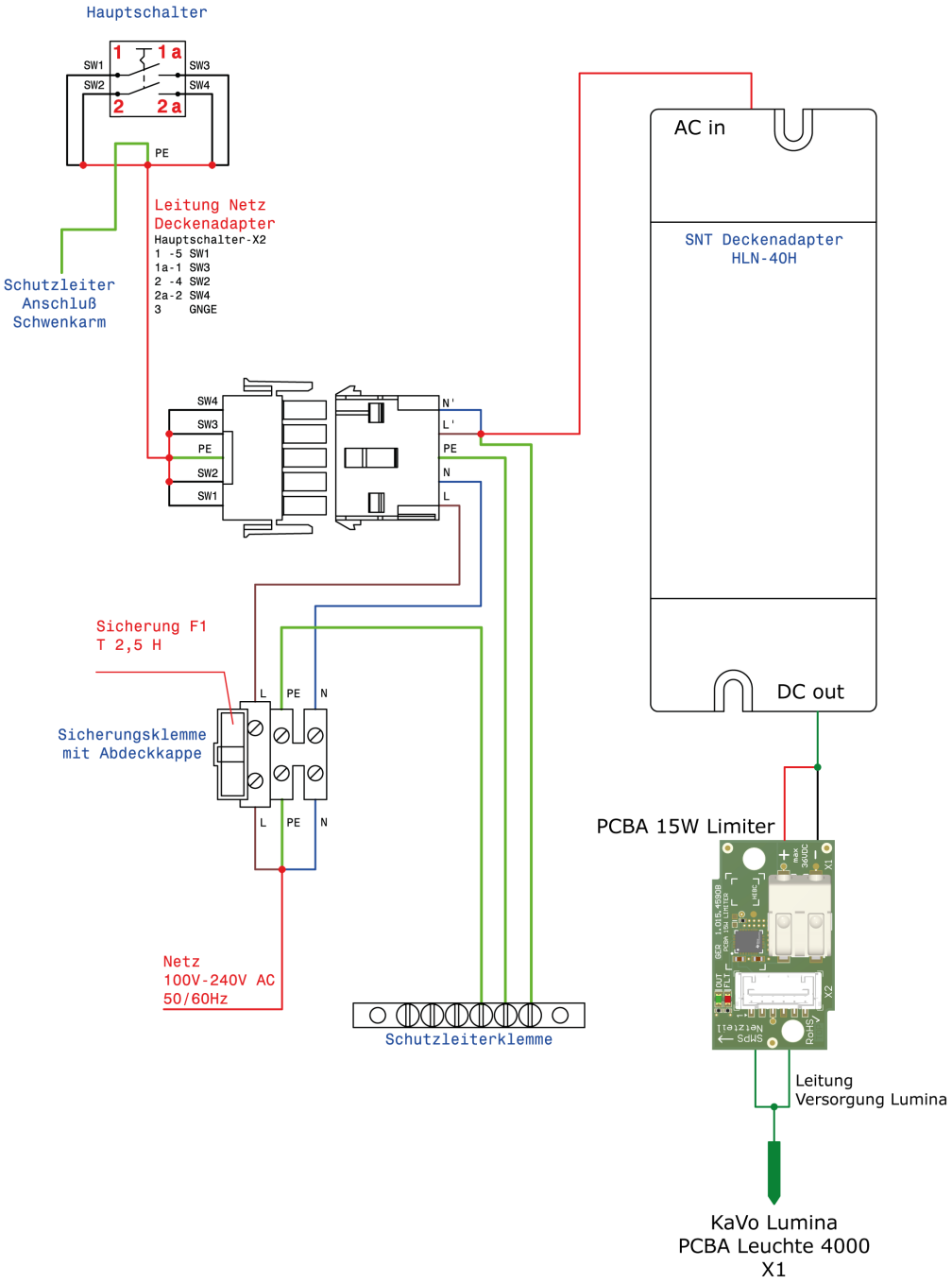
The PCBA 15 W limiter also has a power limit of 15 watts.

5.2 Wiring diagram

5.2.1 KaVo Lumina – Mounting to treatment centre



5.2.2 Ceiling mounting kit with switching power supply unit



6 Assembly and disassembly of the panels

⚠ CAUTION

Contamination/fingerprints on the protective panel, collimator and PCBA light.

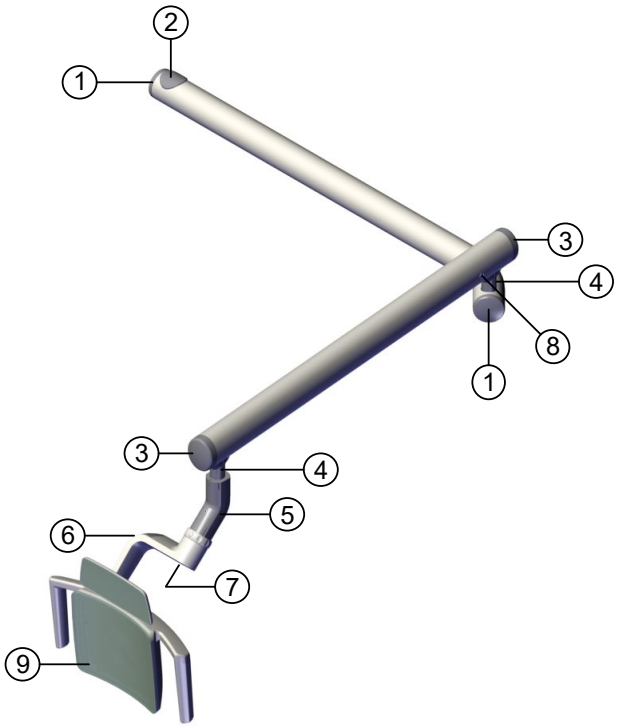
Risk of glare due to increased scattered light or product damage (deterioration of the illumination field).

- Only touch the protective panel, collimator and PCBA light while wearing KaVo-approved lint-free cloth gloves or powder-free latex gloves.

CAUTION

Electrostatic discharge.
Destroys electronic components.

- Before you touch the electronic circuit boards, always earth them by touching the protective earth conductor (PE).
- When working on an open unit, takes precautions against ESD damage.
- Always hold electronic boards on their edge only.



- Loosen and remove the covers ① by slightly rotating them to the left.
- Loosen the latch hook cover ② and remove axially.
- Remove the covers ③ axially with snap connection.
- Remove cover ③. Move the spring arm up or down, unlatch the covers ④ first, then remove the inner covers by lifting upwards.
- Unlatch the front / rear 3D joint covers ⑤ at the connecting gap and remove (optional).
- Release cover of the left stirrup 3D joint ⑥ using a slot screwdriver and remove from the side (optional).
- Release cover of the stirrup ⑦ at the bottom using a slot screwdriver and remove it.
- Spring arm brake cap ⑧

- Release protective panel ⑨ at the bottom and pull it forward.
  Also refer to:
  6.1 Disassembling the protective panel, Page 21

6.1 Disassembling the protective panel

⚠ CAUTION

Hot light.

Risk of injury.

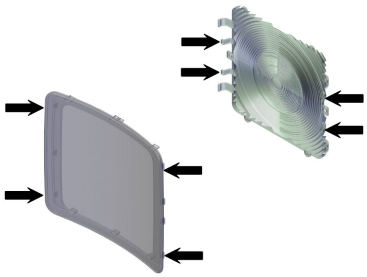
- Only take off the protective panel and collimator after the light has been switched off and cooled down.

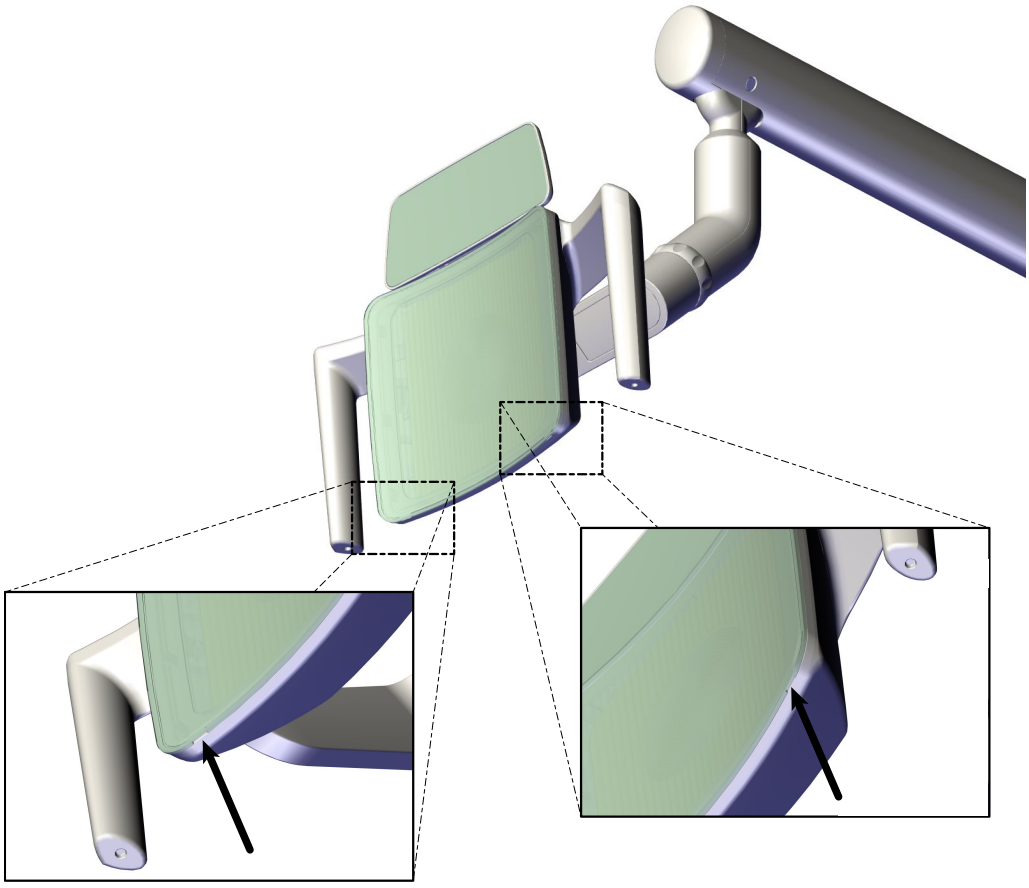
CAUTION

Scratching/contamination of the protective panel/collimator during installation/dismantling.

Product damage.

- Use gloves.
- Mount or dismount the protective panel and collimator carefully and do not touch the visually effective surfaces (inside of the protective panel / inside and outside of the collimator).
- Hold the protective panel by the back-moulded outer edge.
- Hold the collimator by the lugs on the outside.





- Carefully unlatch the protective panel at the bottom edge of the light head using a flat slot screwdriver at the slots and take it off towards the front.

7 Mechanical settings

7.1 Adjusting the swinging arm brake

NOTE

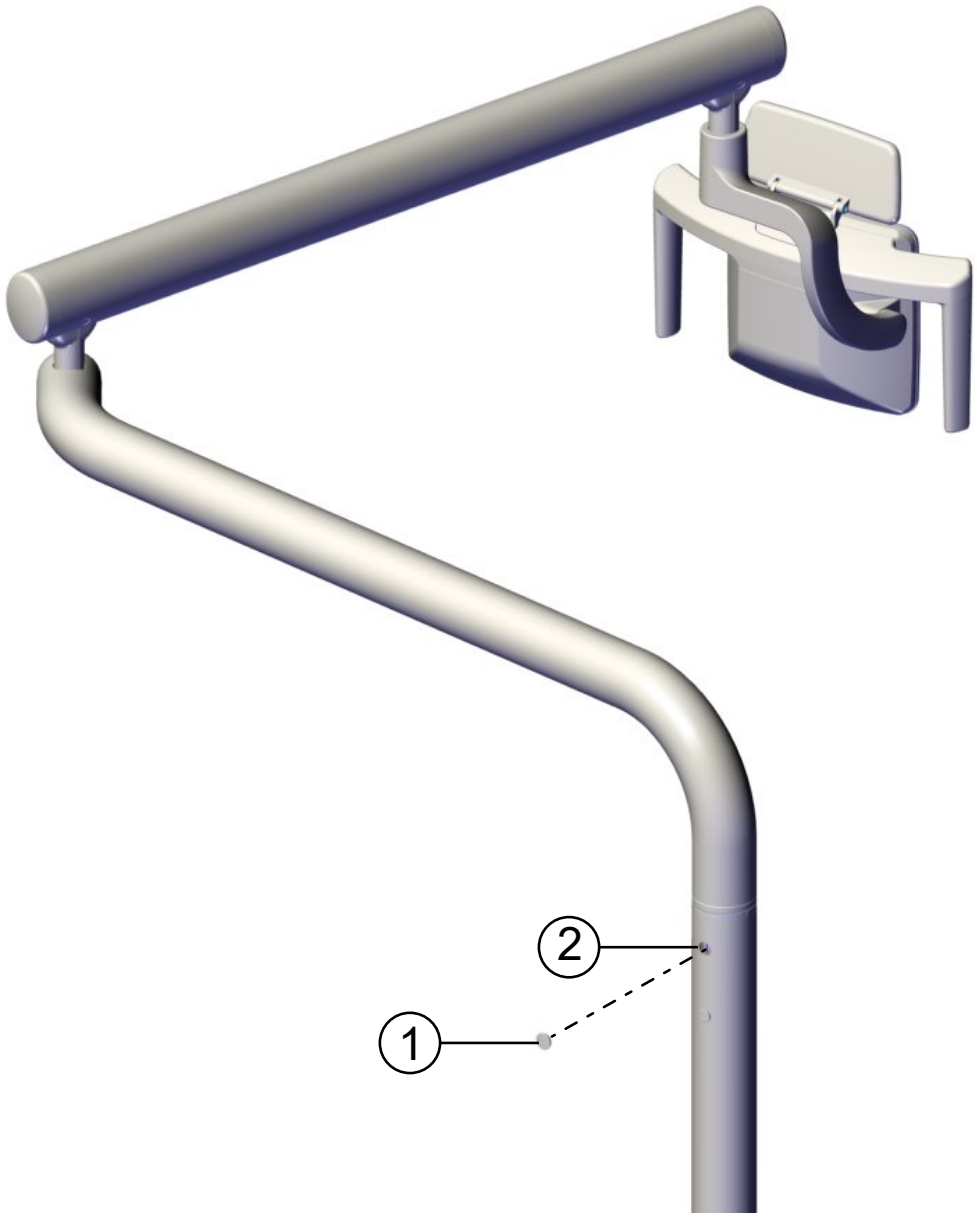
Adjust the brakes on the light mounting post/swivel arm and swivel arm/ spring arm slightly more than the brake on the 2D/3D stirrup.

Fine adjustment of the movement for positioning the light field via 2D or 3D joint and light head.

NOTE

The swinging arm brake determines the ease with which the swinging arm rotates in the light mounting post.

- Pull off the rubber cap ①.
- Tighten the screw ② to make it more difficult to rotate the swivel arm, or loosen it to make it easier.

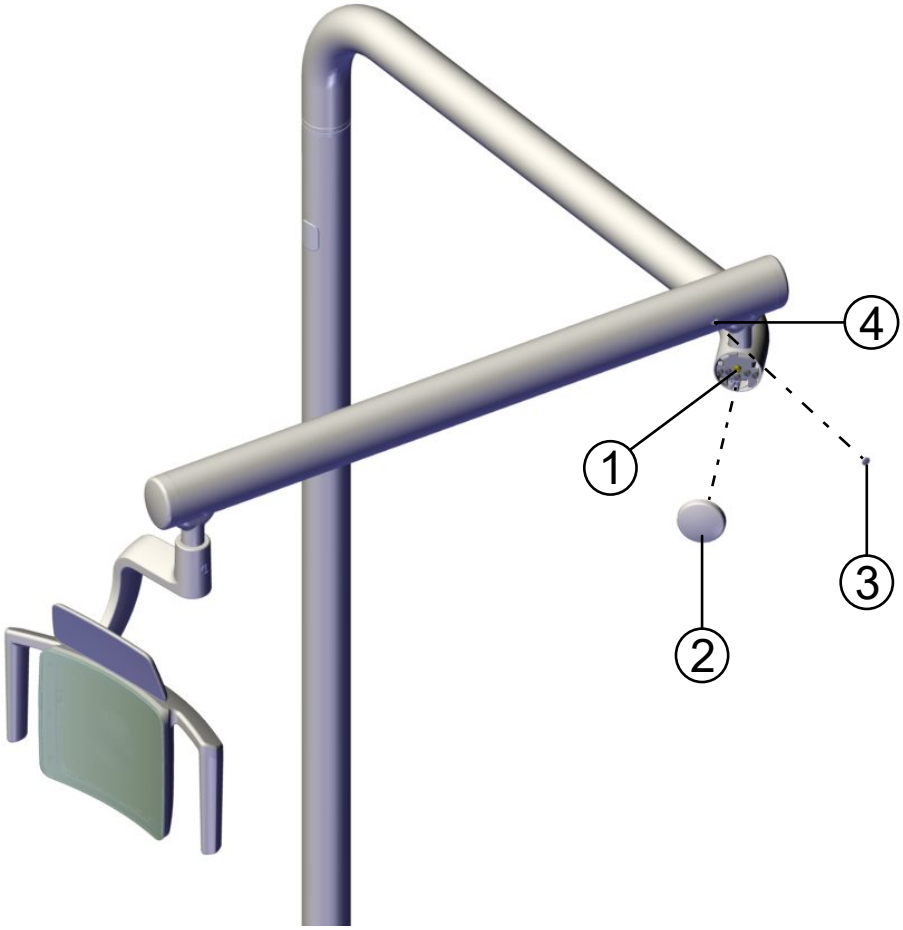


7.2 Adjusting the spring arm brakes

7.2.1 Spring arm – brake rotation

NOTE
Use the brake to set the smooth running of the spring arm rotation in the swivel arm.

- Loosen and remove the cover ② in an anticlockwise direction.
- Use the brake screw ① to set the retention force of the brake.



7.2.2 Spring arm – brake inclination

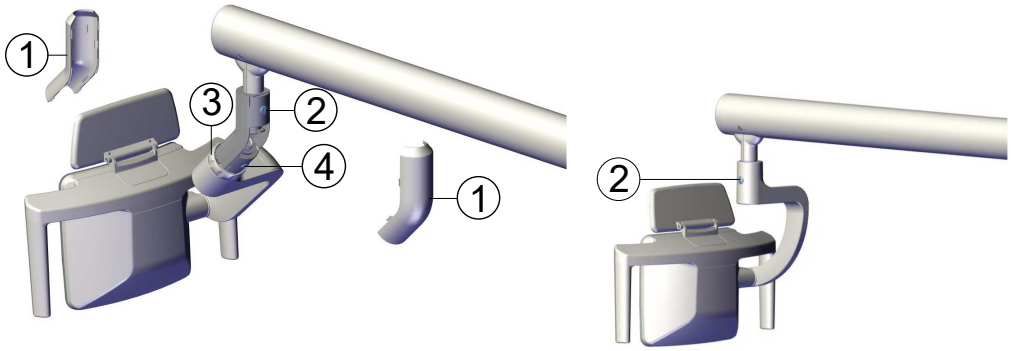
- Remove the cap ③ on the spring arm.
- Use the brake screw ④ to adjust the retention force of the spring arm inclination so that the spring arm remains at the set height.
- Check the retention force of the spring arm in different positions, readjust if necessary

7.3 Fine adjustment positioning of the light field

NOTE
All movements of the light head can be set using different brakes.

7.3.1 Setting the rotary motion

NOTE
The covers ① must be removed to set the rotary motion and the 3D joint movement. The covers ① are fastened with a snap lock and can be removed without dental tools.



With 3D joint (figure on the left):

- Release the joint covers ① and remove them.
- Use the adjusting screw ② to set the smooth running of the rotary motion.
- Unlock the 3D joint movement on the regulating ring ③.
- Use the adjusting screw ④ to set the smooth running of the 3D joint motion.
- Snap the covers ① back on.

With 2D joint (figure on the right):

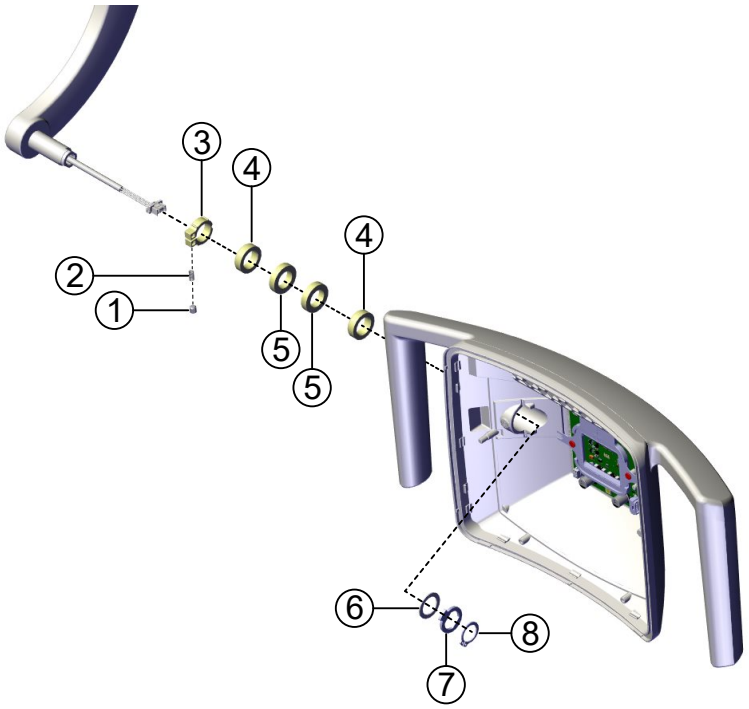
- Use the adjusting screw ② to set the smooth running of the rotary motion.

7.3.2 Setting the inclination

NOTE
The movement force of the light head can be slightly increased from the outside using a brake.

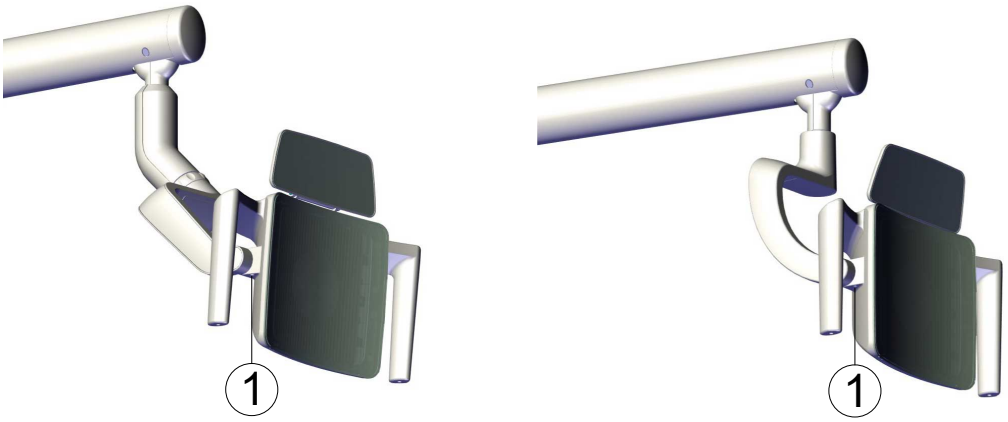
A certain basic strength for the inclination of the light head is already reached by two brake rings in the inclination joint.

Set-up of the light head inclination



① Set screw / threaded pin M5x5	② Pressure spring
③ Brake ring	④ Socket
⑤ Cellasto ring (brake ring for the basic strength of the inclination)	⑥ Plastic washer
⑦ End stop for head inclination	⑧ Locking ring

Fine adjustment



- The retention force of the light head inclination can be increased with threaded pin ①.

8 Firmware update

CAUTION

Shutting off the device during software transfer.

- Do not switch off the device during the firmware update under any circumstances.
- Do not remove the USB stick or the SD card during the firmware update.

NOTE

If the KaVo Lumina is connected to the CAN bus of a treatment centre, the firmware is updated via the treatment centre.

For ceiling mounting, the firmware can be updated via the Bluetooth module.

NOTE

Current firmware versions can be downloaded in the KaVo Extranet in the technical information portal "KaVoTIP" (http://extranet.kavo.com). The firmware files must be stored in the root directory of the USB stick. There must be no other files (licence files) present together with the firmware files in the root directory of the storage medium.

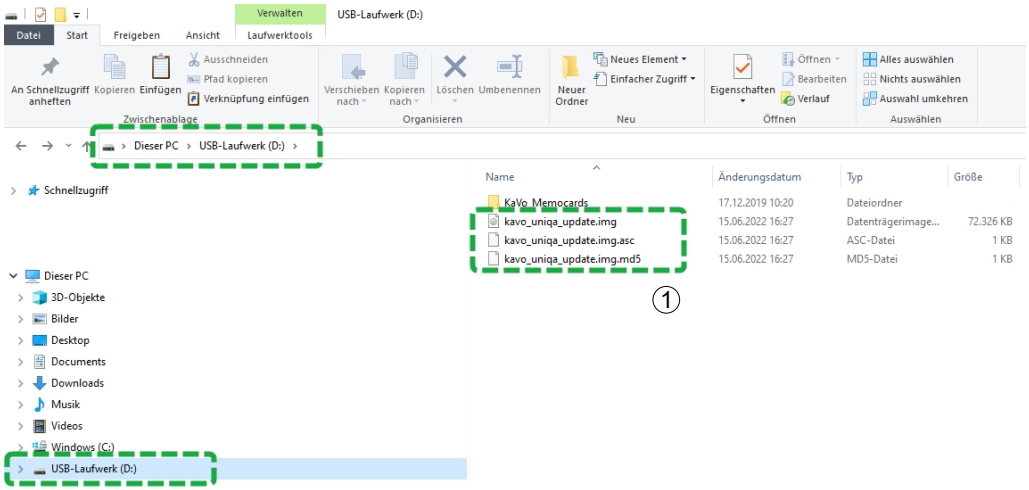
8.1 Preparing the SD card or USB stick for the update

NOTE

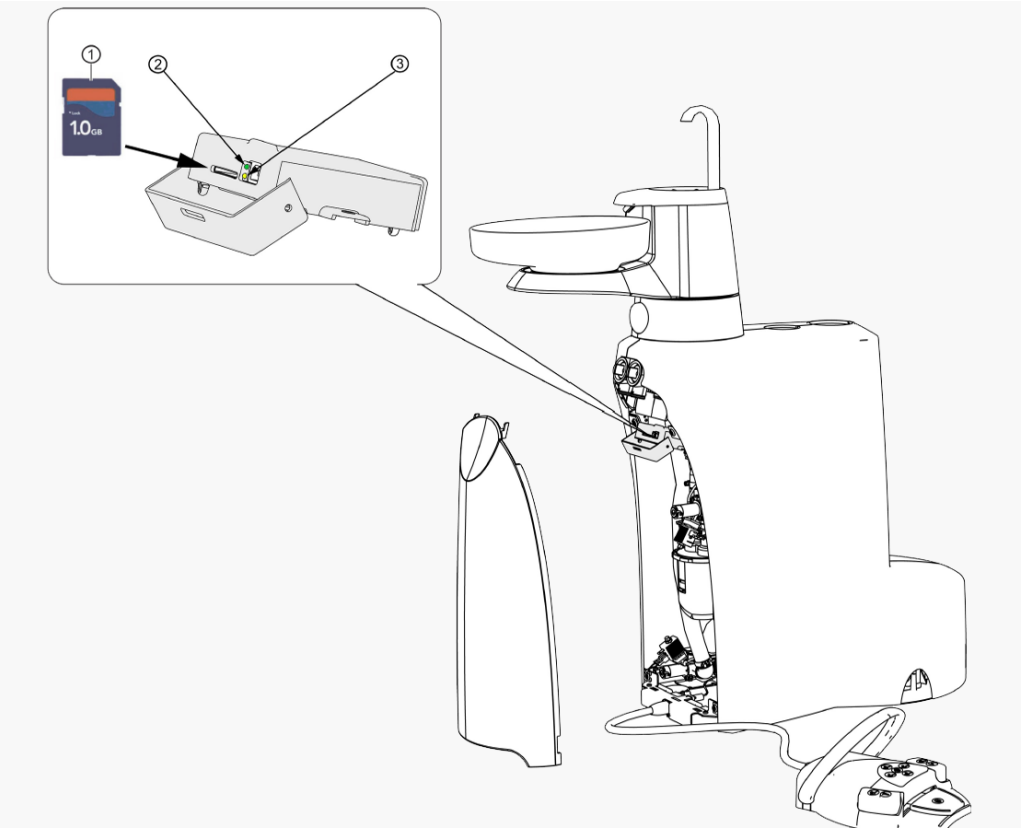
The update is only possible with SD cards and USB sticks that have been formatted to the FAT32 file system.

- Use USB sticks / SD cards with a maximum storage of 32 GB.
- Use standard SD cards, mini or micro SD cards with a standard size adapter have limited functionality.

- Download the firmware update for the respective treatment centre from the KaVo Extranet or KaVoTIP.
- Unpack the downloaded *.zip file.
- Copy the individual files of the firmware update directly to the root directory (without subfolders) on the SD card or USB stick ①.
- Files stored in a subfolder are ignored.

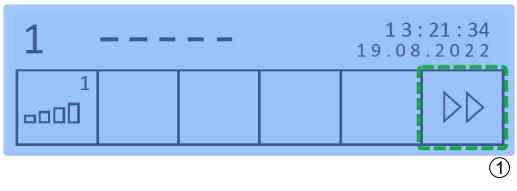


8.2 Update for ESTETICA E50 Life / Primus 1058 Life



① SD card
② green LED
③ yellow LED

- Turn the device off.
- Insert SD card ① with current firmware in the card slot of the MEDIAgateway.
- Switch the unit back on again.
  ⇨ The firmware is transmitted automatically. During data transfer, the green LED ② of the MEDIAgateway flashes at one-second intervals.
- The firmware update will be shown in the display of the treatment centre.
- The treatment centre starts automatically after the firmware update. No licences are loaded at this stage.
- Switch off treatment centre again, remove the SD card from the MEDIAgateway.
- Switch on the treatment centre again.



- Invoke option 14 in the user menu ① to verify the firmware version.

Also refer to:
Instructions for use of the treatment centre

- Run function test.

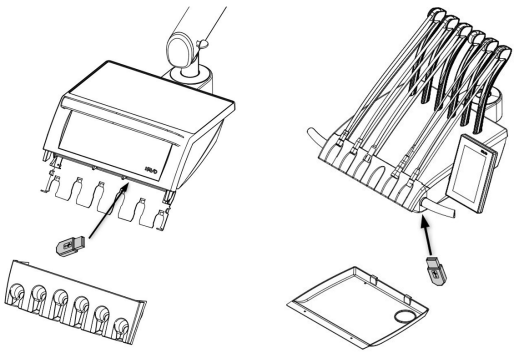
8.3 Update for ESTETICA E70 / E80 Vision and KaVo uniQa / amiQa

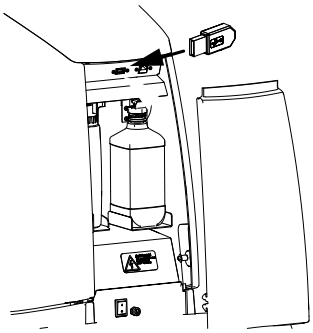
- Prepare the USB stick with the firmware update for KaVo uniQa / amiQa or ESTETICA E70 / E80 Vision.
  (see also 7.1.1 Preparing the SD card or USB stick)
- Treatment centre must be turned on and ready for use.
- For KaVo uniQa / amiQa: Plug the USB stick into the service interface on the dentist element.

or

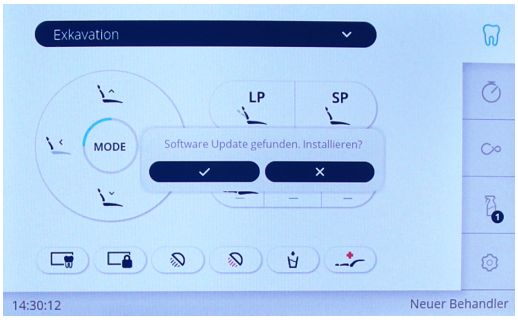
- For ESTETICA E70 / E80 Vision: Plug the USB stick into the service interface above the DEKAmat/OXYmat.

KaVo uniQa / amiQa **ESTETICA E70 / E80 Vision**





- Follow the instructions shown on the display.



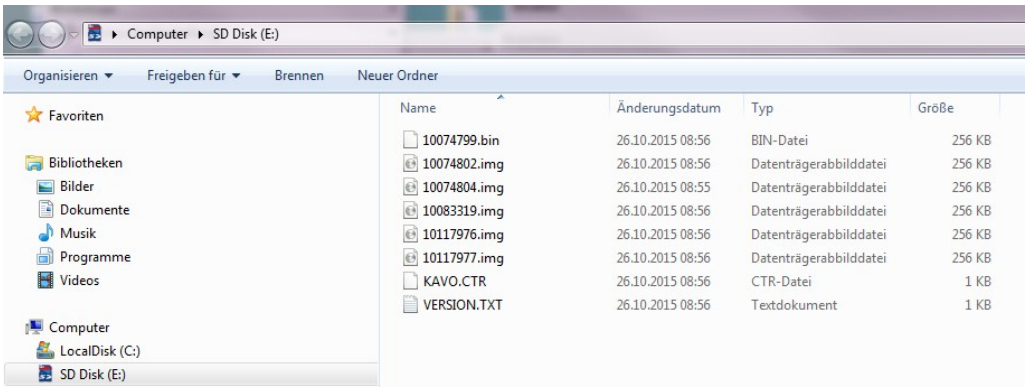
- Confirm the pop-up window on the touch display: "Software update found, install?".
- The update is copied from the USB stick to the touch display.
- When the copying process is complete, the message "Remove USB stick and restart treatment centre" appears.
- During the subsequent restart, the firmware is distributed from the touch display to the controls of the treatment centre and the operating light via the CAN bus.
- After a successful update, the treatment centre starts in normal operation.
- Run function test.

8.4 Update for ESTETICA E30

NOTE

The current updated firmware can be downloaded from KaVo Extranet and KaVo TIP at www.extranet.kavo.com and saved on an SD card.

- Unpack the downloaded zip file.
- Copy the files to the root directory of the SD card.

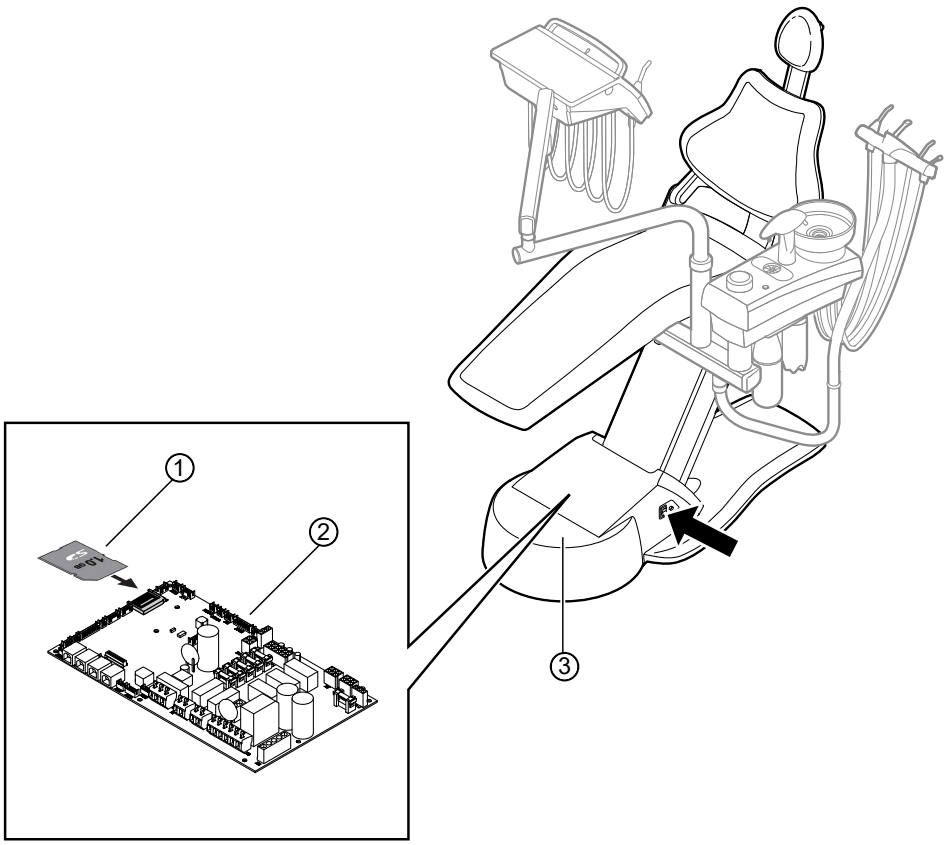


Root directory of the SD card

CAUTION

Shutting off the device during software transfer.

- Do not switch off the device during the firmware update under any circumstances.
- Do not remove the SD card during the firmware update.



① SD card with licence files
② Unit Control
③ Cover

- Turn the device off.
- Remove cover ③.

Removing the junction box cover

- Insert the SD card in the card-slot of the unit control ②.
- Turn the device on.
  - ⇨ The firmware update starts automatically. During data transmission, LED V40 on the unit control ② flashes. The home screen appears on the display once data transmission is completed.

NOTE

The firmware update requires up to 5 minutes.
The service mode remains unaffected.
A firmware downgrade under version V1.2.1 is not possible.

- Remove the SD card after the firmware update.

8.5 Firmware update via Bluetooth

NOTE
The PCBA BLE module must be plugged into the PCBA light 4000 for the firmware update via Bluetooth (also refer to: chapter PCBA BLE module).

The Bluetooth module is only installed for ceiling mounting.

9 KaVo Lumina service mode

NOTE
The PCBA BLE module must be plugged into the PCBA light 4000 for the service menu via Bluetooth (also refer to: chapter PCBA BLE module).
The Bluetooth module is only installed for ceiling mounting.

10 Internal cleaning

⚠ CAUTION

Contamination/fingerprints on the protective panel, collimator and PCBA light.

Risk of glare due to increased scattered light or product damage (deterioration of the illumination field).

- Only touch the protective panel, collimator and PCBA light while wearing KaVo-approved lint-free cloth gloves or powder-free latex gloves.

CAUTION

Scratching of the protective panel during installation/dismantling.
Product damage.

- Carefully mount or dismount the protective panel and collimator.

⚠ CAUTION

Hot light.

Risk of injury.

- Only take off the protective panel and collimator after the light has been switched off and cooled down.

Protective panel and collimator

CAUTION

Improper cleaning
Irreversible damage to the light.

- Do not clean the collimator and protective panel with cleaning agents or alcohol

⇨ Blow away any excess dirt with dry air.

NOTE

Do not touch the protective panel and collimator without gloves.

- Illumination makes fingerprints visible

11 Troubleshooting

Malfunction	Cause	Remedy
Nothing works.	Main switch is off.	▸ Turn on the main switch.
	Main service fuse interrupted the electric circuit.	▸ Unplug the unit from the mains. ▸ For ceiling mounting, check and replace, if required, the main fuse on the ceiling mounting kit (T2.5H 250V). ▸ On the treatment centre, replace the microfuse of the operating light's electric circuit as described in the instructions for use of the treatment centre.
The operating light does not work	No supply voltage.	▸ Turn on the main switch. ▸ Check whether the green status LED flashes for approx. 5 seconds after the voltage supply is applied. ⇨ Green status LED flashes during the bootloader programme. As soon as the application starts, the green LED goes out. ▸ Check the supply voltage. ▪ PCBA AC/DC X12 ▪ Electrical interface for light bow
	Firmware not updated ▪ Green status LED flashes consistently. ▪ CAN communication detected. ▪ No CAN start command of the treatment centre.	▸ Carry out firmware update.
	PCBA operating light is defective. ▪ Green status LED lights up permanently. ▪ Green status LED lights up when voltage is applied. As soon as the application starts, the green LED goes out.	▸ Replace the PCBA light.
The light cannot be operated by means of the treatment centre.	CAN communication is not available.	▸ Switch on the light with a swipe gesture. ▸ Hold your hand over the sensor for approx. 3 seconds and the brightness of the light will alternate in cycles. ⇨ PCBA light works. ▪ CAN communication to the treatment centre faulty. ▪ The light is in stand-alone mode. ▸ ► For 1058 Life / E50 Life / E30 Start service mode: Set service menu U04 – index 09 to "OP light LED”.

Malfunction	Cause	Remedy
Sensor does not react or reacts too sensitively.	Sensor is deactivated in the user menu (uniQa / amiQa / E70/80 Vision).	▸ Activate sensor in the user menu.
	Sensor sensitivity not suitable.	▸ Set the sensor sensitivity in the user menu (uniQa / amiQa / E70/80 Vision).
	Sensor is defective.	▸ Replace the PCBA light.
Gesture control does not work reliably. Green status LED of the light flashes repeatedly during operation.	Wrong setting in the service menu (1058 Life / E50 Life)	▸ Service mode U04: Set flag bit 09 (1058 Life with foot control, hidden flag bit) OP light 1410/EDI to OP light LED.
The spring arm descends independently.	Gas-pressure spring is incorrectly set or defective.	▸ Set the inclination for the spring arm brake. **Also refer to:** 7.2 Adjusting the spring arm brakes, Page 24 ▸ Replace the gas-pressure spring **Also refer to:** 11.1 Replacing the gas-pressure spring, Page 37
Error code 424	Overvoltage of the processor supply voltage detected. Hardware error	▪ Potential error. ▪ The light switches itself off. ▸ Replace the PCBA light.
Error code 425	Overvoltage of the LED supply voltage detected. Hardware error	▪ Potential error. ▪ The light switches itself off. ▸ Replace the PCBA light.
Error code 426	Overvoltage of the LEDs detected. Hardware error	▪ The light switches itself off. ▸ Replace the PCBA light.
Error code 427	The light was not calibrated. Production error	▪ All brightness levels are identical ▸ Calibrate the light.
Error code 428	The temperature deviation between LED circuit 1 and LED circuit 2 is too high. Installation error	▸ Check correct installation of the heat conducting pad.
Error code 429	The ambient temperature is too high. The light is heated by external heat sources (e.g. sunlight). Missing/incorrectly installed heat conducting pad.	▪ The light reduces the maximum brightness (brightness level 5= brightness level 4= brightness level 3). ▸ Adjust ambient temperature. ▸ Repair heat conducting pad.
Error code 430	Extreme overheating detected. Hardware error	▪ The light switches itself off ▸ Replace the PCBA light.
Error code 431	Failure of an LED of the LED string detected. Hardware error	▪ The light continues to work with reduced brightness ▸ Replace the PCBA light.

Malfunction	Cause	Remedy
Error code 432	Degradation of the LEDs detected. Wear/aging of the LEDs.	▪ The light continues to work with reduced brightness. ▸ Replace the PCBA light.

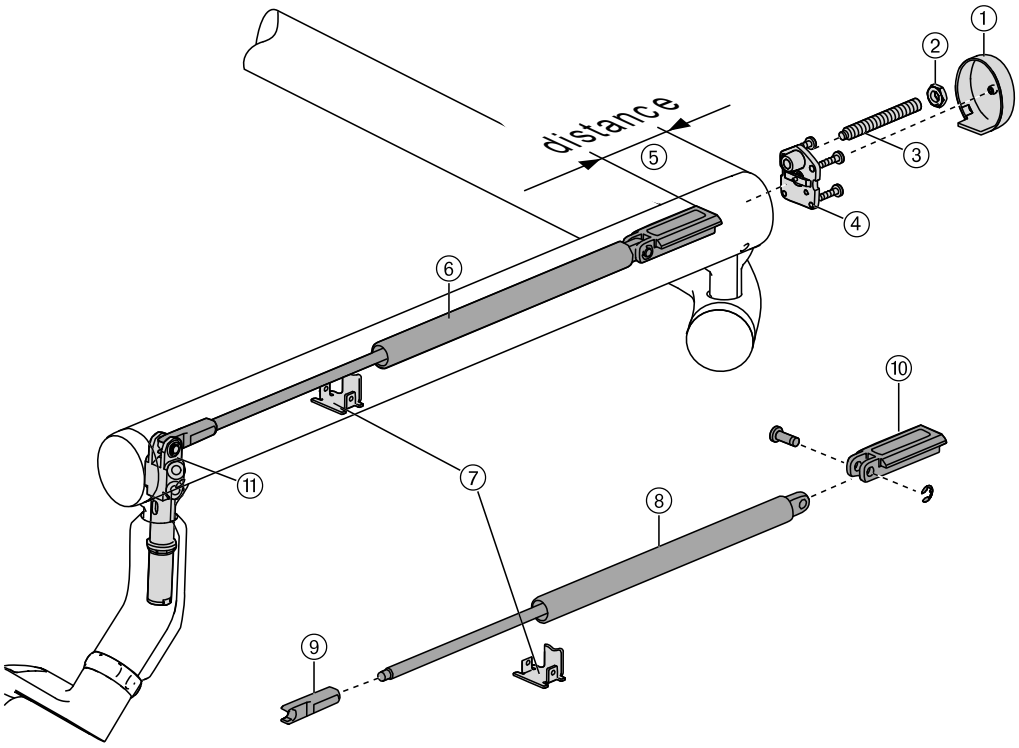
11.1 Replacing the gas-pressure spring

⚠ CAUTION

Gas-pressure spring is tensioned.

Risk of injury.

- ▸ Only remove the plate on the gas-pressure spring when the spring is relieved.



- ▸ Remove cover ①.
- ▸ Remove hexagonal nut ②.
- ▸ Relieve the gas-pressure spring completely by unscrewing the threaded pin M10 ③.
- ▸ Unscrew plate ④.
- ▸ Measure and record the seated depth ⑤ of the gas-pressure spring.
- ▸ Pull out the gas-pressure spring ⑥ completely and at the same time ensure that it does not catch in the spring guide ⑦. If needed, lift the gas-pressure spring slightly using a screwdriver.
- ▸ Install fork ⑨ and slide ⑩ on the new gas-pressure spring ⑧, taking care to position the slide ⑩ in relation to the fork ⑨.
- ▸ Guide the mounted gas-pressure spring ⑥ into the spring arm, ensuring the correct positioning, the fork ⑨ must be correctly inserted in the mount ⑪ in the spring arm, at the front. Then check for correct seating depth.
- ▸ Screw on the plate ④.
- ▸ Screw in the threaded pin M10 ③; this tensions the gas-pressure spring.
- ▸ Secure the threaded pin with the hexagonal nut ②. When tightening the nut, make sure that the nut and threaded pin are in the same plane.
- ▸ Mount the cover ①.

11.2 Replacing the PCBA light

⚠ CAUTION

Contamination/fingerprints on the protective panel, collimator and PCBA light.

Risk of glare due to increased scattered light or product damage (deterioration of the illumination field).

- Only touch the protective panel, collimator and PCBA light while wearing KaVo-approved lint-free cloth gloves or powder-free latex gloves.

CAUTION

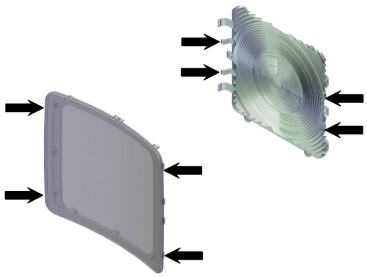
Electrostatic discharge.
Destroys electronic components.

- Before you touch the electronic circuit boards, always earth them by touching the protective earth conductor (PE).
- When working on an open unit, takes precautions against ESD damage.
- Always hold electronic boards on their edge only.

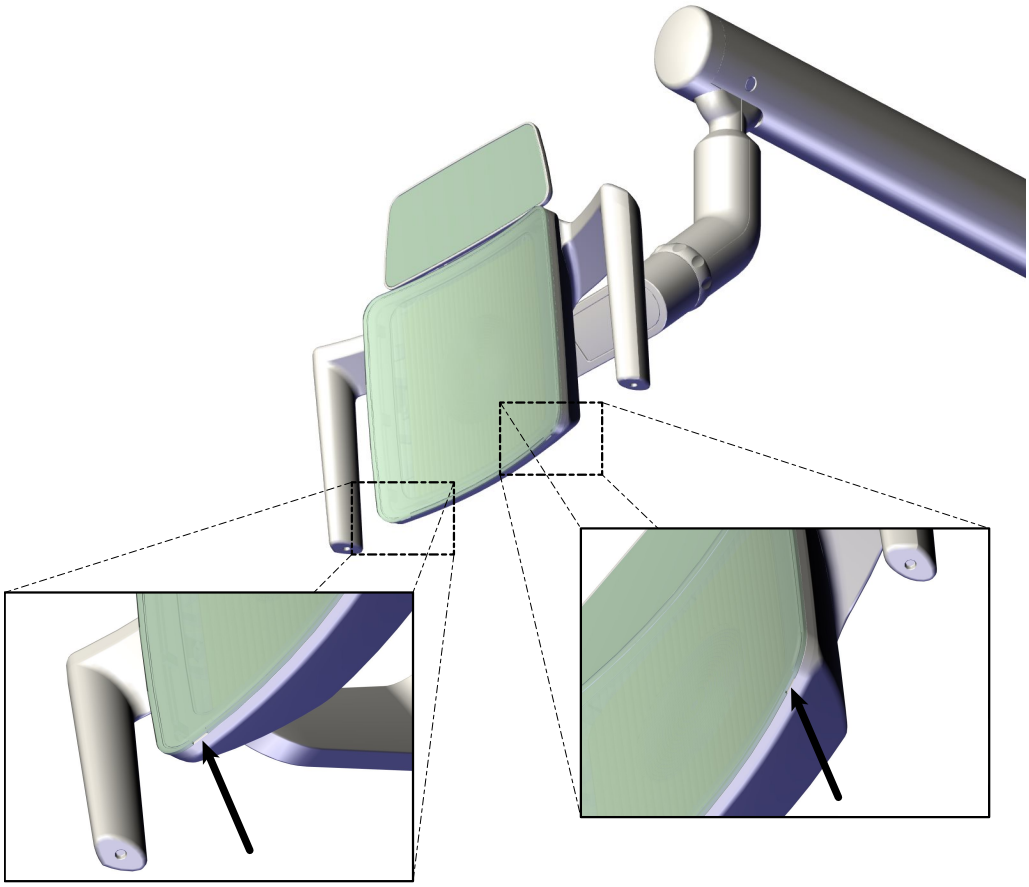
CAUTION

Scratching/contamination of the protective panel/collimator during installation/dismantling.
Product damage.

- Use gloves.
- Mount or dismount the protective panel and collimator carefully and do not touch the visually effective surfaces (inside of the protective panel / inside and outside of the collimator).
- Hold the protective panel by the back-moulded outer edge.
- Hold the collimator by the lugs on the outside.

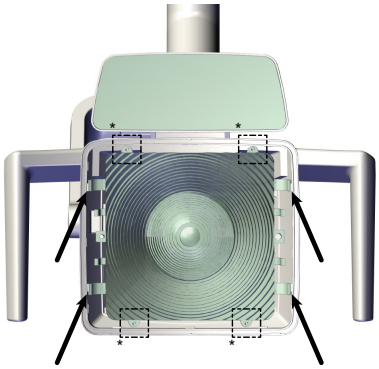


11.2.1 Disassembling the protective panel



- Carefully unlatch the protective panel at the bottom edge of the light head using a flat slot screwdriver at the slots and take it off towards the front.

11.2.2 Removing the collimator



- Release the right and left latch hooks of the collimator on the latches of the light housing.
- The latch hooks of the collimator can break during dismantling. In this case, the collimator can be mounted using the 4 screws supplied.

11.2.3 Replacing the PCBA light 4000

CAUTION

Electrostatic discharge.
Destroys electronic components.
- Before you touch the electronic circuit boards, always earth them by touching the protective earth conductor (PE).
- When working on an open unit, takes precautions against ESD damage.
- Always hold electronic boards on their edge only.

⚠ WARNING

Damaged insulation of electrical cables due to pinching or crushing.

Death or bodily injury from electric shock.

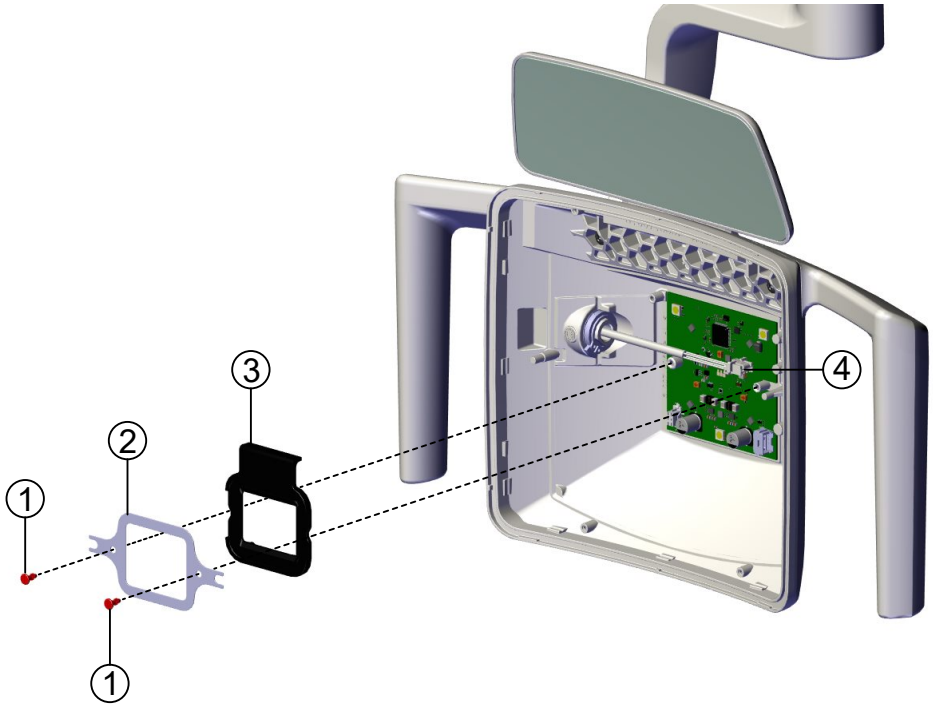
- During the installation of the luminaire insert, great care must be taken to ensure that the cables are not pinched or crushed.

⚠ CAUTION

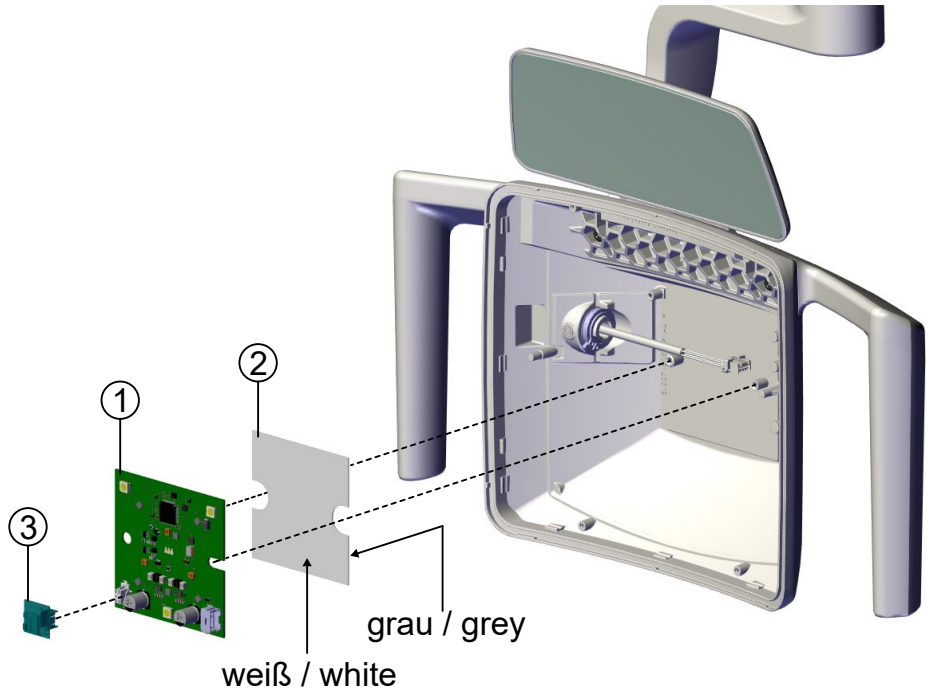
Contamination/fingerprints on the protective panel, collimator and PCBA light.

Risk of glare due to increased scattered light or product damage (deterioration of the illumination field).

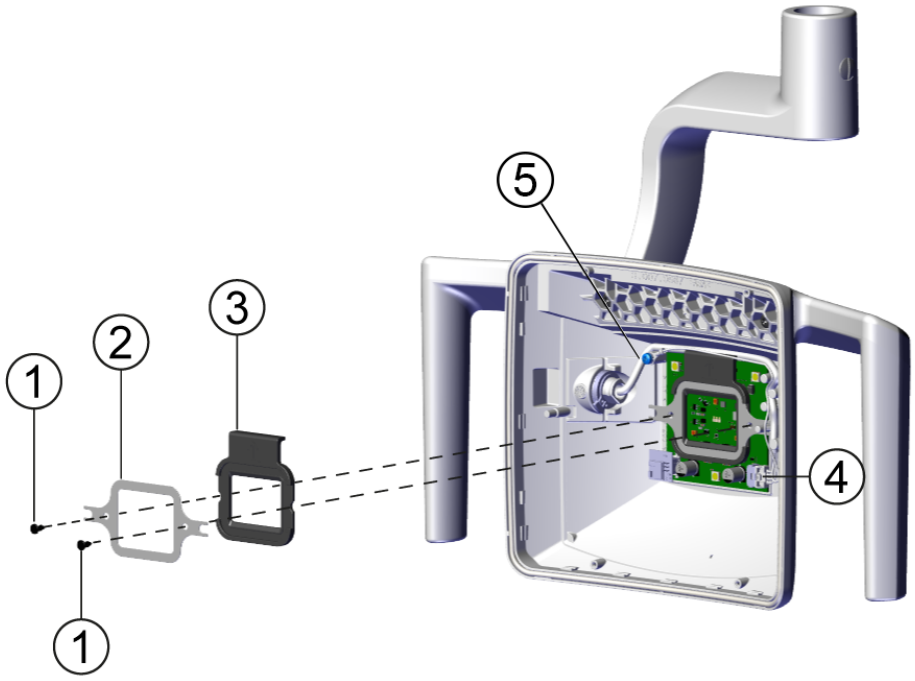
- Only touch the protective panel, collimator and PCBA light while wearing KaVo-approved lint-free cloth gloves or powder-free latex gloves.



- Unscrew two red screws ① with the screwdriver.
- Remove the holding plate ②.
- Remove the silicone holder ③.
- Disconnect supply/CAN bus cable ④ from X1 on the PCBA light 4000.



- Remove PCBA light ① and used heat conducting pad ②.
- Carefully remove any residual adhesive on the old heat conducting pad from the light head.
- Attach the new heat conducting pad ② with the strongly adhesive white side to the new PCBA light ①.
- Install the PCBA light ① and heat conducting pad ② with the slightly adhesive, grey marbled side in the light head.
- If available, unplug the Bluetooth module ③ from the previous PCBA light and plug it into X3 on the new PCBA light.



- Affix the PCBA light in the light head using the black silicone holder ③, holding plate ② and two screws ① included in the delivery.

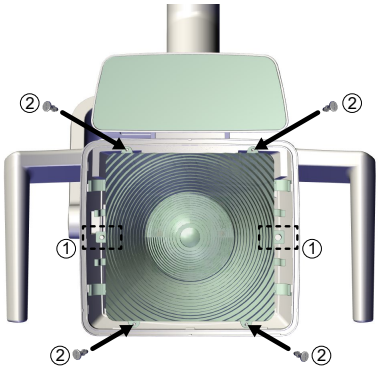
- When routing the cables ⑤, the silicone holder ③ and the cable must not stick out at the top. This can interfere with the light cone and create a shadow in the light field.
- Feed the supply/CAN bus cable ④ past the exterior of the PCBA light and plug it back into X1 on the PCBA light.

11.2.4 Installing the collimator

NOTE

The domes ① are different.

The protective panel and collimator can only be mounted in one orientation (mechanical rotation lock).



- Insert the collimator on the two domes ① and snap into place.
- Mount the collimator with the four enclosed screws ② if one or more latch hooks are broken off.

11.2.5 Installing the protective panel

Prerequisites

✓ Before installing the protective panel, make sure the seal is in the correct position!

- Place the protective panel on the light housing and snap it in evenly with a little pressure. Note installation position:
  Top: 2 latches centred
  Bottom: 1 latch centred

12 Safety check - Test instructions

12.1 Mounting the device

NOTE
The test instructions for the operating light to be mounted to devices are described in the instructions for use of the respective treatment centre. The measurement of the protective earth, defined in the instructions for use for the relevant treatment centre, must be extended to include the measuring points "Scan the light head of the operating light with the probe".

12.2 Ceiling mounting

NOTE
This chapter describes the safety check performed on the KaVo Lumina for the case of ceiling mounting.

12.2.1 Introduction

General notes

NOTE
The safety check may only be carried out by one or more electricians (as defined in IEC 61140) who have been appropriately trained for the device to be inspected.

NOTE
The contents and specified tests described in this document are based on the international standard, IEC 62353. This standard applies to the testing and inspections of medical electrical devices or medical electrical systems complying with IEC 60601-1 (DIN EN 60601-1).

NOTE
In order to evaluate the safety of medical devices, systems or components of medical devices or systems, the safety check must be carried out at the following times:
before commissioning
upon maintenance
during inspection and servicing
after repair
on the occasion of repeat tests

NOTE
With regard to devices that have not been manufactured in accordance with IEC 60601-1 (DIN EN 60601-1), these requirements can be applied taking the mandatory safety standards for the production of these devices into consideration.

NOTE
If several medical electrical devices (ME device) or electrical devices from several manufacturers combined into a system are connected to the KaVo dental unit, the manufacturer data contained in the instructions for use for all products subject to the safety checks must also be noted.

NOTE
Accessories of ME devices that might impact the safety of the device to be tested or the measured results must be included in the safety checks.

NOTE
All tests on accessories included in the safety checks must be documented.

NOTE
Furthermore, the manufacturer data contained in the instructions for use must be adhered to in all products to be tested and inspected.

NOTE
KaVo offers a medical device book for keeping an inventory and recording essential master data on the medical device. The medical device book is only available in German (mat. no. 0.789.0480).

NOTE
The following tests and measurements must be documented, for example in the medical device book. We recommend using the templates at the end of the document.

NOTE
The tests must be performed in the order specified by the manufacturer!

Notes for medical electrical systems

NOTE
An ME System is the combination of individual devices (as defined by the manufacturer) that must meet the following conditions:
at least one of the devices must be a medical electrical device.
The devices must be functionally connected or at least they should be connected by the application of a multiple socket outlet.

NOTE
With ME systems, the person responsible for putting the system together must define the necessary measuring parameters and measuring procedures as required in IEC 60601-1 (DIN EN 60601-1).

NOTE
Each individual device in an ME system, which has a separate connection to the power supply network or which can be connected to or separated from the power supply network without the aid of a tool, must be checked individually. Moreover, the ME system must be checked as one unit to avoid any "aging" of individual devices leading to unacceptable values in sum.

NOTE
An ME system that is connected to the supply network by means of a multiple socket outlet must be treated as one device during checks and testing.

NOTE
If the ME system or part of the system is connected to the supply network by means of an insulating transformer, the transformer must be included in the measurements.

NOTE
In ME systems, in which more than one ME device are interconnected via data lines or otherwise, e.g. via electrically conductive attachments or coolant tubes, the earth wire resistance of every single device must be checked.

NOTE
If it is impossible to check single ME devices that are functionally connected to an ME system individually for technical reasons, the ME system must be checked as a whole.

Components of the safety check

Visual inspection (inspection by examination)

Optical appraisal of the safe and usable condition of the medical device and its accessories.

Measurements

- Measurement of the protective earth resistance in accordance with IEC 62353
- Measurement of the equipment leakage current - Alternative measuring method in accordance with IEC 62353
- Measurement of the applied part leakage current - Alternative measuring method in accordance with IEC 62353

NOTE
A measurement of the insulation resistance in accordance with IEC 62353 need not be carried out. This check is covered by the measurement of the leakage current provided a safety tester specified in IEC 62353 Annex C is used!

Functional test

Medical device function test as well as testing of all safety shutdowns with reference to accompanying documentation/instructions for use.

Testing intervals

Testing interval for type IIa devices is every 2 years

Notes on the test method in accordance with IEC 62353

- Protection class 1
- Type B
- The device is permanently installed / threshold: SL < 0.3 Ω
- Measurement according to EUL / threshold limit: < 10 mA*

*The limit of the equipment leakage current corresponds to the value defined in IEC 60601 (DIN EN 60601), taking comment 2 from table 2 into consideration.

Notes on recurrent testing

NOTE
The value determined in these tests must be documented and evaluated together with the measuring process. The measured values must not exceed the specified values.

NOTE
Comparisons with previous measurements must be carried out if the measured values are lower than the threshold values by more than 10 %. The test intervals should be reduced if a deterioration in values is determined!

12.2.2 Instructions for the safety check

Visual inspection (inspection by examination)

- Check the following items in advance:
  Has the configuration of the ME device or the ME system been changed since the last inspection?
- Has the change been documented and approved (test documentation of safety check)?
- Are there any indications of insufficient safety?

Visual inspection and appraisal of the medical device and accessories

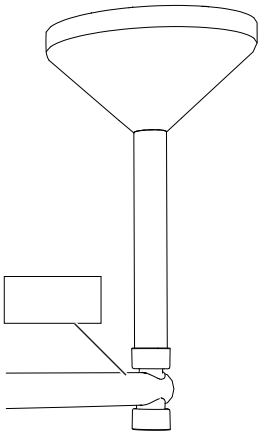
The following list is for exemplary purposes and makes no claim of being complete.

The following needs to be checked:

- Stability of the device
- Absence of damage to the cladding or casing (cracks, breakage)
- Functioning of the carrier systems of the operating light (brakes, height adjustment, etc.)
- Condition of the operating light
- Condition of the power connection provided by the customer

Check of the legibility and completeness of the safety-related markings

- Check if all safety-related markings (plates and labels) are present and legible.
- Check if the rating plate and serial number plates are present and legible.



Mounting location: rating plate

Control of the availability of the necessary documents

- Check if the required instructions for use and care instructions are available in the surgery.

NOTE
Any irregularities determined in the visual inspection must be recorded in the test protocol. It is essential to determine whether defects and deficiencies could have an adverse impact on the safe operation of the unit. If the determined irregularities present a safety hazard and cannot be rectified directly, the unit must be closed down until a safe operating condition is restored.

Measurements

⚠ WARNING

Danger to persons due to insufficient diligence during the safety checks and testing.

Death or bodily injury from electric shock.

- Prior to connecting the treatment centre to the safety tester, disconnect it from the mains supply network.
- Carry out all safety checks and tests in a manner that will ensure that there will be no danger to the testing personnel, patients or other persons.

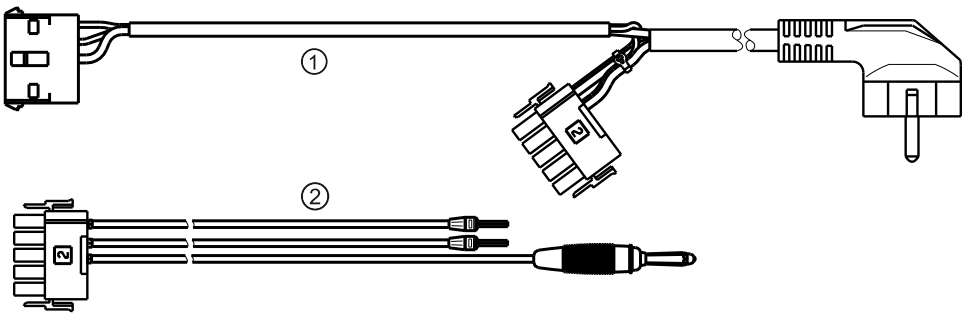
NOTE
The safety tester must comply with the requirements defined in IEC 62353 (DIN EN 62353), Annex C.

NOTE
If no other specifications have been made, all values relating to voltage and current are effective values of alternating voltage, direct voltage or pulsating voltage res. alternating current, direct current or pulsating current.

NOTE
Connection cables such as data cables and cables for the functional earth could simulate protective conductor connections. These types of supplementary but unintentional protective earth connections could lead to erroneous measurements.

NOTE
Cables and wires, e.g. power supply cords, measuring circuits and data lines, must be arranged appropriately such that their influence on measurements is minimised.

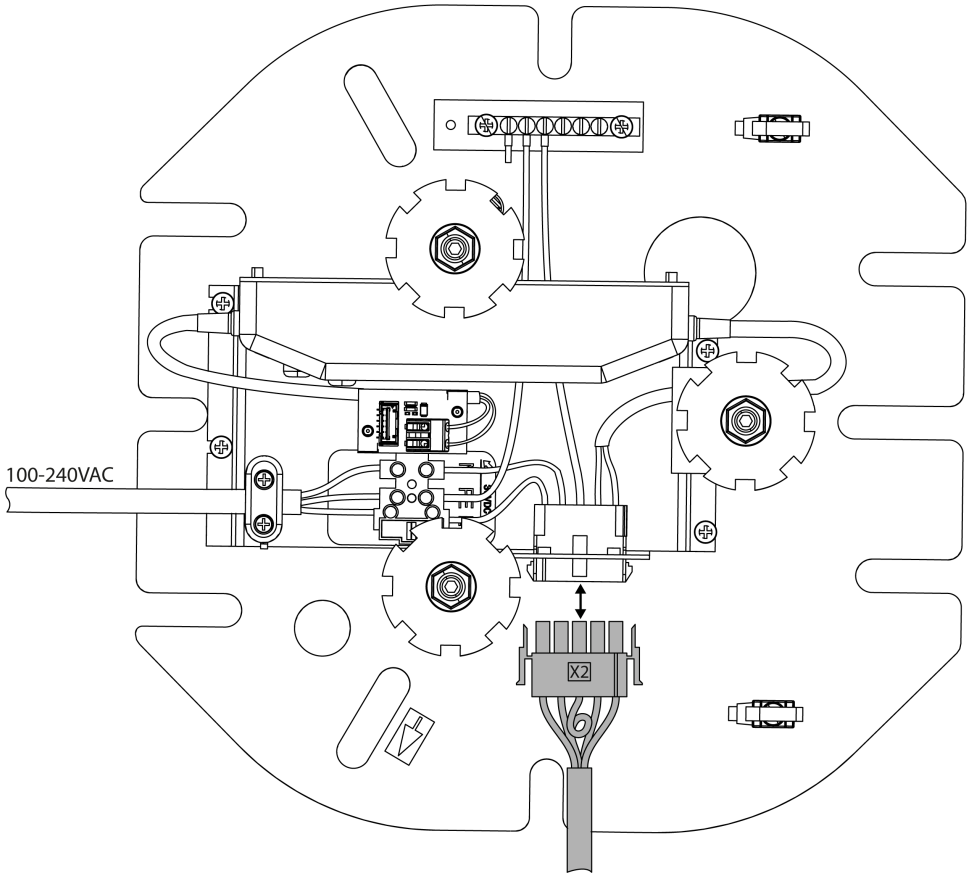
NOTE
The following measuring aid can be ordered: KaVo measuring cable (mat. no. 0.411.8811)



Using the measuring cable ① the unit is disconnected from the mains supply and connection of the treatment centre to the safety tester is enabled. Hence, the customer-provided power supply cord L & N on the power input board need

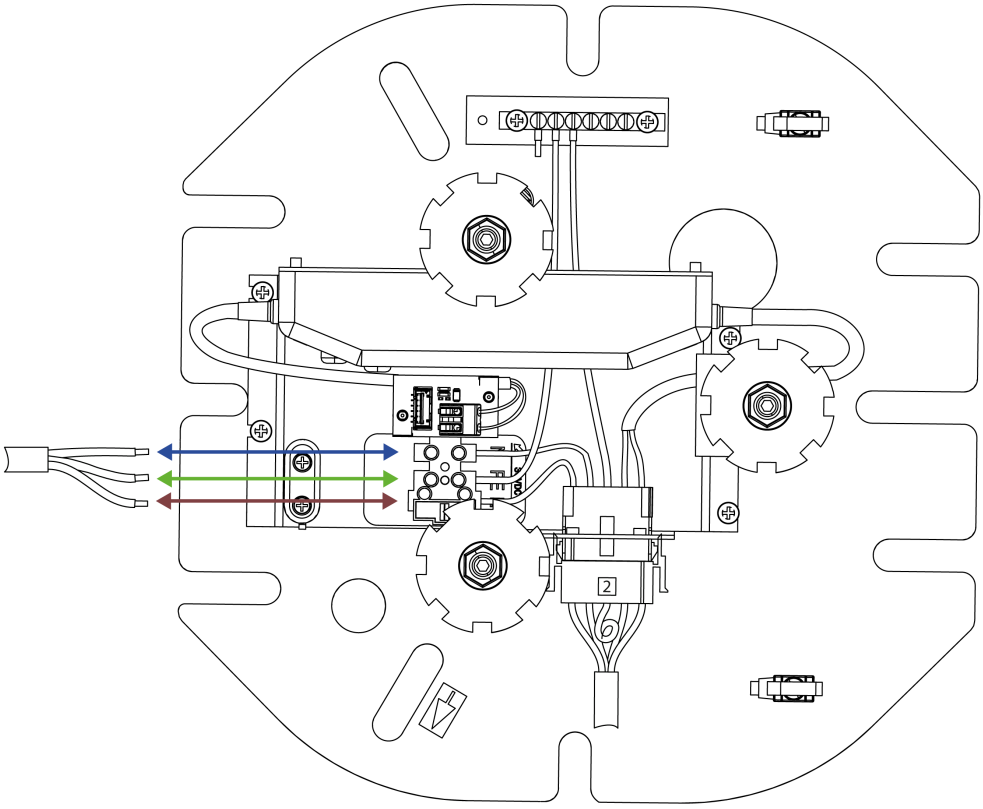
not be disconnected. The adapter cable ② is included in the delivery of the KaVo measuring cable and is required for older treatment centres that are not equipped with an X2 connector.

Connecting the safety tester with KaVo measuring cables to the ceiling adapter



- Remove the cover from the ceiling adapter.
- Remove the plug X2 from the ceiling adapter and plug into the matching plug X2 of the KaVo measuring cable (**Mat. no. 0.411.8811**).
- Plug the second plug X2 of the KaVo measuring cable into X2 in the ceiling adapter.
- Insert the protective contact plug of the KaVo measuring cable into the safety tester.

Connecting the safety tester without the KaVo measuring cable to the ceiling adapter.

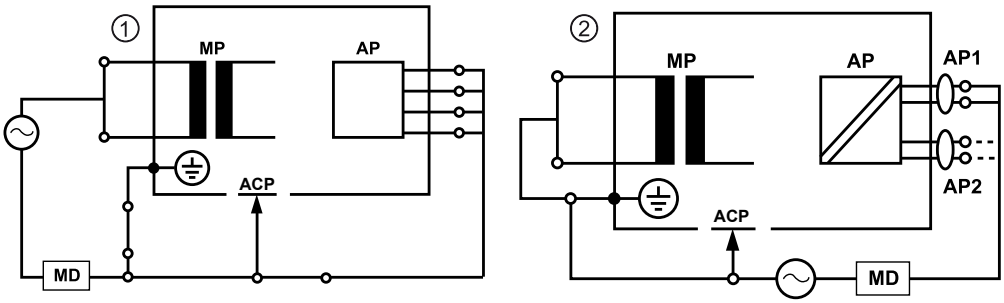


- Switch L + N of the on-site power supply cord to be voltage-free.
- Disconnect L + N on terminals X1.1 (L) and X1.2 (N).
- Connect the safety tester directly to terminals X1.1 (L) and X1.2 (N) and protective earth conductor terminal (PE).

- The main switch on X2 must be turned on for measurement.

NOTE
The main switch of the ME device / ME system must be turned on during the measurement.

Connect accessible conductive parts [ACP] to protective earth conductor (PE)



ACP = accessible conductive parts

NOTE
Additional measuring points ACP X must be taken into consideration in the presence of accessories.

ACPs on the operating light

No ACPs need to be connected to the operating light during the measurement with the protective earth conductor (PE), as all relevant parts are connected to the protective earth conductor (PE)before they leave the factory and are thus included in the test.

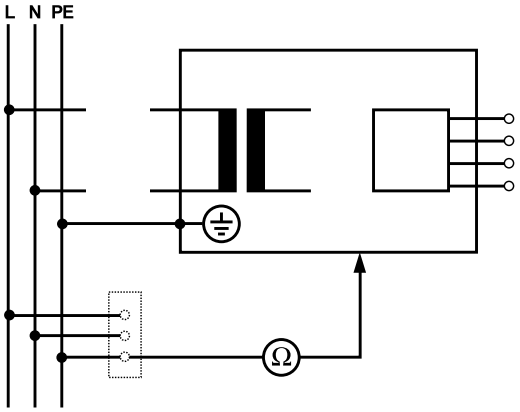
Measuring the protective earth [PE] resistance

Limit	< 0.3 Ω (maximum value!)

NOTE
The integrity of the power supply cable, in particular the protective earth wire of the power cable must be ensured. As this is a fixed installation, the evaluation can be conducted by means of a visual inspection. If damage is determined, the further procedure to be taken is specified in the general instructions.

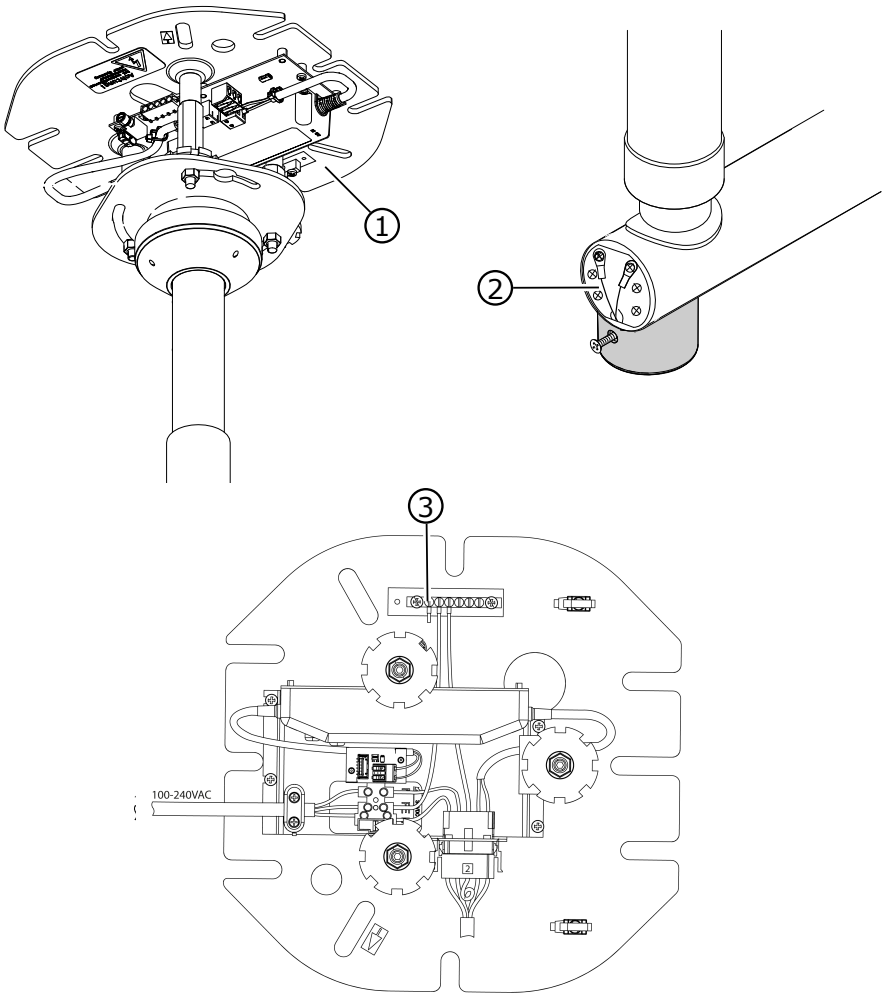
NOTE
In this measurement the resistance of the protective earth connection of the supply network can be taken into consideration.

NOTE
If applicable: all removable supply connection lines, which are kept handy for possible use, should be taken into consideration and the respective PE should be measured.



Protective earth measurement

Scan the ceiling adapter of the treatment light with the probe

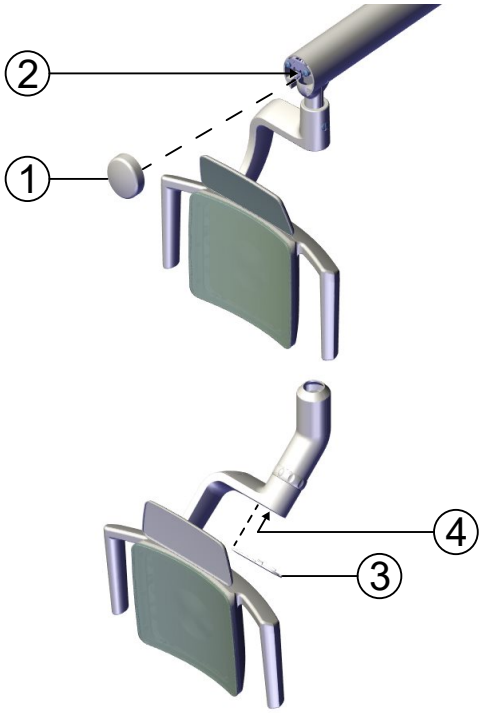


① Base plate for the ceiling adapter

② Surroundings of the protective earth terminal

③ Screw for fastening the power supply board

Scanning the light head of the operating light with the probe



Measuring point for 2D joint:

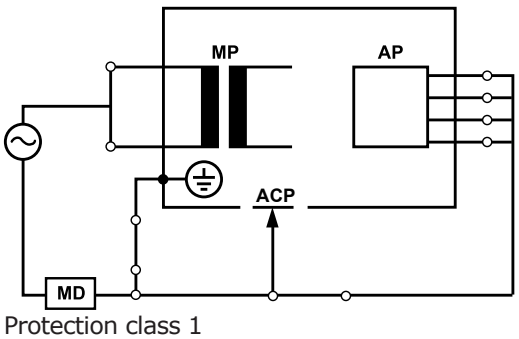
- Remove the cover ① from the spring arm.
- Test point for protective earth measurement ②

Measuring point for 3D joint:

- Remove the bottom cover ③ on the light bow.
- Test point for protective earth measurement for 3D joint ④

Equipment leakage current - Alternative measuring method

Limit	< 10 mA (maximum value!)



Protection class 1

⚠ WARNING

Danger to persons due to insufficient diligence during the safety checks and testing.

Death or injury from electric shock.

- Conduct test for leakage current in Protection Class I devices only after the protective earth test has been passed.

⚠ WARNING

Electrical shock.

Death or bodily injury from electric shock.

- Prior to connecting the treatment centre to the safety tester, disconnect it from the mains supply network.
- Before servicing, pull the mains plug out of the socket or completely disconnect the device from the power to de-energise it!
- After conversion, check the electrical safety in accordance with DIN EN 50678 (VDE 0701) and DIN EN 50699 (VDE 0702).

Functional tests

The following conditions must be met in all functional tests:

- The basic functions of the operating light must be guaranteed.
- The treatment light must be fit for use.
- There must be no irregularities, noise or abrasion, etc., present.

The following list is for exemplary purposes and makes no claim of being complete.

- Functioning of the main switch of the device
- Functional test of the operating light
- Functional test ...

Assessment and documentation

NOTE

All tests conducted must be documented comprehensively. The documents must contain at least the following particulars:

- Name of the test centre
- Name of the test engineer
- Name of the tested device (e. g. type, serial number)
- Tests and measurements
- Data, type and measuring results of the visual inspections
- Data, type and measuring results of the measurements
- Data, type and measuring results of functional tests
- Measuring/test equipment including SN/test equipment number and calibration period
- Final evaluation
- Name, date and signature of test engineer

There is a copy of a test report template at the end of the chapter on Safety Checks. KaVo recommends to use this template.

NOTE

Following testing, repair or adjustment, it must be verified whether the ME equipment or ME system has been restored to the state that is required for the intended usage before it is employed once again.

NOTE

If the safety of the tested ME equipment or ME system has not been established, e.g. the tests have not been completed with positive results, the equipment or system must be marked accordingly and the potential hazard associated with the equipment or system must be communicated in writing to the RESPONSIBLE ORGANISATION (to the operator, as a rule). This action is not required if the cause of the malfunction was determined and rectified. But the defect must be recorded in the protocol.

12.3 Test protocol for the safety check

Test Protocol - Safety Check

(Test of safety and function according to §7 section 3 Medical Device Operation Ordinance)

KAVO Dental Excellence

Operator	**Testing organisation**
	Name of the test engineer

☐ Test before startup
☐ Recurrent test
☐ Test after repair

Date of testing:

Manufacturer:	
Equipment:	
Serial number:	
ID no.:	

next recurrent test required in

6	12	18	24	months

Test according to:	**IEC 62353 : 2014**		
Protection class:	**I**	**II**	
Power connection: *1	**PIE** / **NPS**	**DPS**	
Applied part, type:	**B**	**BF**	

Measuring device used:

Make:	
Type:	
Ser. no.:	
Calibration date	

Test:	**Limit**	**Measured value**	Passes test yes	Passes test no
Visual inspection:			☐	☐
Measurements:				
Protective earth resistance	**0,3 Ω**	**Ω**	☐	☐
Insulation resistance	optional: Measurement is not to be performed		☐	☐
Equipment leakage current - Alternative measuring method *2	**10 mA**	**mA**	☐	☐
Applied part leakage current - Alternative measuring method	**5 mA**	**mA**	☐	☐
Functional test (according to manufacturer instructions)			☐	☐

Defect/Comment/Assessment

Overall assessment:

☐ No safety or functional defects detected
☐ No immediate risk, detected defects can be remedied in the short term.
☐ Device must be taken out of commission until defects are remedied!
☐ Device fails to meet requirements - Modification / replacement of components/de-commissioning recommended.

Date / signature

*1 PIE Permanently installed equipment
NPS Non-DETACHABLE POWER SUPPLY CORD
DPS DETACHABLE POWER SUPPLY CORD

*2 The limit of the equipment leakage current corresponds to the value defined in IEC 60601 (DIN EN 60601), taking comment 2 from table 2 into consideration

Date this test protocol was created: 2021-07-28

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