VIO® NESSY® System and NESSY Ω®
Safe use of return electrodes
Important information

While Erbe Elektromedizin GmbH has taken the greatest possible care in preparing this brochure and compiling the recommended settings, we cannot completely rule out errors. The information and data contained in the recommended settings cannot be used to justify any claims against Erbe Elektromedizin GmbH. In the event of compelling legal justification for a claim, liability shall be limited to intent and gross negligence.

Although the information on recommended settings, application sites, duration of application and the use of instruments is based on clinical experience, individual centers and physicians also favor settings other than those recommended here. This information is intended only as a guideline and must be evaluated by the surgeon for applicability. Depending on individual circumstances, it may be necessary to deviate from the information provided in this brochure.

Medicine is constantly subject to new developments based on research and clinical experience.

This is another reason why departing from the information provided here may be appropriate.
Electrosurgery is the surgical technique most frequently deployed in the operating room. In almost every operating room, throughout all disciplines, an electrosurgery unit is used.

Monopolar and bipolar techniques are distinguished according to the electric circuit (unit/instrument/patient). For monopolar electrosurgery, a return electrode is applied to the patient’s body to conduct the high frequency current. In the bipolar technique the electric circuit is closed with a bipolar instrument such as forceps.

The aim of this brochure is to minimize potential risks in monopolar electrosurgery connected with the application of the return electrode – ensuring the maximum possible protection for the patient.
The current flow in monopolar electrosurgery

In the monopolar technique the alternating current flows in a closed circuit: from the instrument though the patient’s body to the return electrode and from there back to the unit.

Current with a high current density is emitted at the active electrode in order to create an electrosurgical cut or coagulation. At the exit site, the return electrode, no appreciable thermal effects arise if the current is conducted over the entire large-surface return electrode at a low current density.

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Conventional return electrodes must be oriented towards the surgery.

APPLICATION DIRECTION OF A SPLIT-PAD RETURN ELECTRODE

A higher current density arises on the side of the return electrode closer to surgical site, as the current seeks the shortest path with the lowest resistance. The resulting uneven temperature distribution on the return electrode is also known as the “leading edge” effect.

If the short side of the return electrode faces the operating field, the current density is higher and the heat distribution is more inhomogeneous. For this reason, the return electrode should always be oriented with the longest side towards the operating field. This long edge orientation can reduce heat peaks (Fig. 02 ↑ and ↓).
Our safety tip:
Avoid the leading edge problem
by using a NESSY® return electrode.

Even distribution of current density and heat generation on both surfaces of the return electrode

NESSY® compares the current densities of the two electrode surfaces

NESSY® stands for Neutral Electrode Safety System (neutral electrode = return electrode). NESSY®, integrated in the VIO® series, checks whether the split-pad return electrode is correctly applied over the entire area. The current flowing through the two contact surfaces are continuously equalized. If the return electrode is not applied properly there is a current asymmetry. The risk: partial thermal peaks due to increased current density.

Activation is possible with a low deviation. In the event of a large difference, there is the risk of thermal tissue necrosis.

NESSY® stops the activation and outputs a warning signal (display: red traffic light ↑). In order to avoid thermal necrosis, the electrosurgery function can only be reactivated once the application of the return electrode has been corrected.
The NESSY ® safety concept

ADVANTAGES OF NESSY ® AT A GLANCE

☐ High current densities and partial heating are largely avoided, despite the small return electrode area
☐ Positioning irrespective of surgical site
☐ Suitable for adults and children
☐ Skin-compatible contact layer
☐ The thin material means the return electrode adapts well to the body shape

MAXIMUM SAFETY AND NON-DIRECTIONAL APPLICATION WITH NESSY ®

The NESSY ® can be freely placed without orientation towards the operating field. The outer uncontacted equipotential ring distributes the current evenly to the inner contact surface, thus avoiding the unwanted leading edge effect.

Another advantage: NESSY ® is smaller than conventional return electrodes. So it can also be used for smaller patients and is easier to place. NESSY ® can therefore be used for adults and children.

Both NESSY ® and the return electrode safety system stand for a high degree of safety in monopolar electrosurgery.

Thermal comparison between a conventional return electrode and the NESSY ® (on the right): homogeneous current distribution (application on the thigh r. and l.)

NESSY ® with the outer, uncontacted equipotential ring
Information on safe use of electrosurgery

1. PLACE THE PATIENT IN AN ELECTRICALLY INSULATED POSITION

- Place the patient on a dry and electrically insulated OR table pad.
- Ensure that the arm support cover is insulated.
- Remove any jewelry (piercings, rings, chains, watches, bracelets) and/or removable dental prostheses; taping over jewelry does not suffice.
- Bend the patient’s arms and legs or wrap them in towels so as to prevent contact with the body; avoid skin-to-skin contact in areas of loose skin or breast folds (by covering the areas with dry surgical gauze).
- The patient must not touch any electrically conducting objects (drip stands, hoses).

2. SELECTING A SUITABLE RETURN ELECTRODE

- Self-adhesive split return electrodes are preferable to single return electrodes and silicone electrodes.
- A suitable return electrode has to be used for infants.
- We recommend NESSY Ω, which can be placed without orientation towards the operation field.
- Please only use split return electrodes if possible, as only these can be monitored by the safety system.

CAUTION: This checklist does not replace the instructions for use.

3. SELECTING THE POSITION FOR THE RETURN ELECTRODE

- It is possible to position the return electrode on the patient’s thigh, upper arm or flank.
- Attach the return electrode as close as possible to the operating field while maintaining a minimum distance of 15 cm.
- The monopolar current should not pass through constricted areas of the body (e.g. elbows, knees).
- Position the return electrode above electrically conducting tissue (muscle tissue) whenever possible.
- Do not place the return electrode on top of fat tissue, bones/joints, skin folds or on the patient’s head.
- Attach the return electrode to healthy tissue if possible. Avoid scars, hemorrhages, tattoos.
- The patient should not lie on top of the return electrode, cables or the cable connector.
- When lifting and moving the patient make sure the return electrode and the cable do not detach and the patient is not laid down on top of them.

Patients with active and passive implants:

- In cases of patients with a cardiac pacemaker or any other kind of conductive implant use bipolar instruments wherever possible.
- When monopolar instruments are used, attach the return electrode far enough away from the implant to prevent the current path of the return electrode from passing over the implant. Minimize the effect number (voltage) and output limitation.

4. PREPARING THE APPLICATION SIDE

- Do not attach the return electrode to areas with hair. Shave the return electrode application site beforehand.
- The return electrode application site must be dry and free of skin oil.

5. ATTACHING THE RETURN ELECTRODE CORRECTLY

- Do not trim the return electrode.
- Always attach oblong return electrodes with the long side directed towards the operating field.
- Make sure the entire surface of the return electrode is attached to the patient’s skin and is wrinkle-free; avoid air bubbles.
- For patients wearing antithrombosis stockings, the return electrode can be attached underneath one of them with the connector and cable exposed.
- Self-adhesive return electrodes can only be used once.

6. AVOIDING IGNITION OF COMBUSTIBLE SUBSTANCES

- Disinfectants must not flow underneath the patient.
- Wait until the disinfectant has been dried off and the combustible gas has evaporated before covering the patient.
- Avoid inflammable and oxidizing gases in the surgical field (e.g. anesthetic or endogenous gases).