In-vivo and In-utero Electroporator

SP – 4x series

User Manual

SUPERTECH Instruments

General Description

Electroporator SP-4x is optimized for in-vivo and in-utero applications. For this reason it has extremely high output current capability on an affordably secure voltage level.

Electroporator SP-4x is designed for in-vivo and in-utero applications to work in the bodies of living (certainly anaesthetized) animals. That is the reason, why the maximal output voltage of our equipment is 200 V or 400 V, depending on the application.

The output voltage range is set in the factory during the manufacturing process. You should specify the desired voltage range in the order.

Security Rules

The In-vivo and In-utero Electroporator, as all electroporator models of every manufacturer, is especially dangerous equipment! The output wires of the Electroporator are driven by 200 V or 400 V DC voltage as maximum. This voltage can cause a lethal electric shock!

Only good quality, highly isolated output cables should be used.

Only good quality, highly isolated electrodes should be used.

Never touch the electrodes!

Hold the electrode with only one, right hand! Keep your left hand far away from the electrodes, because your heart is in the left side of your body.

The security of the output wiring made by the user is not the responsibility of Supertech Ltd.

The security of the electrodes made by another manufacturer is not the responsibility of Supertech Ltd.

The electrical security aspects of the Electroporator during normal usage are completely under the sole responsibility of the user!

The equipment is supplied from the 115/230 VAC / 50 (or 60) Hz mains system. This is a dangerous voltage! All general electrical security precautions should be kept in mind during the usage of the equipment!

Continuous short circuit at the output connectors will destroy the internal circuitry of the Electroporator.

Emergency Stop

If you experience any unwanted effect (such as electric shock, parasite stimulating effect in the living tissue, coagulation, etc.) during the output pulse sequence, you can stop the actual action of the Electroporator with pressing the F button. After making an emergency stop, please switch the Electroporator off, investigate the circumstances and repair the fault before continuing the work.

Certainly, simple switching off the Electroporator will also cancel its activity. But because of the huge energy buffer of its power supply, the shutting down after switching off is slower.

Technical Data

Output voltage ranges: 0 – 200 V, or 0 – 400 V

Manual output voltage adjustment with a 10-turn precision helical potmeter

Output impedance: 33.6 Ohms

Real (true, pure) output voltage indicator LED on the front plate

The timing parameters are controlled by a built-in RISC microcontroller in a user-friendly menu system

Display: 4 x 20 characters alphanumeric LCD with bright blue backlight

Programming: three pushbuttons on the front, in menu system

Automatic internal diagnostic algorithm in the firmware

Flash program memory

Non-volatile EEPROM memory to store the parameters used last time

Functions:
- Single Pulse mode
- Burst mode

Number of output pulses: 1 - 99

Pulse length: 1 – 250 ms (adjustable in 1 ms steps)

Pause between the pulses: 10 ms – 60000 ms (adjustable in 10 ms steps)

Manual Start or externally controlled activity (may be used together, independently of each other)

Double security insulation from mains

Emergency Stop capability

External Start Pedal input on the back side

Dimensions of the instrument: 290 x 250 x 120 mm

Mains voltage: 100-120V or 220-230V (chosen by an internal selector switch, fixed in the factory)

Power consumption without output load, the Electroporator only: 80 VA

Weight: 3.8 kg

Electrodes and Cables

Nearly all kinds of in-vivo electroporation applications require different, special shaped electrodes. There is a great commercial choice of various electroporator electrodes, such as flat, pin, cuvette, tweezers, pinch and other kinds of electrodes. That is why Supertech Instruments does not offer electrodes for electroporation. But we provide the appropriate, secure, high voltage output cable for your preferred electrode, as a free accessory.

Front Panel Controls

The equipment is assembled with a 4 x 20 character blue LCD display and a user-friendly 3-button keypad on its front plate. The development strategy of the Electroporator was to design an easy-to-use user interface, while highly professional capabilities are activated behind the simple menu system.

The accuracy of the time parameters in the Electroporator is guaranteed by internal crystal pacers. All the programmed time parameters are stored in built-in nonvolatile memories. They hold the previously used values during switched off periods. If you use the equipment in a fixed application, you should program it one time only. If you switch the Electroporator on, it checks, which function was used last time. After it the parameters used by the actual function are checked. If the parameters have got valid values preset, the last used function will be started automatically.

Next to the LCD display there are three buttons. With them you can do (nearly all) what you would like to do.

Up, and Down buttons: Use them to choose from the menu items, and configure the values. Where you see the cursor you can adjust the appropriate menu point, or you can set that numeric value what is under the cursor.

F (Function) button: Use it in the menu as enter, during the programming, and parameter setup actions. When you are in a programming phase and the Function button works as enter, the microprocessor automatically saves the newly selected value after the key press. When the equipment is actually working in a selected function, the Function button can be used as escape to inactivate, and leave the actual task, and to jump to the main menu.

The mains switch is located at the right side of the front. If the Electroporator is switched off, it is necessary to wait until the power supply looses all its energy. It is prohibited to switch the Electroporator on again, without waiting enough; otherwise a faulty reset condition would happen, even, the internal software (firmware) can be destroyed! The enough time before the Electroporator can be switched on again after switching off, if the last screen content (not the backlight, but the letters) disappears completely, and 10 seconds more is spent.

START event means a keypress on START button, or pushing of the Start Pedal. The two sources of Start events can be used together or independently any time (they are in logical OR relation).

Pulse Amplitude potmeter: You can adjust the output voltage of the Electroporator with this 10-turn precision helical potmeter.

The 4 mm red and black banana jacks are the output connectors of the Electroporator. The polarity is written above them. Never touch the output connectors (see the Security Rules above, too)!

Active Danger LED shows the working actions of the Electroporator, even in the case of short circuit at the output connectors.

Pure Indicator LED shows the working actions of the Electroporator, if there is a real voltage appears at the output connectors. The brightness of the Pure Indicator LED is proportional to the actual output voltage.

Connectors at the Back Side

There is the AC input plug at the left side. Connect it to the 115/230 VAC mains system with the appropriate cable.

Start Pedal connector: This 1/4 inch jack input is used to connect an optional, normally open pedal as the source of an external Start event.

Warranty

Supertech Instruments gives you 5 years of full warranty for electronic products and 3 years of full warranty for mechanical products by default. Longer warranty periods can also be defined and agreed (the actual conditions should be discussed before placing the order).

Supertech Instruments gives you full warranty for its products against defects in materials or workmanship as long as the equipment has been subjected to normal and proper use. During the warranty period, faulty products will be repaired or replaced free of charge provided they are returned to our workshop. Postage of the warranty repair actions is paid by the Customer. The exceptions are the Vibration Isolation Tables. There are special conditions introduced for repairing of Vibration Isolation Tables (see the appropriate User Manual). Supertech Instruments will undertake the servicing and calibration after the expiration of the warranty period for a nominal fee.

The warranty does not cover the faults made by the user.

The measuring equipments manufactured by Supertech Instruments are for experimental and/or lab animal purposes only and are not intended for human use. Electrical safety measures of operating the 115 V or 230 V AC main units are the sole responsibility of the user.

Further information sources

Technical hotline via email (all of them work):

office@superte.ch
office@supertechinstruments.co.uk
office@super-tech.eu

International technical hotline on the phone: +36 20 9234 386

For further technical information please visit our websites. Supertech Instruments continuously uses several websites with the same content. Please use that one, which is the easiest for you to remember:

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