

BTL-4000 Topline Series

USER'S GUIDE



BEFORE YOU START

Take a moment to reflect on the advantages of the BTL-4000 Topline Electrical Stimulation, Ultrasound, Laser and Magnet technology in your own clinic. The BTL-4000 Topline system has many benefits not available in other systems. For example, the touch screen is a major step forward since it allows users to precisely monitor the therapy and document and store patient data for later recall. A choice of therapy protocols offers maximum flexibility in a variety of clinical applications.

The combination electrical stimulation / ultrasound / laser and magnet therapy system also offers substantial benefits since it eliminates the need to purchase separate units. We sincerely believe the latest BTL physiotherapy system is technically superior to any other physiotherapy products available and will provide years of trouble-free and profitable use.

All of us at BTL wish you every success with your BTL-4000 Topline system. We pride ourselves on being as responsive as possible to our customers' needs. Your suggestions and comments are always welcome since we believe an ongoing relationship with our customers is critically important to our future product line. Please call or email us your suggestions.

While we would like you to start using your equipment right away, we encourage you to thoroughly read this manual in order to fully understand the operational features of the BTL-4000 Topline system.

Again, thank you for being a BTL customer. In the event of any problem, or if you require service, please make an initial call to your local distributor, who will decide whether to refer the problem to our office.

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1 GENERAL CHARACTERISTICS

The BTL-4000 Topline Series offers advanced and well designed physiotherapy units for professional use. Depending on the required configuration, each system can consist of up to four units - for electrotherapy, ultrasound, laser or magnet therapy treatment.

The touch-controlled display considerably simplifies the use of the unit. The touch screen is equipped with a touch stylus for more convenient operation. The vertically positioned case of the instrument enables you to see the information on the screen clearly and from different positions. In addition, the display's brightness can be adjusted to fit the light conditions in the office. The information displayed on the screen will guide you throughout the whole therapy. Simply adjust the parameters by pressing the touch screen buttons and turn the main knob to set the intensity.

The modular design of the BTL equipment allows you to build the combination you require. Combine an electrotherapy unit of your choice with either ultrasound, laser or magnet all in a single unit. This can save considerable money in your physiotherapy investment

Selecting a diagnosis from a list of alphabetically organized treatment protocols, or selecting a program, will make an easy and efficient start of the therapy. Naturally, you can adjust any treatment parameter manually by the simple use of the touch screen buttons. Throughout the whole therapy, the display informs you about the remaining therapy time, channel and therapeutic method used, the type of therapy applied, attached accessories, and other necessary data.

If several accessories are attached to your unit at the same time, you can easily recognize the accessory required for a specific treatment. Select a treatment on the display (electrotherapy, ultrasound, laser or magnet), and the control light on the corresponding accessory (electrotherapy cable, ultrasound head, laser probe / cluster or magnet disc / double disc / linear or solenoid applicator) will start blinking to indicate that this accessory should be used.

Save time by using the pre-programming of the BTL-4000 Topline units. Based on detailed research and practical use of the units, the well-organized pre-programmed protocols will give you recommendations for treating various conditions. The unit also includes up to 500 free lots to define your own protocols. Moreover, you can recall the last 20 treatments.

Add the names of your patients and other relevant information to the unit's internal memory and connect the patient data with pre-programmed or your own protocols. When your patients call again, simply recall their name and apply the pre-set therapy.

With every BTL unit, you can purchase a cart specially designed for BTL products. Its versatile design allows you to conveniently store and use 1 or 2 physiotherapy units and a vacuum unit. The cart includes a range of accessory trays and baskets. Four well-built and steady castors ensure easy movement of the unit in the office or hospital.

Please visit our corporate website at <http://www.btl.net> for the latest information on BTL products and services.

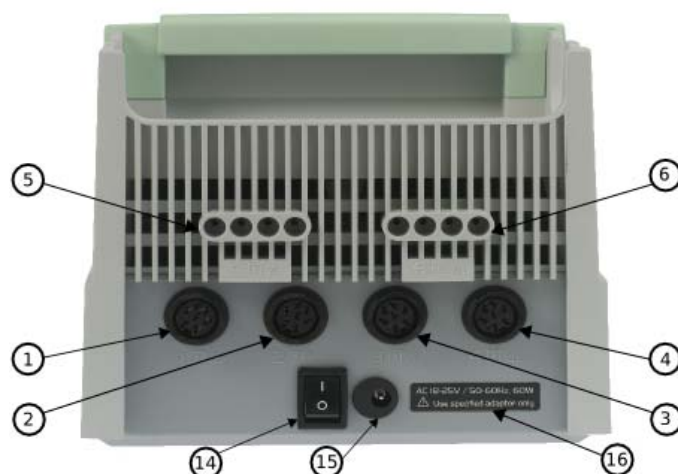
2 INSTRUCTIONS FOR USE

2.1 TOP PANEL



- 1. - 6 outputs for patient cables on the rear panel of the device, see chapter **Rear Panel**
- 7. display
- 8 **diag/prog** button, for quick selection of diagnosis or programs
- 9 **man** button, for manual setting of all therapy parameters
- 10 **menu** button, to set date, time, language, display contrast, sounds, user options, etc.
- 11 **enter** button to confirm selection or setting
- 12 **esc** button to cancel selection or setting and return to the original setting
- 13 **select** knob to select individual parameters

2.2 REAR PANEL



- 1 -6 patient outputs – for exact configuration, see table **Configuration of Output Connectors**
- 14 mains switch for switching the device on/off – positions I / 0.
- 15 socket for connection of external power supply Adapter 60W / Adapter 90W
- 16 warning label with parameters of power supply and input of the device

2.3 FRONT PANEL



- 17 display of the remaining time of therapy for the active channel
- 18 display of the current intensity for the active channel
- 19 **start** button, for starting or pausing the therapy on the active channel
- 20 **stop** button, for pausing or stopping the therapy on the active channel
- 21 **on/off** switch – serves for switching the device on/off
- 22 service connector under a cover and the type, manufacture and warning labels (placed on the bottom cover of the device)

2.4 INSTALLATION OF TOUCH PEN HOLDER



Lean the upper part of the holder against the upper part of any selected gap between the ribs on the rear panel of the device. Press the holder to plug the parts indicated on the picture up to stop.

2.5 UNPACKING AND ASSEMBLY

Inspect the box for damage and report any damage to the carrier and your distributor. Do not proceed with installation and assembly if the box is damaged.

Unpack the equipment and place it on a stable horizontal surface suitable for the equipment's weight. Always position the unit out of direct sunlight as this may make the touch screen difficult to read. Always position the unit away from direct heat sources such as radiators or a room heater. Cooling of the equipment is provided by forced air circulation. Cooling vents are located on the rear panel and at the bottom of the equipment and must not be covered. Place the equipment so that the free space behind the rear side is at least 10 cm. Do not position the equipment on a soft surface which may obstruct air flow to the bottom cooling vents. Do not put any heat-producing devices or objects containing water or other liquid on the equipment. Do not place the equipment close to devices producing strong electromagnetic, electric or magnetic field (diathermy, X-rays, etc.), as equipment electronics could be undesirably influenced. In case of any questions, please call your distributor or service agent.

The same installation conditions should be observed for the Adapter 60W / Adapter 90W power supply adapter.

Retain the original packaging to ensure future possible transportation of the device.

Plug the device into the mains socket by means of the Adapter 60W / Adapter 90W power supply adapter (see chapter **Technical Parameters**).

PLUG THE POWER SUPPLY ADAPTER DIRECTLY INTO THE MAINS SOCKET; DO NOT USE ANY MULTI-CONNECTION EXTENSION CABLE OR ADAPTOR.

In case of any questions, please call your distributor or service agent.

Switching the device on:

Connect the power supply adapter to the device and plug its mains cable into the mains socket, switch the **I/O rocker switch (14)** on the rear panel to the **I** position and finally press the **ON/OFF switch (21)** on the front panel. The system will then run a self-test. If the self-test finds no faults, the screen will display the equipment type and it is ready for use - see note below.

Connection of accessories

Connect the accessories to the output connectors (1) - (6) on the rear panel in this way:

Put in the cable connector and secure the fluted ring by pressing and turning in clockwise. ATTENTION WHEN DISCONNECTING THE CONNECTOR, first of all, it is necessary to take by the fingers the fluted ring NOT THE WHOLE connector. TURN THE FLUTED RING ANTICLOCKWISE and then after releasing the ring, disconnect the connector by pulling the fluted ring still held in the fingers!

ATTENTION!!! DO NOT TURN THE WHOLE CONNECTOR USING FORCE, THE DEVICE COULD BE DAMAGED.

For configuration of the output connectors (1) to (6), see the table **Configuration of Output Connectors**

The unit will automatically detect the accessories type and display it on the screen. If a wrong one is connected, the equipment will not operate and the screen will display a warning and help about where to connect which accessory.

Recharging the accumulator

The device accumulator is sold in half-charged status. That is why we recommend formatting the accumulator after purchase of the device: connect the device to the mains via the external adapter for at least 48 hours without interruption, with the **mains rocker switch (14) in position I**. The device will be recharged and the accumulator will be properly formatted. A properly formatted accumulator enables longer operation of the device without mains supply. For details, see the chapter **Accumulator**.

Restart of the device - reset

If for any reason (electromagnetic interference, etc.) the device stops responding to the user's commands and the message "please wait..." with small moving squares is not displayed, the device can be put into the initial state by simultaneously pressing the **man (9)** and **enter (11)** buttons. After this, the device immediately goes into the initial status.

Note:

After switching on, the unit tests for about 10 - 15 secs all internal functions. If any fault exists, the screen will display a warning. If any fault that compromises patient safety exists, the system will 'lock' itself into 'secure' mode. If this situation occurs, please call your local distributor for service advice.



Tab. 2.1 Configuration of output connectors

Type	Output 1	Output 2	Output 3	Output 4	Output 5	Output 6
BTL-4610 Topline				E1		
BTL-4615 Topline				E1		
BTL-4620 Topline			E2	E1		
BTL-4625 Topline			E2	E1		
BTL-4810S Topline	S1A	S1B		E1		
BTL-4815S Topline	S1A	S1B		E1		
BTL-4810L Topline	L1A	L1B	DOOR	E1		
BTL-4815L Topline	L1A	L1B	DOOR	E1		
BTL-4810M2 Topline		E1	M1	M2		
BTL-4815M2 Topline		E1	M1	M2		
BTL-4626Topline	E1A	E1B	E2A	E2B		
BTL-4628Topline	E1A	E1B	E2A	E2B		
BTL-4816S Topline	E1A	E1B	S1B	S1A		
BTL-4818S Topline	E1A	E1B	S1B	S1A		
BTL-4816L Topline	E1A	E1B	DOOR	L1A		
BTL-4818L Topline	E1A	E1B	DOOR	L1A		
BTL-4816M2 Topline	E1A	E1B	M1	M2		
BTL-4818M2 Topline	E1A	E1B	M1	M2		
BTL-4800SL Topline	S1A	S1B	DOOR	L1A		
BTL-4920 Topline			M1	M2		
BTL-4800LM2 Topline	L1A	DOOR	M1	M2		
BTL-4800SM2 Topline	S1A	S1B	M1	M2		
BTL-4110 Topline	L1A	L1B	DOOR	ACUP		
BTL-4710 Topline	S1A	S1B	E input	E output		
BTL-4210 Topline	T1A	T1B	E input	E output		
BTL-4640 Topline	E2B	E2A	E1B	E1A		
BTL-4645 Topline	E2B	E2A	E1B	E1A		
BTL-4820S Topline	S1A	S1B	E2	E1		
BTL-4825S Topline	S1A	S1B	E2	E1		
BTL-4820L Topline	L1A	DOOR	E2	E1		
BTL-4825L Topline	L1A	DOOR	E2	E1		
BTL-4820M2 Topline	E2	E1	M1	M2		
BTL-4825M2 Topline	E2	E1	M1	M2		

* units 4610 Topline and 4615 Topline can be supplied or upgraded with the HVT module

Notes:

E1	connector for connection of electrotherapy accessories (BTL-236-1(2), BTL vac) to E1 generator
E2	connector for connection of electrotherapy accessories (BTL-236-1(2), BTL vac) to E2 generator
E1A, E1B	connector for connection of electrotherapy accessories (BTL-236-1(2), BTL vac) to E1 generator (adaptor)
E2A, E2B	connector for connection of electrotherapy accessories (BTL-236-1(2), BTL vac) to E2 generator (adaptor)
E input	connector for electrotherapy input on the ultrasound unit for combined therapy
E output	connector for electrotherapy output on the ultrasound unit for combined therapy
L1A, L1B	connector for connection of laser probe/cluster BTL-448/BTL-445 to L1 generator
S1A, S1B	connector for connection of ultrasound heads BTL-237 (e.g. 1 cm ²) to U1 generator
M1, M2	connector for connection of magnetotherapy applicators (BTL-239) to M1 generator
Door	connector for sensor of open door
Acup	connector for acupuncture electrode

How many patients and which outputs you can simultaneously connect to can be seen on the display after pressing the **menu** button in **menu / accessories / connectors – information**.



2.6 OPERATING THE UNIT

2.6.1 TOUCH SCREEN

The touch screen may be operated by finger touch or using the special soft tip stylus that is supplied with the unit. DO NOT TOUCH THE SCREEN WITH A SHARP OBJECT OR PEN, AS THIS MAY CAUSE PERMANENT DAMAGE.

Select required parameters by pressing:

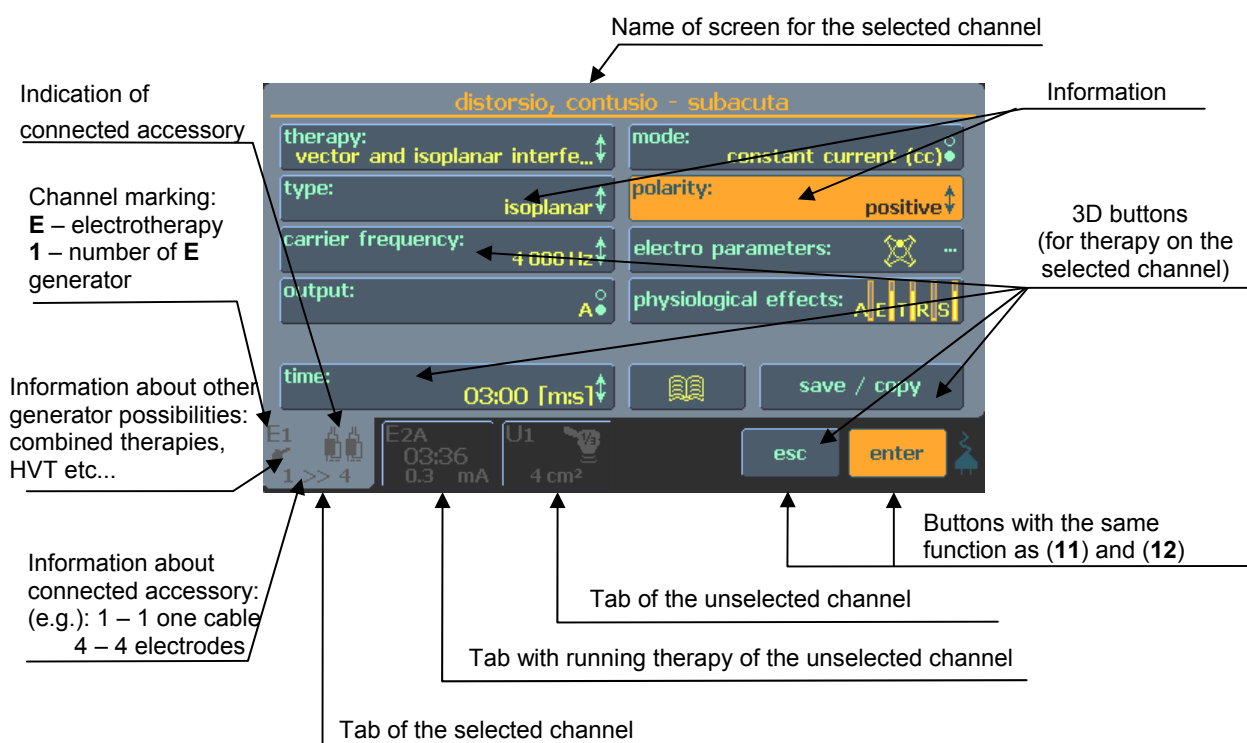
1. 3D buttons.
2. Bright tabs of the selected channel (in the lower left corner of the screen) to switch between connected accessories, such as ultrasound heads or laser accessories.
3. The dark tab of the required channel (in the lower left corner of the screen) to switch between channels.

Touch screen buttons:

The touch screen buttons have three dimensional (3D) shading and may be pressed with the finger or special stylus. To confirm the requested changes or values, press **enter**. To cancel the changes, press **escape (esc)**.

Selected channel:

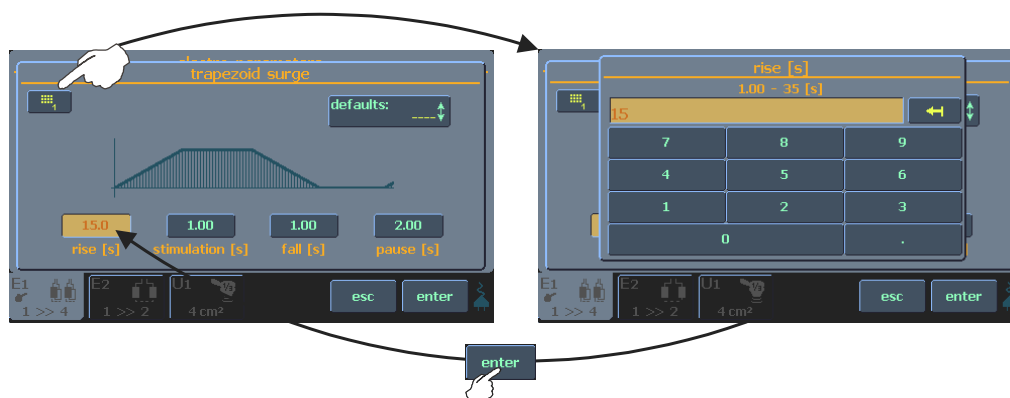
Although most of the configurations allow the running of several therapies at one time, only one channel can be controlled at once. The tab of this selected channel is shaded light. All information on the screen and all controls are related to this channel. The most important information about the therapies on the other channels is visible on their tabs.



2.6.2 NUMERICAL KEYBOARD

In addition to setting the numerical value with the **select (13)** button, you can also use the “numerical keyboard”.

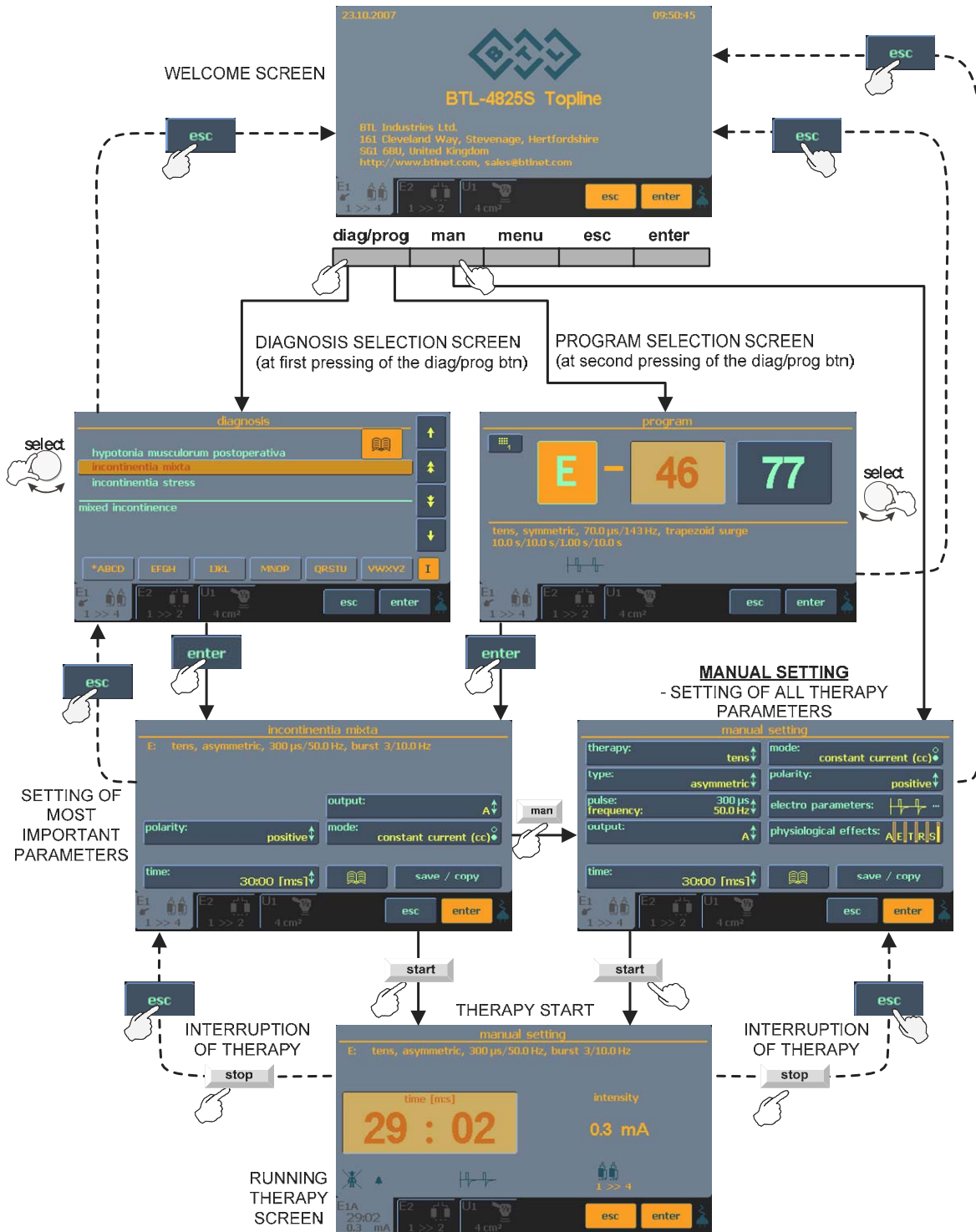
Press this icon to open the window with the numerical keyboard:



Set numerical values of the parameter that has been selected - the “orange” button in the left picture above. Enter the value and press **enter (11)** to return to the original screen. Press **esc (12)** to exit the screen. If you set a value that exceeds the allowed value range (allowed value range is stated at the top of the screen), or if the unit cannot set the required value, the value will be rounded as close as possible to the allowed value.

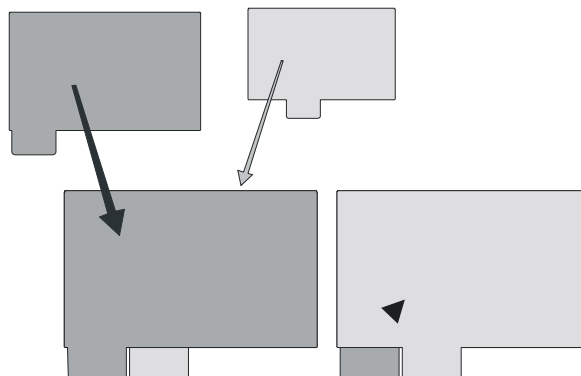
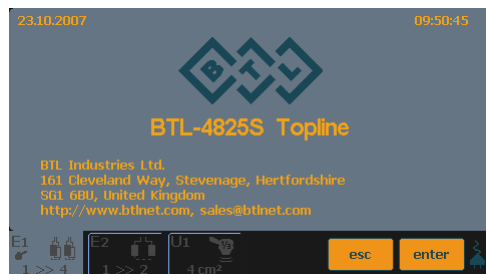
2.7 THERAPY SETTING

2.7.1 THERAPY FLOW CHART



2.7.2 WELCOME SCREEN AND SELECTION OF CHANNELS, TABS AND ACCESSORIES

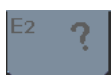
The welcome screen, accessed upon power up, displays channel tabs and icons showing which accessories are connected. The number of channels displayed depends on the unit configuration. The following diagram shows that almost the entire display is available for the selected channel.



If more accessories are connected to one generator (e.g. two ultrasound heads connected to a single ultrasound generator), pressing the channel tab of the generator will switch between accessories.

The colour of the selected channel tab is light grey.

Examples of information on tabs:



Tab of channel E2, which is selected and has no accessories



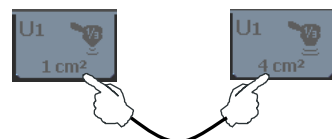
Tab of selected channel E1 with the possibility to apply HVT therapy and with electrotherapy accessory BTL-236-1 with two electrodes. HVT generator can be added only to units 4610 Topline and 4615 Topline



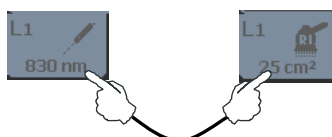
Tab of channel E1 (which is not selected), with electrotherapy accessory BTL-236-2 and possibility to apply **combined therapy**



Tab of non selected generator M1 with connected disc applicator BTL-239-2.



Tab of selected generator U1 with connected ultrasound heads. Press the tab to switch between the 1cm² and 4cm² heads.



Tab of selected generator L1 with connected laser probe and cluster. Press the tab to switch between the 830nm probe and the cluster.

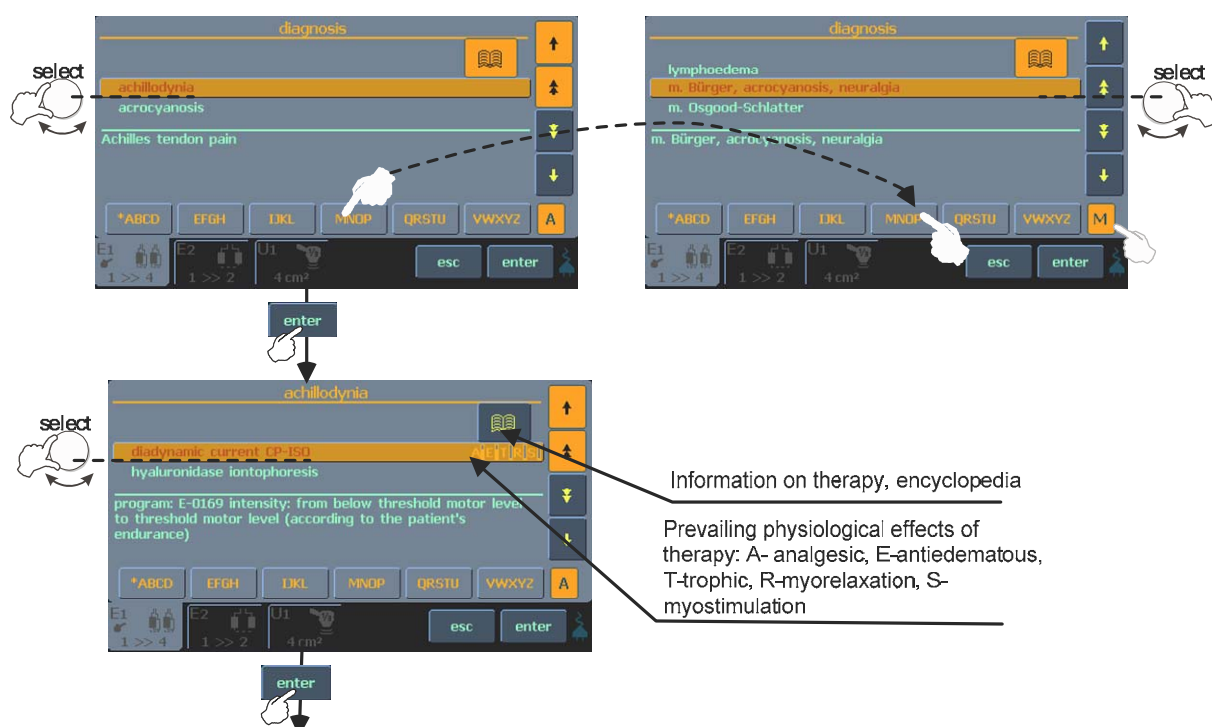
2.7.3 SETTING THERAPY PARAMETERS VIA DIAG OPTION

Press the **diag/prog (8)** button once to display a list of diagnoses / therapy protocols. Each channel tab has its own list of therapy protocols. The letter in front of each number corresponds to the type of selected therapy: **E** – electrotherapy; **U** – ultrasound; **L** – laser; **M** – magnetotherapy. For example, the channel tab of the ultrasound generator includes a list of therapy protocols for ultrasound treatment. If the tab depicts an HVT (only for

BTL-4610 Topline and BTL-4615 Topline units) or combined therapy symbols (see the chapter **Welcome Screen and Selection of Channels, Tabs and Accessories**), the list includes protocols for HVT or combined therapies.

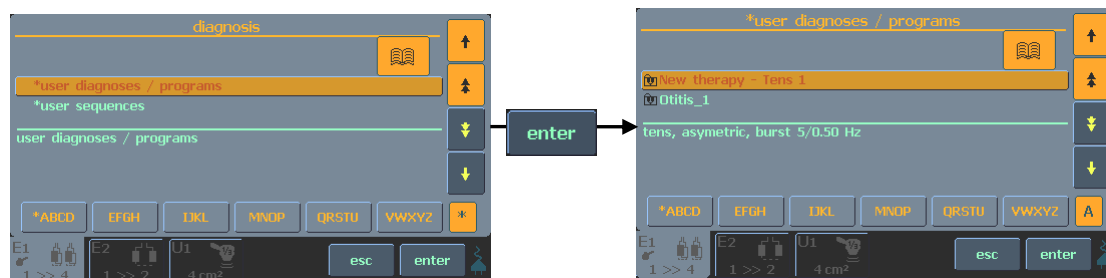
To find a therapy protocol fast, press the button with the initial letter of the required protocol. The selected letter depends on how many times the button is pressed. For example, after pressing the **MNOP** button once, there are listed protocols starting with the first letter, **M**. Pressing **MNOP** twice = **N**, three times = **O** and four times = **P**. The currently selected letter is displayed in the box to the left of the buttons.

To select the found required diagnosis, press the **enter** button (11). If the protocol has more therapies, they are listed after selecting the protocol.



See the chapter: **Therapy Parameters Screen – Ergonomic, Standard and**

Saved by user protocols can easily be find in the “*user diagnoses / programs” item, which appears at the top (bottom according to the chosen sorting type) of the diagnoses list.



2.7.4 SETTING THERAPY PARAMETERS VIA PROG OPTION

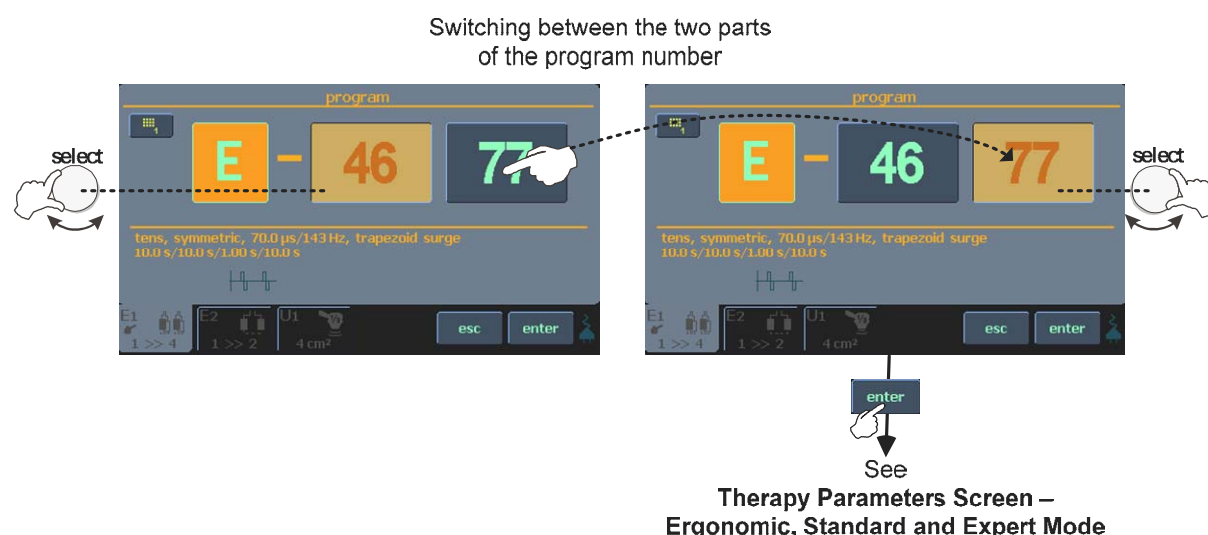
Press the **diag/prog** (8) button twice to set the required program number. The program numbers generally correspond to the program numbers used in the traditional BTL physiotherapy line. The letter in front of each number corresponds to the type of therapy selected: **E** – electrotherapy; **U** – ultrasound; **L** – laser; **M** – magnetotherapy.

Combined therapies E+U are listed among **E** programs and can be found on the electrotherapy tab with the symbol of the ultrasound head (see the chapter **Welcome Screen and Selection of Channels, Tabs and Accessories**). They are in the positions **E-35xx - E-39xx**.

Your own therapy protocols (except sequences) can be saved under the following numbers: **E-80xx - E-89xx** for electrotherapy, **U-80xx - U-89xx** for ultrasound therapies, **L-80xx - L-89xx** for laser therapies and **M-80xx - M-89xx** for magnetotherapy.

Your own sequences are saved under the following numbers: **E-95xx - E-99xx** for electrotherapy, **U-95xx - U-99xx** for ultrasound therapies, **L-95xx - L-99xx** for laser therapies and **M-95xx - M-99xx** for magnetotherapy.

Programs recommended for diagnoses can be found in the User's Guide.

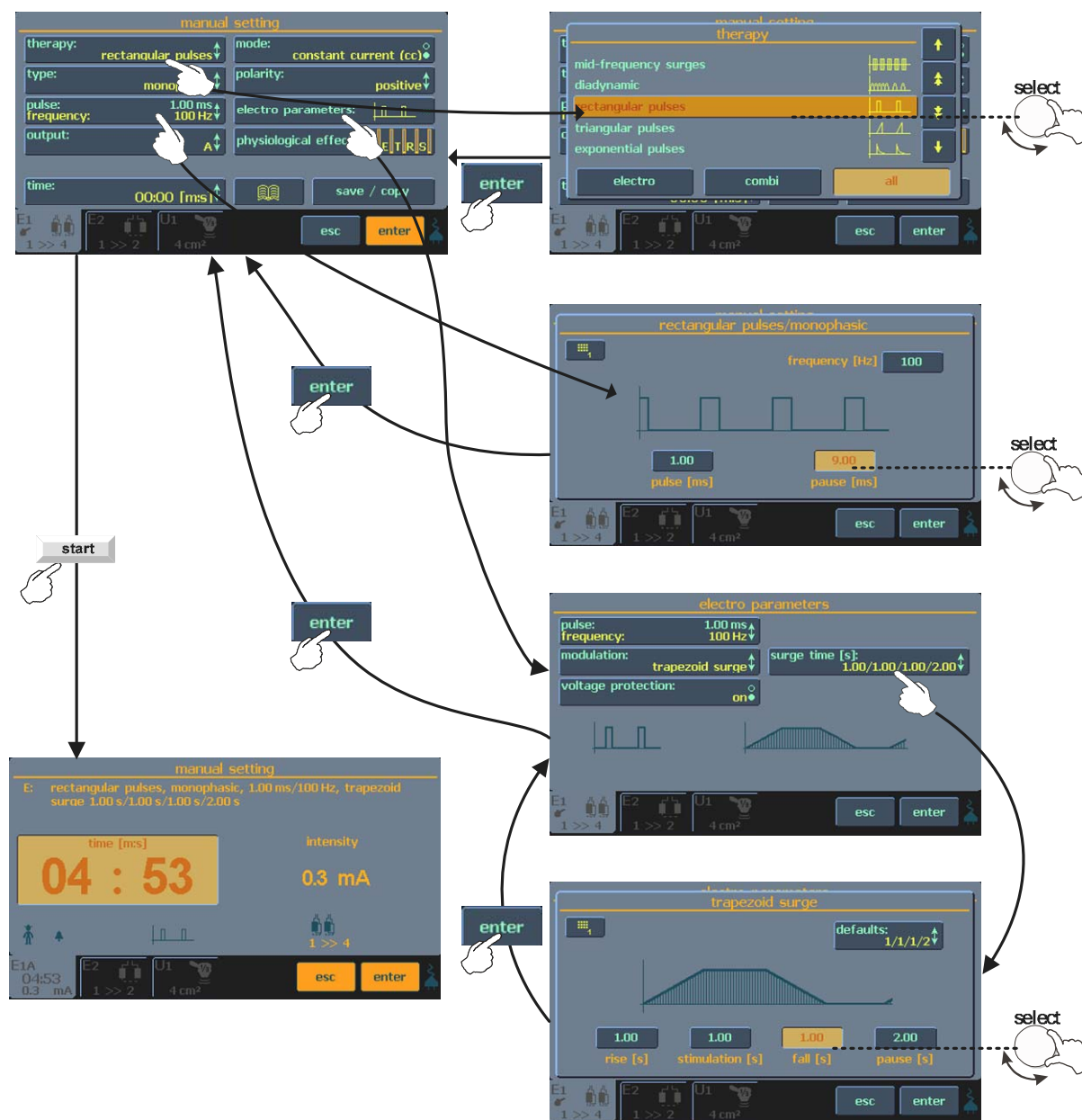


For fast program number selection, use the numerical keyboard, see the chapter **Numerical Keyboard** for details.

2.7.5 SETTING THERAPY PARAMETERS MANUALLY VIA THE 'MAN' BUTTON

Press the **man (9)** button to select manual setting for the therapy. You may store manual settings for use at a later time.

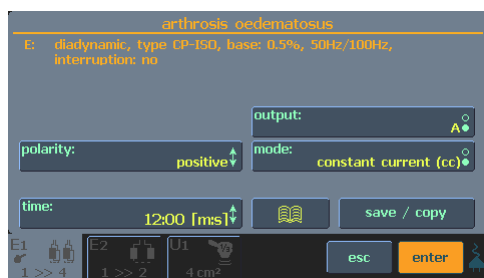
Press individual 3D buttons to open menus and setting screens. The majority of screens are accompanied by illustrating pictures and symbols. See the example below:



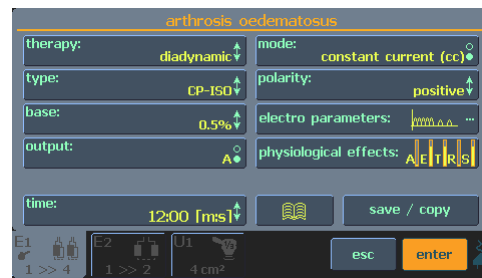
2.7.6 THERAPY PARAMETERS SCREEN – ERGONOMIC, STANDARD AND EXPERT MODE

This screen opens after loading a diagnosis or a program via pressing the **diag/prog (8)** button respectively once or twice (see the chapter **Therapy Flow Chart**), before the start of therapy. The screen shows either the most important therapy parameters (you have selected the ergonomic mode) or all information about the therapy (you have selected the expert or standard mode). In addition, in expert mode you can modify all parameters.

The differences between modes are best seen here:

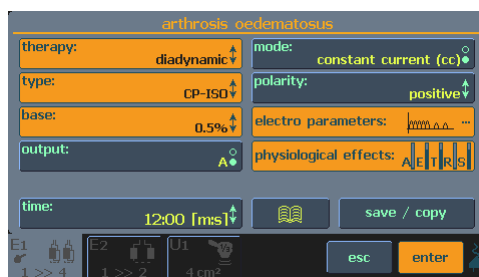


ergonomic mode



standard mode

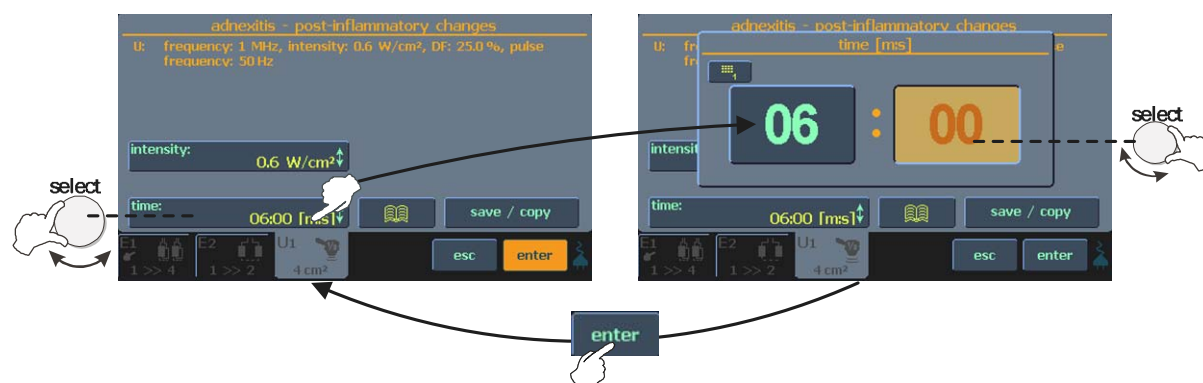
expert mode



Set the operation mode via the **menu (10)** button – refer to the chapter **Operation Mode**. For fast switching to expert mode from any other operation mode, press the **man (9)** button.

• SETTING THERAPY TIME

Press the **time** screen button on the therapy parameters screen to set the required time. Use the select knob or the numeric keyboard in the top left corner.



• INTENSITY SETTING

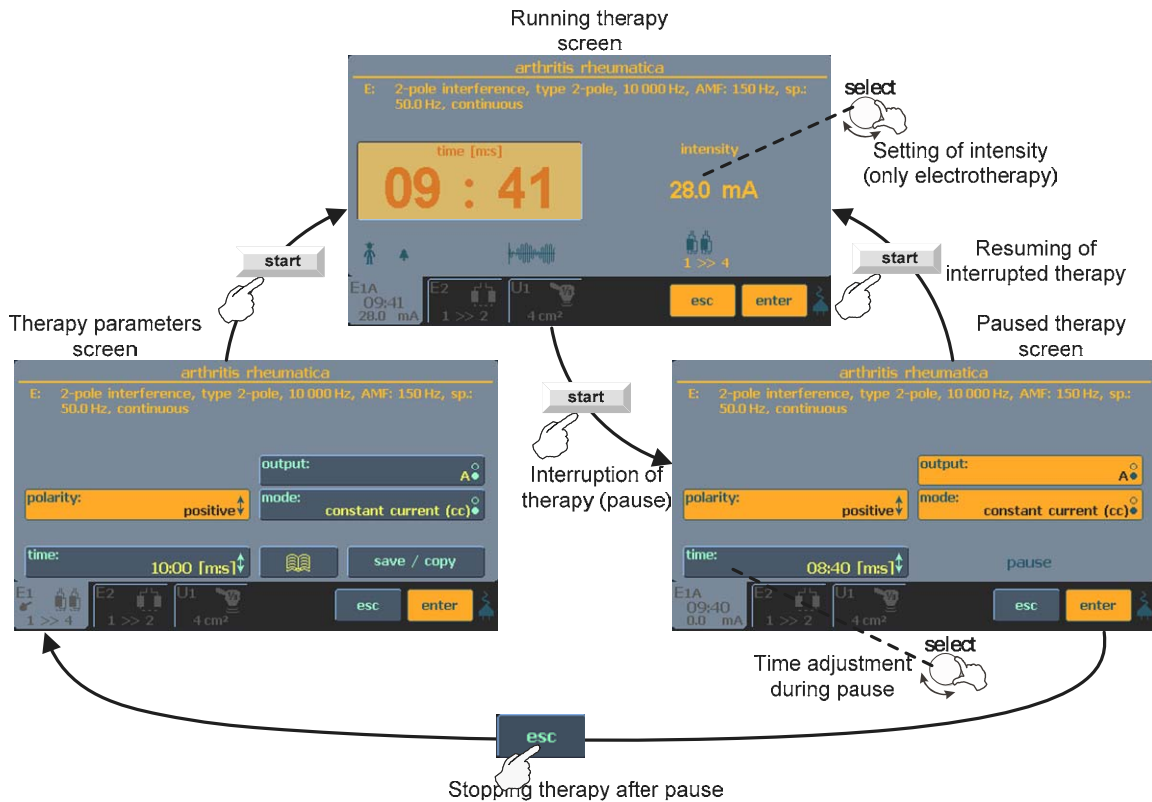
For the ultrasound, laser and magnet therapies, the intensity (output) can be set only on the therapy parameters screen and only when the therapy is not running. To set the intensity, press the **intensity** button.

Electrotherapy: Intensity is set during therapy and can only be adjusted by turning the **select (13)** knob.

2.8 COURSE OF THERAPY

2.8.1 START, INTERRUPT AND END OF THERAPY

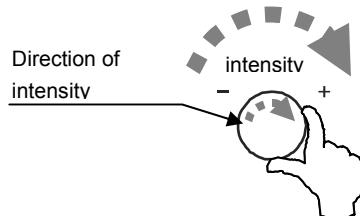
To start a therapy on the selected channel, press the **start (19)** button. The therapy can start only if the therapy parameters screen is displayed. To pause the therapy, press the **start (19)** button again or the **stop (20)** button.



The paused therapy can be resumed by again pressing the **start (19)** button or stopped by pressing the **esc (12)** button.

While the therapy is paused, you can adjust the time (except for laser therapies and all types of sequences) by the **select (13)** knob.

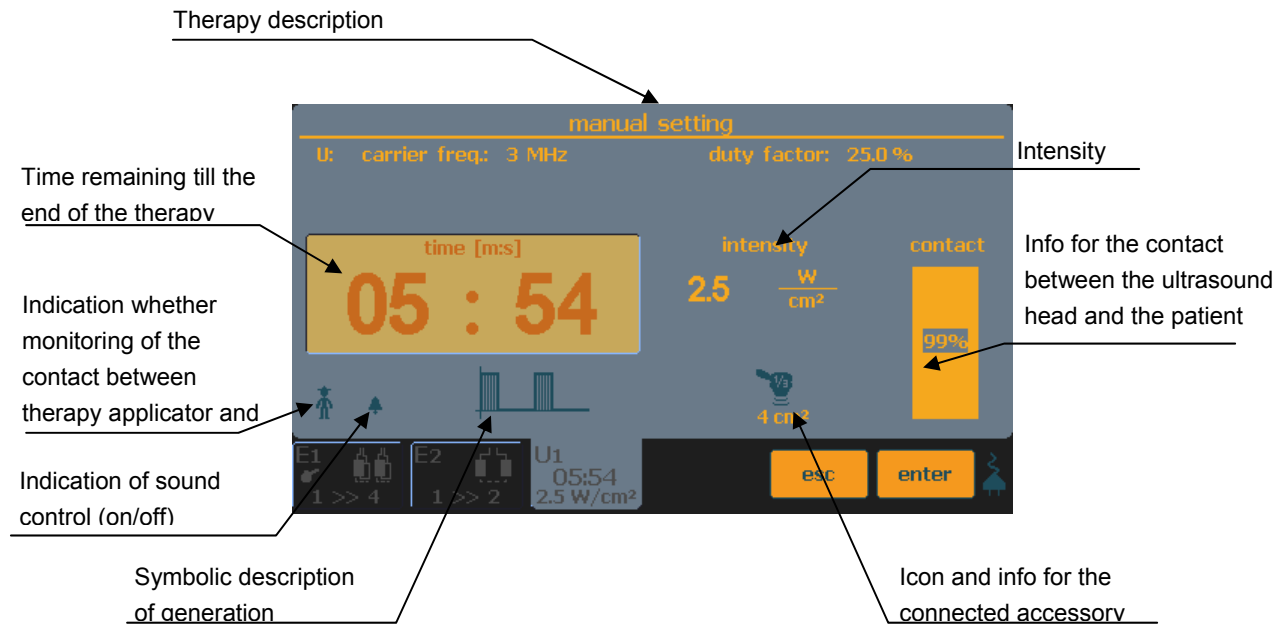
For **electrotherapy**, you can adjust the intensity during therapy running by turning the **select (13)** knob to the right (to increase intensity) or to the left (to decrease intensity).



Laser therapy can also be started / paused by the **start / stop** button on the laser probe.



2.8.2 RUNNING THERAPY SCREEN



2.8.3 ELECTROTHERAPY – SETTING DURING THERAPY

• SETTING THE INTENSITY IN 4-ELECTRODE THERAPIES

Making a therapy with four electrodes, you can set different intensities between each pair of electrodes. In case of 4-pole interference, the output intensity is set by the **select (13)** knob on both channels at the same time (the screen button **1+2** is pressed) or on each channel separately (the screen button **1** or **2** is pressed) according to your ordered configuration.

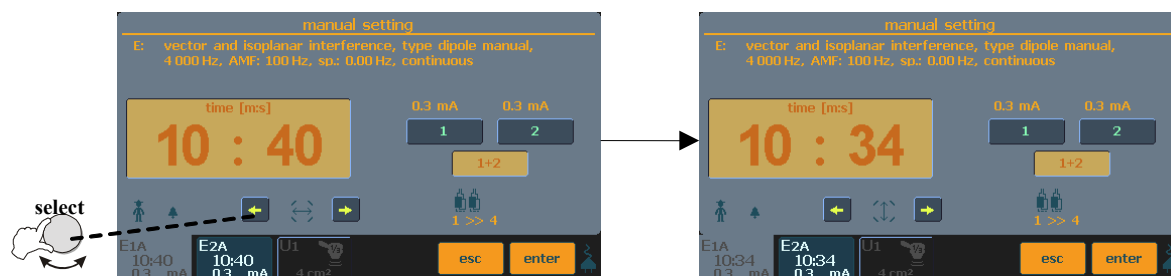


If the intensity on one of the channels is set to zero, the therapy is terminated.



- **MANUAL CONTROL OF VECTOR IN DIPOLE INTERFACE**

Dipole angle is set manually by the **arrow** buttons during therapy. Dipole position is schematically displayed on the screen between the two buttons allowing rotation.



When rotating the dipole, the unit automatically switches to diagnostic mode (Spectrum value = 0Hz). After 1 or 2 seconds the unit returns to therapeutic mode (Spectrum value = preset value).

2.8.4 ACCESSORIES / APPLICATORS – VISUAL SIGNALIZATION.

Accessories BTL-236 (for electrotherapy), BTL-237 (ultrasound heads) and BTL-239 (magnetic applicators) feature blue pilot lights that signal their operating conditions.



BTL-236-1: patient cable with two electrodes. Blue pilot light signals:

- **Slow blinking** – accessory is prepared for therapy. Therapy settings screen displayed.
- **Continuous light** – therapy in process, possible dangerous voltage on electrodes.



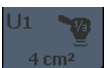
BTL-236-2: patient cable with four electrodes. Blue pilot light signals:

- **Slow blinking** – accessory is prepared for therapy. Therapy settings screen displayed. Pilot light blinks on a pair of selected electrodes.
- **Blinking in rhythm of generated currents or continuous light** – therapy in process, possible dangerous voltage on electrodes with pilot light blinking.



[BTL vac: vacuum unit for electrotherapy – see separate manual

For detailed information, please refer to the leaflet enclosed with each accessory supplied.



BTL-237: ultrasound head of 1 cm² or 4 cm². Blue pilot ring signals:

- **Slow blinking** – accessory is prepared for therapy. Therapy settings screen displayed.
- **Continuous light** – therapy in process.
- **Rapid blinking** – wrong contact of head with patient's tissue, therapy paused; contact must be re-established to continue therapy.



BTL-448: laser probes: red and infrared – green pilot light and focused beam:

- **Blinking in rhythm of generated laser or continuous light.**

Laser irradiation is also indicated by acoustic signal.



BTL-445: laser clusters: red, infrared and combined – focusing beam:

- **Blinking in rhythm of generated laser or continuous light.**

Laser irradiation is also indicated by acoustic signal



BTL-239-1: disc magnetic applicator – blue pilot light signals:

- **Slow blinking** – accessory is prepared for therapy. Therapy settings screen displayed.
- **Continuous light or blinking in therapy rhythm** – therapy in process.



BTL-239-2: solenoid ø30 cm magnetic applicator – blue pilot light signals:

- **Slow blinking** – accessory is prepared for therapy. Therapy settings screen displayed.
- **Continuous light or blinking in therapy rhythm** – therapy in process.



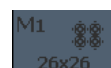
BTL-239-3: solenoid ø60 cm magnetic applicator – blue pilot light signals:

- **Slow blinking** – accessory is prepared for therapy. Therapy settings screen displayed.
- **Continuous light or blinking in therapy rhythm** – therapy in process.



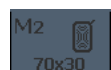
BTL-239-4: double disc magnetic applicator – blue pilot light signals:

- **Slow blinking** – accessory is prepared for therapy. Therapy settings screen displayed.
- **Continuous light or blinking in therapy rhythm** – therapy in process.



BTL-239-5: multi disc magnetic applicator – blue pilot light signals:

- **Slow blinking** – accessory is prepared for therapy. Therapy settings screen displayed.
- **Continuous light or blinking in therapy rhythm** – therapy in process.



BTL-239-6: linear magnetic applicator – blue pilot light signals:

- **Slow blinking** – accessory is prepared for therapy. Therapy settings screen displayed.
- **Continuous light or blinking in therapy rhythm** – therapy in process.



BTL-239-8 solenoid ø70 cm magnetic applicator with couch– blue pilot light signals:

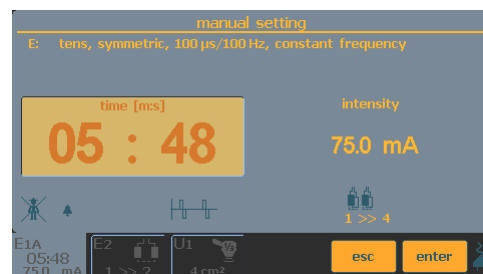
- **Slow blinking** – accessory is prepared for therapy. Therapy settings screen displayed.
- **Continuous light or blinking in therapy rhythm** – therapy in process.

2.8.5 INDICATION OF OPERATION – ENERGY ON OPERATION

Electrotherapy

Presence of electrotherapy voltage on output is indicated:

- on the screen:
 - by value of intensity of output current
 - by showing the remaining time till the end of therapy
 - by icon of running electrotherapy current
- on the channel tab – by value of intensity and time
- on the electrotherapy accessory BTL-236 – by continuously lit blue pilot light.



Disconnection of electric circuit (such as in the case of wrong contact between electrode and patient) is indicated by blinking information about intensity and time on the corresponding channel tab, or by audio signalling.

This function can be switched on and off in the menu of the unit (press **menu button (10)**, select **menu – specific settings – check contact of electrodes**). Its current state is marked by a figure symbol (crossed-out if disabled). Audio signalling can be switched on and off – marked by a bell symbol on the screen (crossed-out if disabled).

Ultrasound Therapy

Generation of ultrasound energy by ultrasound head BTL-237 is indicated:

- on the screen:
 - by value of intensity
 - by bar-graph showing contact of head with tissue
 - by time value showing the remaining time till the end of therapy
 - by icon of ultrasound head and icon of signal type
- on the channel tab – by value of intensity and time
- on the ultrasound accessory BTL-237 – by blue light ring.



Insufficient contact between the ultrasound head and the tissue is indicated by rapid blinking of the blue light ring on the head and blinking of the information on intensity and time on the channel tab of the corresponding ultrasound generator. This function is indicated by a figure symbol on the screen. Acoustic indication is signalled by the symbol of a bell. If the function is disabled, the bell is crossed-out.

Laser Therapy

Laser irradiation by BTL-448 laser probe is indicated:

- on the screen:
 - by intensity value
 - by icon of laser probe and signal
 - by time value showing the remaining time till the end of therapy
- on the channel tab – by value of intensity and time
- by acoustic signal. Signalling can be enabled or disabled from the menu (press **menu button (10)**, select **menu – specific settings – sound in running therapy**)
- by green pilot light on laser probe
- by green or red beam.

Laser irradiation by BTL-445 laser cluster is indicated:

- on the screen:
 - by intensity value
 - by icon of laser cluster and signal
 - by time value showing the remaining time till the end of therapy
- on the channel tab – by value of intensity and time
- by acoustic signal. Signalling can be enabled or disabled from the menu (press **menu button (10)**, select **menu – specific settings – sound in running therapy**)
- by blue focusing beam.

Magnetotherapy

Presence of magnetotherapy field on output is indicated:

- on the screen:
 - by value of intensity of output magnetic field
 - by counting down the remaining time till the end of therapy
 - by icon of running magnetic field
- on the channel tab – by value of intensity and remaining time
- on the magnetic applicator BTL-239 – by blue pilot light.

2.9 THERAPY PARAMETERS

Therapy parameters are variable. Only the parameters that characterize the therapy and that can be set in manual mode are displayed - by pressing the **man (9)** button. For a detailed description of parameters for individual therapies, refer to the **User's Guide**.

2.10 ENCYCLOPAEDIA

The encyclopaedia provides information about individual therapies, examples of electrode and magnet applicator placement and application areas for ultrasound and laser. Each unit is supplied with a hard copy of the encyclopaedia. Its electronic format is included in the unit, and is available from most screens and menus.

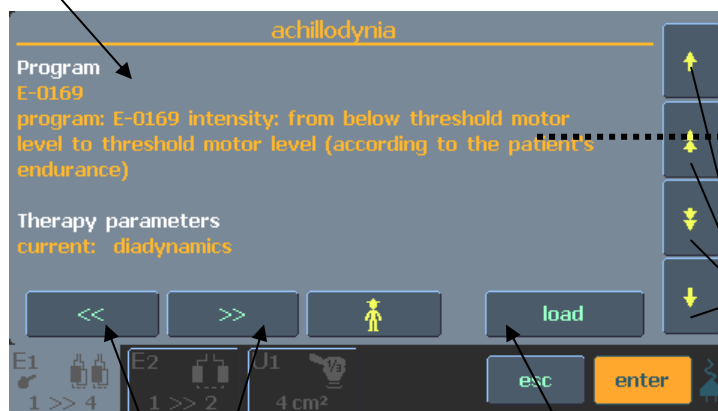
Note: Treatment protocols and related information are only a guide and are not intended as a replacement for good clinical judgment and experience!

Press this icon to open the **encyclopaedia**



Opening the encyclopaedia, after selection of a treatment protocol, will give you information about the selected protocol. Otherwise, you will enter the encyclopaedia contents – move between the diagnoses using the **select (13)** knob. Select a diagnosis and press the **enter (11)** button to get the required information:

Information about diagnosis



Moving between information if not on one screen

Moving between diagnoses

Loading parameters of selected diagnosis to the parameters screen - unit is ready to start therapy

2.11 THERAPY SAVING

Pressing the **save/copy** button allows you to make several choices. Simply complete the form by entering the required data field as shown on the screens below.

2.11.1 SAVE THERAPY

You can save your therapy after setting therapy parameters from the **therapy parameters screen** – see the chapter **Therapy Parameters Screen – Ergonomic, Standard and Expert Mode**.

The following information is saved with each therapy:

Electrotherapy:

- All parameters of currents (pulse length, pause length, modulation, etc.)
- Therapy time
- Polarity
- Output mode (current / voltage)*

Ultrasound therapy:

- All therapy parameters (for example, ultrasound frequency, duty factor - DF, pulse frequency, etc.)
- Therapy time
- Intensity

Combined therapies electro + ultrasound:

- All electrotherapy parameters (pulse length, pause length, modulation, etc.)
- All ultrasound therapy parameters (ultrasound frequency, duty factor - DF, pulse frequency, etc.)
- Therapy time
- Polarity of electrotherapy output
- Electrotherapy output mode (current / voltage)
- Intensity of ultrasound*

Laser therapy:

- All therapy parameters (frequency, course of signal, etc.)
- Irradiated area
- Dosage

Magnetotherapy:

- All magnetotherapy parameters (pulse, pause, modulation, random frequency)
- Pulse shapes
- Therapy time
- Intensity of magnetic field

* output intensity can be entered in a comment (e.g. at threshold motor level)

When saving a therapy, enter:

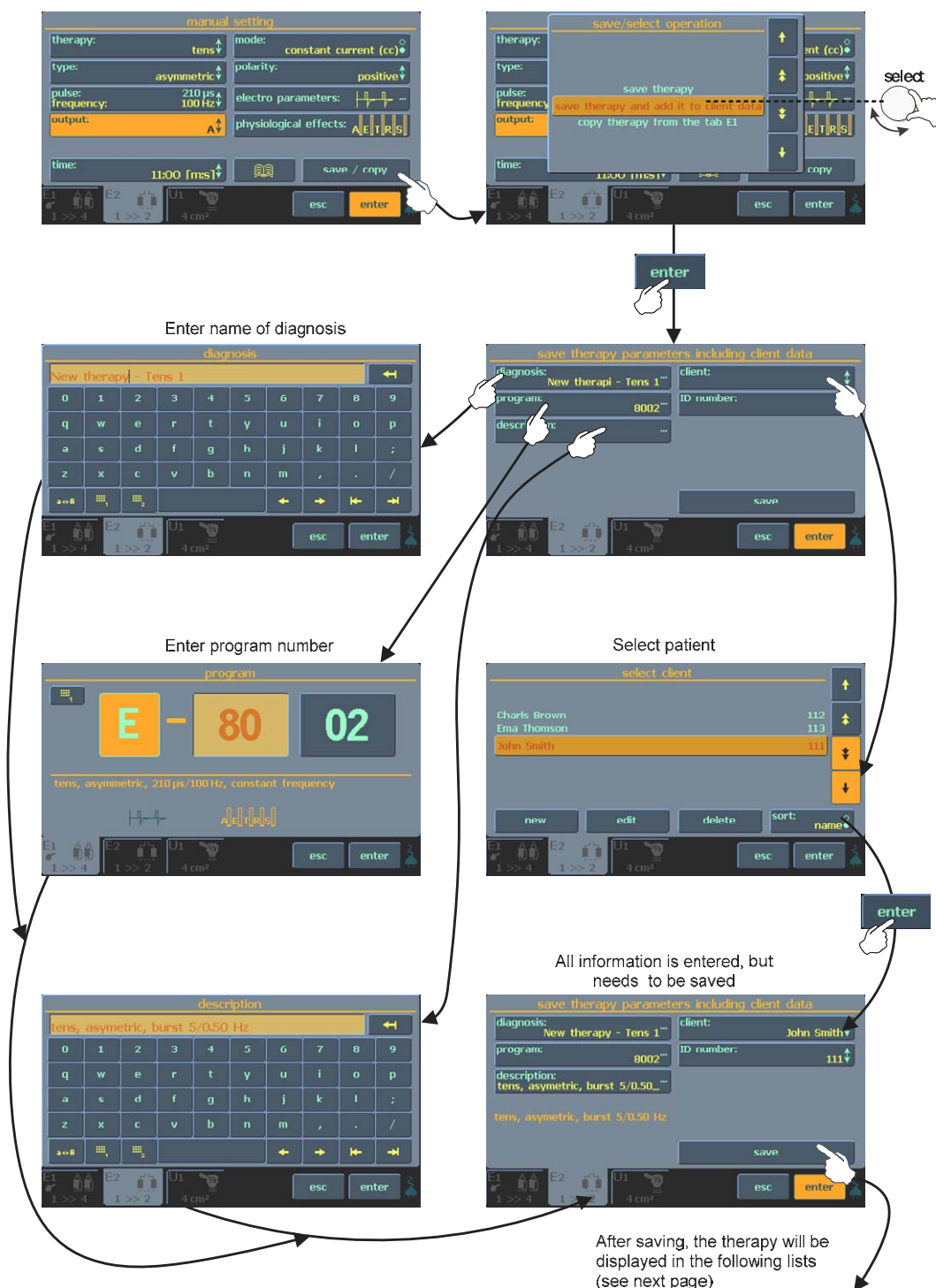
- Name of diagnosis (therapy) – to be displayed in the list of user diagnoses – after pressing the **diag/prog (8)** button once and selecting **user diagnoses/programs**
- Number of program – to be displayed in the list of programs - after pressing the **diag/prog (8)** button twice
- Description, additional information – to be displayed in both lists.



The unit suggests the lowest available number (from the range of 8000-8999) and adds the letter of the corresponding generator (E for electrotherapy and combined therapies, U for ultrasound therapies, L for laser therapies and M for magnetotherapy).

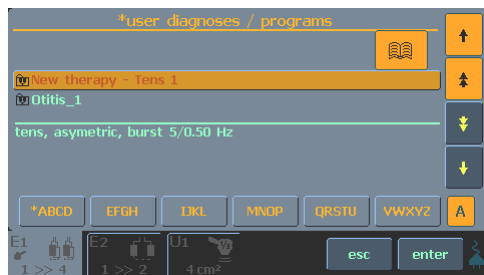
2.11.2 SAVE THERAPY AND ADD IT TO THE PATIENT DATA

The therapy is saved as described above and assigned to the patient in their list of therapies.



A saved therapy will be visible in the:

List of diagnoses



List of programs



And in the list of therapies of the selected patient



2.11.3 COPYING THE SETTINGS OF THE THERAPY PARAMETERS BETWEEN TABS OF THE SAME TYPE

For the units with more than one channel of the same kind, there is the option to directly copy the therapy settings between them.

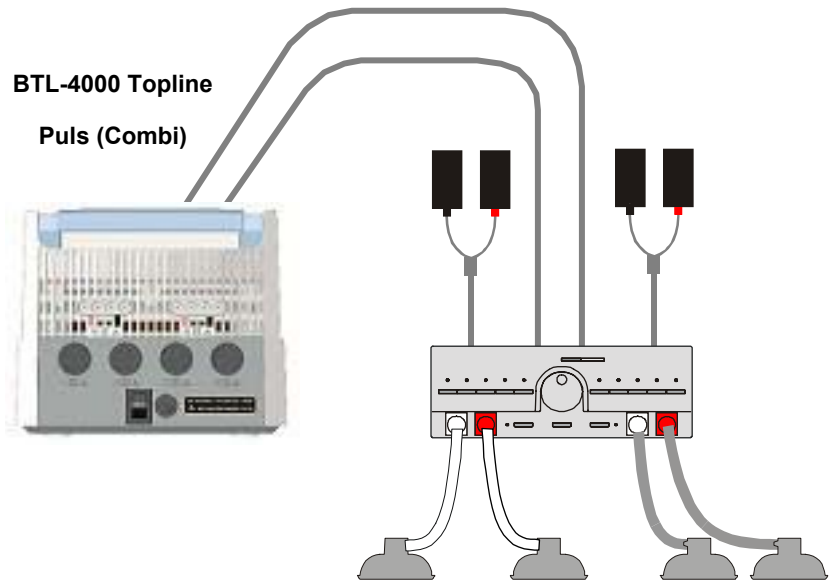
Select one of the tabs, adjust the values of the parameters, pass to another tab of the same type, press the **save/copy** button, from the list select the tab which settings should be copied (**Copy therapy from Tab X**) and press the **enter (11)** button for confirmation. The unit tries to duplicate the therapy settings but in case of different accessories, like magnet or laser generator, the values of the intensity can differ according to the max. possible value for the respective accessory.

2.12 INTERCONNECTION OF UNITS

2.12.1 INTERCONNECTION OF BTL 4000 TOPLINE PULS (COMBI) AND VACUUM UNIT BTL VAC

Combine any **BTL-4000 Topline Puls** or **Combi** unit with the vacuum unit **BTL vac** to apply electrotherapy currents by means of suction cup electrodes. Adjustable vacuum pressure ensures simple and convenient attachment of patient electrodes, especially on parts of the body hard to reach with classic electrodes. Moreover, the pulse mode provides mechanical massage of the tissue, improves body metabolism and increases blood supply.

The electrotherapy unit has its outputs connected to the vacuum unit. Both vacuum and flat electrodes are attached to the vacuum unit. Each channel on the vacuum unit has a switch. When the switch is on, current is brought to the vacuum electrodes. When the switch is off, current is brought to the standard electrodes.



(the picture is only an illustration, for the actual interconnection follow the table **Configuration of Output Connectors**).

For interconnection, use the interface cables leading from BTL-4000 Topline Puls outputs E1, E2 (and connected to BTL vac inputs **IN1** and **IN2**). For more information, see the User's Guide of **BTL vac**.

2.12.2 INTERCONNECTION OF BTL-4000 TOPLINE PULS AND BTL-4000 TOPLINE SONO

If combined therapy is used, connect the ultrasound and electrical stimulation units together.

Electrotherapy BTL-46xx Puls, 46xx Topline or BTL-56xx Puls		Ultrasound BTL-4710 Topline Sono or BTL-5710 Sono	
Connector	Connected accessories	Connector	Connected accessories
E1	interface cable to ultrasound	U1A	ultrasound head 1 cm ²
E2*	electrodes E2*	U1B	ultrasound head 4 cm ²
		E input	interface cable to electrotherapy
	* if installed	E output	electrodes E1



Setting of polarity between the ultrasound head and the electrode

After interconnection with the electrotherapy device, the ultrasound head becomes the anode (+). The other pole is the cathode (-) which is the electrode with the black banana plug. If the ultrasound head is required to be the cathode (-) during combined therapy, select 'negative polarity' in the therapy parameters screen of the electrotherapy unit.

ATTENTION

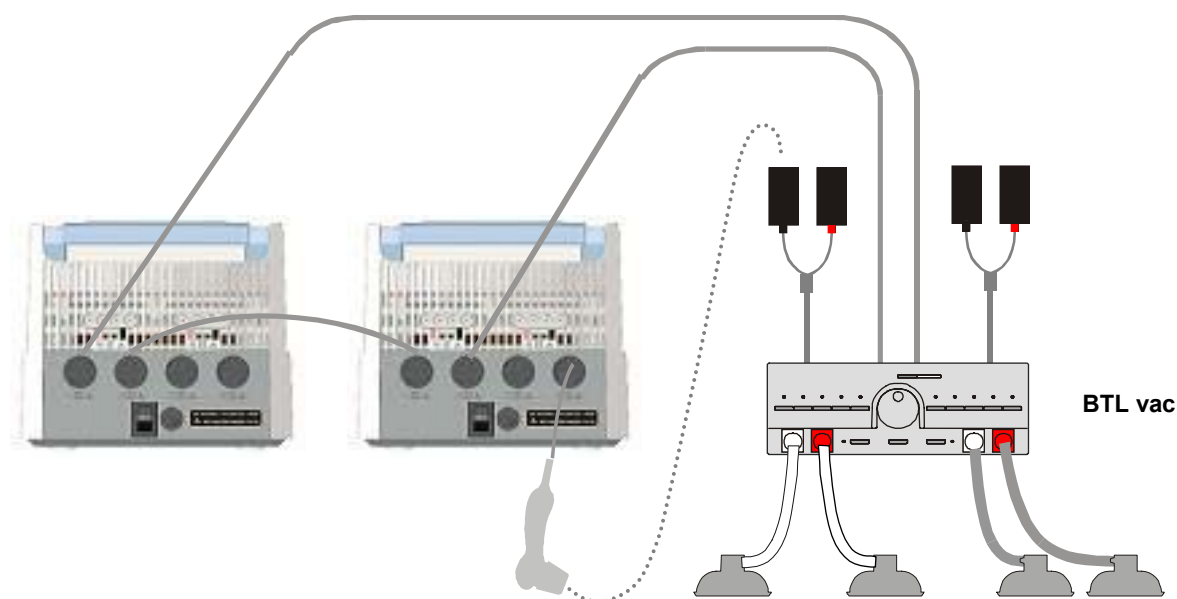
In the case of accessories „1>>2“ connected to the electrotherapy device, the ultrasound head becomes the anode (+). The cathode (-) is connected thru the **black banana plug** with minus sign “-,” on it.

In the case of accessories „1>>4“ (optional) connected to the electrotherapy device, the ultrasound head becomes the anode (+). The cathode (-) is connected thru **red banana plug** with minus sign “+,” on it, independent of selected output A or B.

If you want to apply only electrotherapy with such interconnected devices, it is no problem. Uncheck the option "with electro" on the BTL-4000 Topline Sono device, and the electrotherapy electrodes are automatically connected to the electrotherapy output. Connectors E-input and E-output are interconnected inside the ultrasound device even if the BTL-4000 Topline Sono device is off.

2.12.3 INTERCONNECTION OF BTL-4000 TOPLINE PULS, BTL-4000 TOPLINE SONO AND BTL VAC

To connect the units, follow this diagram:



(the picture is only an illustration, for the actual interconnection follow the below-stated table as well as the **Table Configuration of Output Connectors**).

Electrotherapy BTL-46xx Topline or BTL-56xx Puls		Ultrasound BTL-4710 Topline Sono or BTL-5710 Sono	
Connector	Connected accessories	Connector	Connected accessories
E1	interface cable to ultrasound	U1A	ultrasound head 1 cm ²
E2*	interface cable to BTL vac (IN2)	U1B	ultrasound head 4 cm ²
		E input	interface cable to electrotherapy
	* if installed	E output	interface cable to BTL vac (IN1)

2.12.4 SETUP AND OPERATION OF COMBINED THERAPY IN INDIVIDUAL DEVICES

After checking for correct interconnection of the electrotherapy and ultrasound units, select a diagnosis or program that utilizes combined therapy. Select these separately on the electrotherapy and on the ultrasound units. Set the electrotherapy unit to CV mode. Then attach the respective electrode to the patient to close the electric circuit ultrasound head-patient-electrode (see the above diagrams). It is now possible to run the ultrasound by the **start** button. Position the ultrasound head in contact with tissue and notice that the timer commences counting down. Slowly increase the intensity on the electrotherapy by turning the **select** knob to the right in the "+" direction. Combined therapy is now running. If the contact between the ultrasound head and the treated tissue during the therapy was not continuous, the times shown on both devices can differ, because timer countdown on the ultrasound device does not run when the contact is interrupted.

2.12.5 STOPPING COMBINED THERAPY IN INDIVIDUAL DEVICES

Delivery of combined therapy ends after expiration of the set time on both units' timer devices. To stop or interrupt therapy before the set time expires, it is necessary first to interrupt the therapy on both units by pressing the **stop** buttons.



3 MENU BUTTON

Press the **menu (10)** button, and two options appear, **menu** and **user**. Enter the **menu** option and scroll through the following options:

- accessories
- encyclopaedia – see chapter **Encyclopaedia**
- unit settings
- special settings

3.1 ACCESSORIES

The available options are:

- installation of accessories
- information about connected accessories
- information about the number of patients and connection of connectors on the rear panel of the device

3.1.1 INSTALLATION OF ACCESSORIES

Each connected accessory has a memory that includes identification data of this accessory. According to these data, the unit recognizes which accessory is connected, if it is compatible or not, if the unit can work with the connected accessory or not. The memory also contains the serial number of the accessory. This memory contains a lot of information and reading it takes from 30 seconds to 2 minutes. The installation of accessories serves for faster functioning of the unit. After the installation, only the serial number of the accessory is read from the accessory memory and the other information is read from the unit's memory.

During the installation process, follow the instructions on the screen. In particular:

- switch off all therapies
- do not have connected other accessories than the one that is being installed. Make sure the installed accessory is connected directly, not via interface cable and vacuum or BTL-4000 Topline Sono devices.

This will help decrease electromagnetic interference, which could cause improper reading of memory data.

3.1.2 INFORMATION ABOUT ACCESSORIES

Allows identification of connected accessories (name, serial number, for which generator - output / input - the accessory has been designed).



3.1.3 CONNECTORS – INFORMATION

This menu item will inform you about the way of connection of the connectors on the rear panel of the device and up to how many patients you can connect safely to the device.



3.2 UNIT SETTINGS

Provide a list of settings of parameters and user preferences:

- **Password setting**
- **Sound setting**
- **Screen saver and auto switch-off**
- **Colour settings**
- **Display options** - setting contrast of LCD screen, back light and the small displays (which show the time and intensity of the running therapy)
- **Date and time setting**
- **Language setting**
- **Operation mode**
- **Touch panel calibration**
- **User options**
- **Style of operation**
- **Setting of HW key**
- **Unit Information**
- **Unlock code**
- **Service functions**

3.2.1 PASSWORD SETTING

Changes the password required to operate the unit after power-up. The units as standard come with this function disabled.

If the unit includes a laser generator - **BTL-4000 Topline Laser**, **BTL-48xx Topline L**, **BTL-4800 Topline xL**, you cannot disable the password code (in compliance with the applicable standards). In this case, the four-digit code is factory-set to **0000**.

Note:

If you happen to forget the password, you can always use the universal one: "00000000"

3.2.2 SOUND SETTING

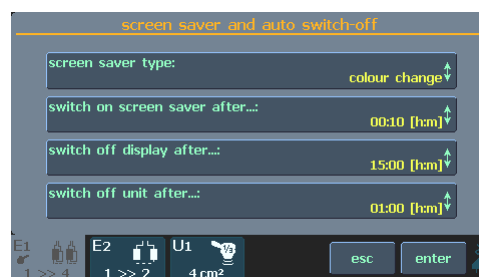
Sets audio signalling of buttons and provides warnings of various operational conditions (start of therapy, stop or pause of therapy). All audio tones can be switched off or modified as required.

Units with laser generator - **BTL-4000 Topline Laser**, **BTL-48xx Topline L**, **BTL-4800 Topline xL**, cannot have the audio tone of the running therapy switched off (in compliance with the applicable standards).

Volume can be set in the User options menu (see chapter **User Options**).

3.2.3 SCREEN SAVER AND AUTO SWITCH-OFF

Selects the design of the screen saver and sets the time for activation of the screen saver. Sets the auto power off feature for switch-off of the LCD screen and for switch-off of the equipment.



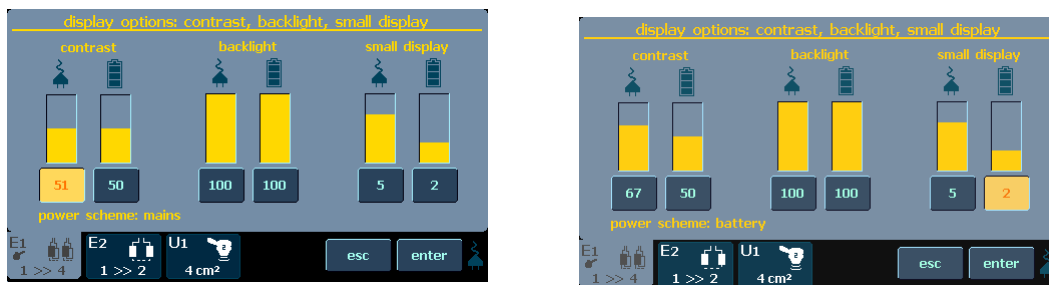
3.2.4 SETTING OF COLOURS

The user can set the colours of all elements displayed on the screen: select one of the available preset colour schemes or, if not satisfied with any of them, create and save custom colour schemes. In the custom colour scheme, the user successively selects individual elements.

3.2.5 DISPLAY OPTIONS

Sets the optimum clarity of the screen, intensity of the backlight and contrast of the small displays. The settings can be done for mains and battery operation.

To change the display contrast, select the type of operation (mains or battery) and via the **select (13)** knob adjust the value. The contrast of the screen depends on various factors, such as temperature.



For fast and direct screen contrast setting, use the **select (13)** knob while simultaneously holding the **enter (11)** and **esc (12)** buttons.

With the **backlight** option whether and how the display should be backlit can be set. This setting has a strong influence on the time for which the device can be supplied from the accumulators without recharging. The switched-on backlighting is a considerable load on the accumulators and reduces the time of operation without recharging.

To change the value, select the type of operation (mains or battery) and via the **select (13)** knob adjust it.

With the third option, optimal contrast (readability) of the lower digital display panel can be set. Select the type of operation (mains or battery) and via the **select (13)** knob adjust the contrast.

3.2.6 DATE AND TIME SETTING

Sets the date and time.

3.2.7 LANGUAGE SETTING

Selects the language of the text displays presented on the screen. Factory pre-set is **English**.

3.2.8 OPERATION MODE

Selects one of the three modes, see the chapter **Therapy Parameters Screen – Ergonomic, Standard and Expert Mode**.

Factory-preset is **ergonomic mode**.

3.2.9 TOUCH PANEL CALIBRATION

If the buttons on the touch screen do not react when pressed, the touch screen needs calibration. Calibration values are displayed on the screen and the soft touch stylus is used to make adjustments to the sensitivity of the buttons.



Press 'ESC' to stop calibration. To verify touch screen adjustments, use the "TOUCH PANEL FUNCTION TEST".

3.2.10 USER OPTIONS

It is possible to set:

- direction of cursor movement when using the **select (13)** control
- listing of therapies and some other menu options (in ascending or descending alphabetical order)
- location of the tab bar (up / down)
- speaker volume

3.2.11 STYLE OF OPERATION

- **NEW STYLE OF OPERATION**

Keep this option set to **YES**

- **END OF THERAPY – SETTING ZERO INTENSITY AND TIME VALUES**

After the end of therapy, you can have displayed either zero values of intensity and time or the intensity and time values of the last performed therapy.

- **ZERO INTENSITY FOR SEQUENCE**

This option controls whether a sequence can be interrupted by reducing its intensity. If set to **yes**, the sequence can be interrupted by decreasing the intensity to 0mA/V. When the option is set to **no**, and the intensity of a running sequence is reduced, it decreases minimally to 0.1mA/V and the therapy continues.

- **REPEAT SOUND FOR END**

Sets whether the sound for the end of therapy shall be repeated or not.

3.2.12 SETTING OF HW KEY

Via this option the type of unit can be changed by inserting a special 64-digit code.

3.2.13 UNIT INFORMATION

Displays info about the unit (serial number, firmware version, etc.). It also contains information till when the device will work – so called "device validity". If the functioning of the device is temporary, this item contains information until which date the device will be fully functional.

3.2.13 UNLOCK CODE

If the functioning of the device is temporary, in this item the code which can prolong the functionality of the unit or will remove the time restriction can be inserted.

3.2.14 SERVICE FUNCTIONS

- **REPAIR OF FILES**

Checks the file system in the unit and repairs possible errors - deletes empty files, etc. Recommended for use in case of lack of memory, if the unit refuses to save data, or if you think that some data have been lost.

- **FILE SYSTEM FORMATTING**

Clears all data and programs created by the user. You may select this function if the "repair of files" function did not help.



- **DELETE ACCESSORIES**

Deletes all installed accessories. Use only in case of improper installation – corrupted accessory image on the channel tab, connected accessories are not detected (the “?” symbol is displayed), etc.

- **DEFAULT SETTING WITHOUT LOSING USER DATA**

All factory settings are restored. User data, such as patients, therapies, etc. are preserved.

- **GENERS INFO**

Shows information about the generators in the unit - their type, ID, FW version, position (master or slave) and temperature.

- **INFORMATION ON FREE SPACE FOR USER DATA**

The bottom part of the screen displays the current free space in the memory that can be used for user data. User data are, for example, patients, saved user diagnoses, I/t curves, etc.

The user can use the memory marked "E: "; the memory marked "S: " and "L: " are intended for internal use.

3.3 SPECIAL SETTINGS

Variable for each generator. See your User's Guide for details.



4 USER SETTINGS OPTION

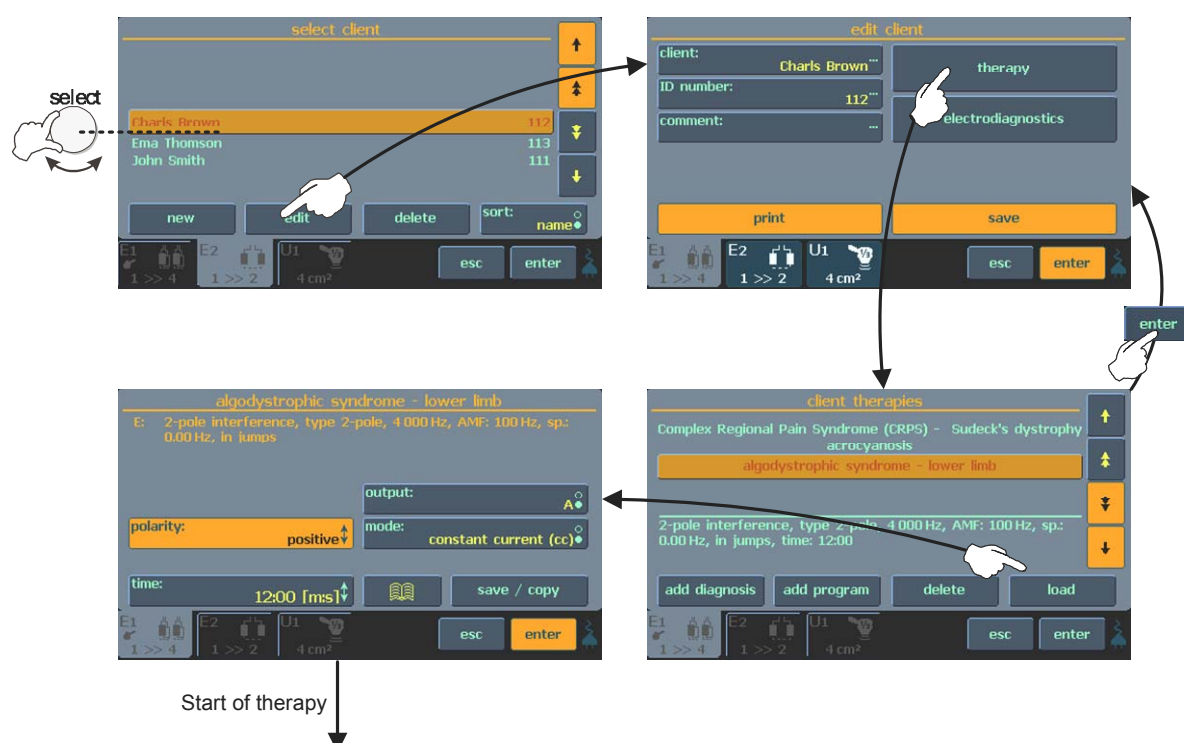
Press **menu**, select the **user settings** option - opens a screen allowing access to special features of the unit, as well as to data saved by the user. The following items can be selected:

- clients
- user sequences
- user diagnoses / programs
- recent therapies
- motor point detection*
- rheobasis – chronaxie*
- accommodation coefficient*
- I/t curve*

* Available only with electrical stimulator equipped with electrodiagnostics (optional).

4.1 CLIENTS

Insert, edit, or delete a client's name. A particular therapy can be assigned to a client. If your stimulator is equipped with electrodiagnostics, you can assign to the client a measured I/t curve, accommodation coefficient, and rheobasis and chronaxie values



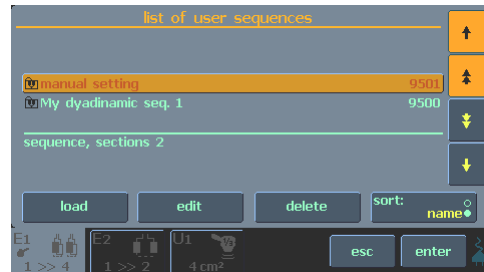
For details on electrodiagnostics, refer to the **User Guide for Electrotherapy**



4.2 USER SEQUENCES

This article **4.2 User sequences** is valid for electrotherapy, ultrasound therapy and laser therapy generator.

User sequences serve to work with the list of self-designed sequences of therapy programs. The selected sequence can be run, edited, and deleted from this menu.



4.2.1 CREATING NEW SEQUENCE

There is limitation of the choice of currents in one sequence when there is no pause set between the sections:

If the option **pause between sections** is set, the unit stops generation after each current and the intensity of the next current has to be set manually. In this case, there is no limitation and the user can select and combine any current in one sequence. We suggest setting this option for electrotherapy sequences.

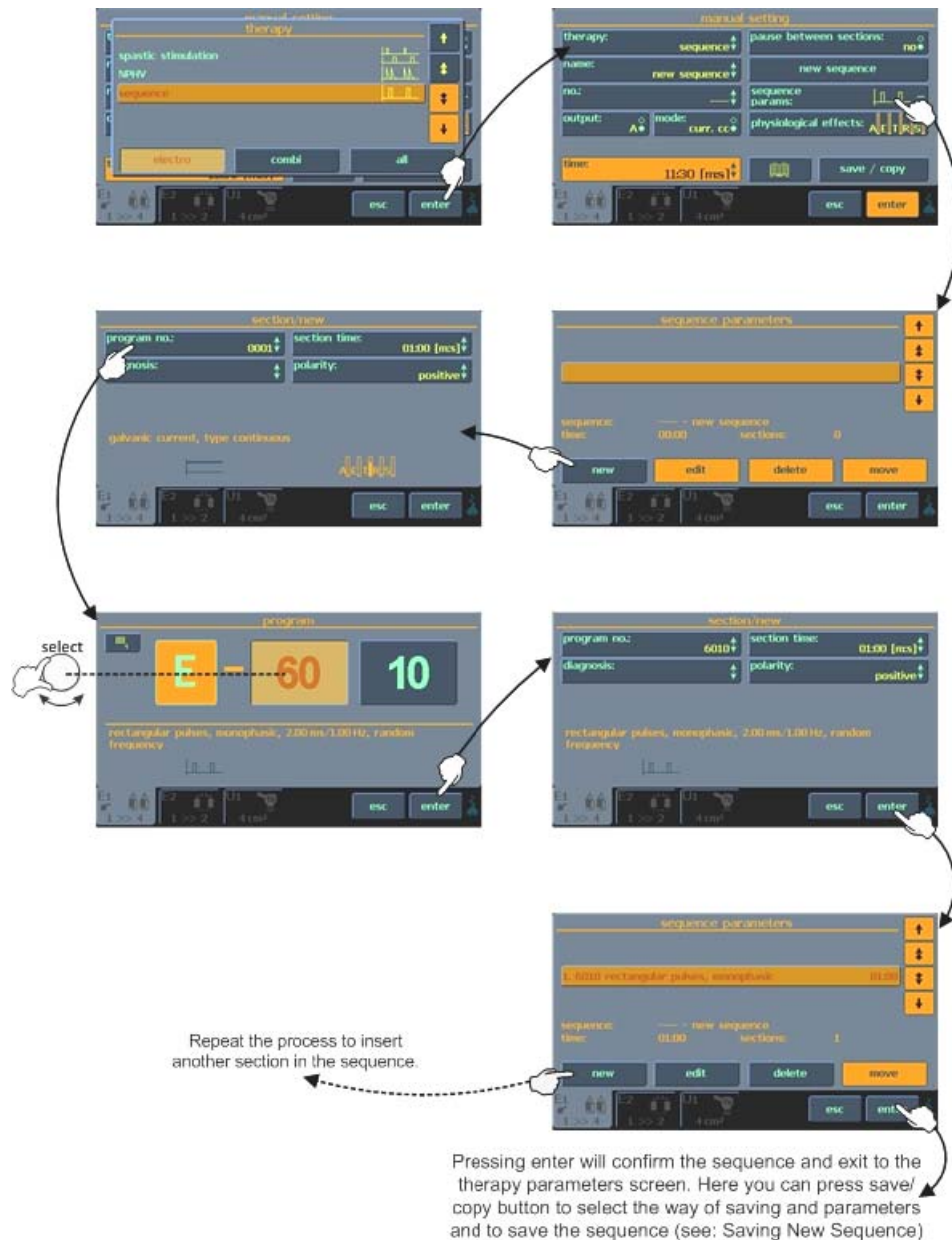
If the pause between sections is not set, the unit generates the same intensity for all currents. Be careful when setting sequences. Each current is felt differently by the patient. Whereas in case of TENS the patient tolerates an intensity of about 100 mA, the maximum tolerated intensity in case of DD currents is 10 times lower. Combine in one sequence only currents that are perceived by the patient in a similar way – such as currents with the same pulse length and with maximum difference in frequency 1:10. Monophasic, symmetric and alternating currents should not be mutually combined.

The following combinations are recommended if the pause between sections is not set:

- diadynamic currents
- monophasic pulses of the same length with DC component (differing in frequency or modulation)
- symmetric pulses of the same length with zero DC component (differing in frequency or modulation)
- alternating pulses of the same length with zero DC component (differing in frequency or modulation)
- mid-frequency bipolar currents (differing in frequency or modulation)
- interferences
- TENS (differing in frequency or modulation)
- ultrasound therapies
- laser therapies



Open the therapy parameters screen. In the manual mode, select **therapy sequence** (or **ultrasound sequence** or **laser sequence**). Creation of a new sequence is displayed in the following diagram:



4.2.2 PARAMETERS OF SECTIONS IN SEQUENCE

A sequence consists of a few currents / programs that are called sections. Parameters of sections must be set when creating a sequence.

Each program includes basic current parameters such as frequency, pulse length, modulation, etc. For more information, please refer to the chapter **Save Therapy**. Set all data in the manual setting screen and save them as a user-designed program (diagnosis). Insert the program/diagnoses in the sequence. Set the length of time of the section when inserting the program/diagnoses in the sequence (except laser, where the time of the section depends on the currently connected laser probe). Obviously, the factory-preset programs can also be inserted in the sequences. In the section only the polarity can be set (for electrotherapy sequence). The other parameters must be specified and saved in the inserted program.

Example: you want to create a sequence of diadynamic DF current (without base, positive polarity, CC mode, time of stimulation: 1 minute) and CP-ISO current (base 10%, reversal of polarity in the middle of the set time, CC mode, 10 minutes). Press **man** to select the manual mode, set diadynamic currents, DF type, without base, positive polarity, CC mode. Save this setting as (for example) program E-8001. Then set the parameters of the CP-ISO current: base 10%, positive, reversal, CC mode, and save it as (for example) program E-8002. Select therapy and press **new sequence** then press **new**, set the program number **8001**, set the time of section **1:00**, positive polarity, and press **enter**. Then add the second section in the same way – **new**, program number **8002**, time of section **10:00**, positive polarity with reversal, and press **enter**. Then press **enter** again to return to the manual settings screen, press **save/copy** and save the sequence (for example, as number 9501). The cv/cc mode is set globally for the whole sequence before starting it.

4.2.3 SAVING NEW SEQUENCE

Sequence created according to the chapter **Creating New Sequences** can be saved as follows:



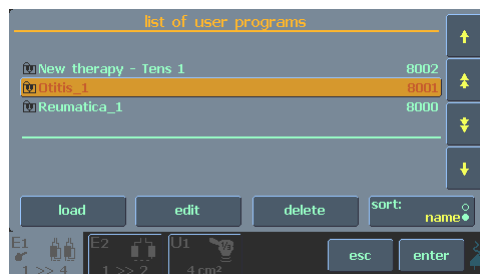
User-made sequences are saved under numbers **9500 - 9999**. They can be found in the list of programs, in the list of diagnoses or in the list of sequences.



4.3 USER DIAGNOSES / PROGRAMS

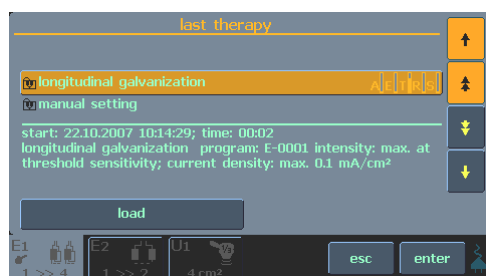
Use this feature to run user designed therapies, to edit and delete their parameters, names and therapy comments. It is very similar to the creation of a new diagnosis / program – see the chapter **Therapy Saving**.

On each channel tab, you can see only those therapies that were created on this tab. An icon before the name of the therapy will tell you which type of generator the therapy has been designed for.



4.4 LIST OF RECENT THERAPIES

Allows the user to select a recent therapy on the selected tab, run it again after pressing the **load** button or view its parameters.



5 ACCESSORIES

The equipment is not designed for use in connection with other medical devices except those stated in this manual.

Following is a list of accessories that can be supplied with the units, both standard and optional. For detailed information on individual accessories, see the enclosed leaflet and/or the User's manual.

5.1 POWER SUPPLY ADAPTER 60W / ADAPTER 90W

The devices of the BTL-4000 Topline series can be connected to the mains exclusively via the supplied power supply Adapter 60W or Adapter 90W. Adapter 90W is more powerful and is used only for the connection of specific device configurations. Your device always includes the proper type of adapter.

It is forbidden to connect another adapter than mentioned to the device.

5.2 ACCUMULATOR

BTL-4000 Topline devices have a built-in accumulator. Its type is specified in the chapter **Technical Parameters**. Replacement of the accumulator is provided by the authorized service of BTL devices.

During operation, the accumulator is continuously being recharged from the mains. Its recharging and keeping charged is running even if the equipment is switched off and connected to the mains, and the **mains switch (14)** on the rear panel is in position I. At switching off, the device checks the status of the accumulators and if it finds them low, it switches to the charging mode; in the charging mode the display is dark and the main display shows the symbol of a recharging battery. After recharging of the accumulator, the device automatically switches off completely. Note that the charging process runs only if the device is plugged into the mains and the rocker **mains switch (14)** on the rear panel is in position I.

Determination of the accumulator status may take some time, therefore, the device may respond with a delay after switching off and then on again.



If the device is supplied from the mains, this status is signalled by the plug picture. In case the device is supplied from the mains and the accumulator is low, there is shown an animation of a recharging battery on the display.



For full charging of the accumulator, let it recharge for approximately 6 hours – preferably overnight. A charged accumulator is signalled by a "full battery" picture.



If the accumulator is low, it is still possible to work with the device for a short time. But when the picture of a low accumulator starts to blink, the accumulator is dead and no therapy can be started, the running therapy will be finished and the device will switch off automatically.

To ensure long lifetime of the accumulator, we recommend keeping it permanently charged. When possible, connect the device to the mains via the adapter and switch the **mains switch (14)** to position I. The indication of recharging is displayed, after recharging it goes out and the accumulator will automatically be kept charged.

If the device is left unplugged from the mains for a longer time (even in the OFF status), the accumulators gradually spontaneously discharge. This effect is characteristic of the accumulators and cannot be removed; therefore, if the device has been off and unplugged for a longer time than approximately 2-3 months, we recommend recharging it, preferably for 48 hours without interruption.

For the same reason, we recommend charging the device continuously for at least 48 hours immediately after purchase, regardless of the accumulator status indication (you can work with the device normally, only do not unplug it from the adapter, the accumulator recharges even during standard operation of the device). Thus the accumulator becomes “formatted” and will keep working longer without recharging.

5.3 LITHIUM BATTERY

The device contains a lithium battery for backing up the date and time. The type of battery is stated in the chapter **Technical Parameters**. Replacement is provided by the authorized service of BTL devices.

5.4 ACCESSORIES COMMON FOR ALL UNITS

- External power supply Adapter 60W / Adapter 90W including the mains cable
- Touch-pen
- User's manual
- Markers for output cables
- Cart

5.5 ACCESSORIES FOR ELECTROTHERAPY

- user's guide for electrotherapy
- patient cable BTL-236-1
- patient cable BTL-236-2 (optional)
- flat rubber electrodes 7 x 5 cm²
- flat rubber electrodes 12 x 8 cm²
- sponge covers 7 x 5 cm²
- sponge covers 12 x 8 cm²
- set of fixation belts
- point electrode
 - ball point attachment – diameter 2 mm
 - ball point attachment – diameter 6 mm
 - HVT attachment (only for BTL-4610 Topline and BTL-4615 Topline)
- self-adhesive electrodes
- vaginal electrode
- rectal electrode
- interface cable between BTL-4000 Topline and BTL vac

5.6 ACCESSORIES FOR ULTRASOUND THERAPY

- user's guide for ultrasound therapy
- 1cm² ultrasound head BTL-237-1-13 for 1 and 3MHz, ERA 0.7 cm²
- 4cm² ultrasound head BTL-237-4-13 for 1 and 3MHz, ERA 3.24 cm²
- ultrasound gel 235ml, 5l, 10l
- interface cable between BTL-46xx Topline Puls and BTL-47xx Topline Sono

5.7 ACCESSORIES FOR LASER THERAPY

- user's guide for laser therapy
- laser probes - red BTL-448
- laser probes – infrared BTL-448
- laser clusters - red BTL-445
- laser clusters - infrared BTL-445
- laser clusters - combined (red and infrared) BTL-445
- holder for laser probe and laser cluster
- holder for optical attachment
- optical attachments for laser probes
- warning labels
- safety goggles OPTE BS 2, L3, 630 – 1350nm

5.8 ACCESSORIES FOR MAGNETOTHERAPY

- user's guide for magnetotherapy
- disc applicator - BTL-239-1
- solenoid small applicator - BTL-239-2
- solenoid big applicator - BTL-239-3
- double disc applicator - BTL-239-4
- multi disc applicator - BTL-239-5
- linear applicator - BTL-239-6
- solenoid applicator ø70cm with couch- BTL-239-8
- interface cable for connection of old type of applicators from BTL-09
- fixation belts

6 MAINTENANCE AND SAFETY INSTRUCTIONS

The service inspection including measuring of all parameters of the device and possible recalibration must be performed at intervals shorter than 30 months. The inspection and recalibration is performed by the authorized BTL service department on the basis of the user's order. If the inspection is not done within the stated term, the manufacturer does not guarantee the technical parameters or safe operation of the product.

Safe operation of any item of medical equipment requires close attention to detail. Please check the following on a regular basis:

Power cord and plug: Check for frays and kinks. Ensure that the insulation is not damaged in any way.

Ultrasound head surface: Gel should always be thoroughly cleaned from the surface of the head. Always maintain this surface in as clean a condition as possible. Do not use any abrasive products for cleaning this surface as they could damage this delicate accessory.

Wires, cables and electrodes: Check for frays, cuts or tears in the insulation. Always route electrical cords and cables away from user or patient foot traffic areas where they could increase the chance of a tripping-related accident.

Check the unit before each use to determine that all controls function normally.

Calibration of heads and probes / clusters must be done by authorized personnel.

Cleaning

To keep the device clean, do not store or use it in a dusty environment and do not spill any liquid on the surface. To clean, turn the equipment off and unplug the power supply. Clean the unit with a damp cloth. Do not use abrasive materials. Do not use agents containing alcohol, ammonia, benzene, or thinners. Clean the accessories that come into contact with the patient after each treatment. Use appropriate agents. No part of the equipment needs to be aseptic or sterilized.

Laser probes/clusters: Keep the lens clean. After each application, wipe the head of the probe with a cotton cloth (divergent probes). Unscrew the head, wipe the lens and blow compressed air through the head (convergent probes). In laser clusters, wipe the laser aperture with a cotton cloth so as to keep the protective glass clean.

Laser optical attachments: Can be sterilized for 20 minutes at a temperature of 180°C.

Fuse replacement

A protective fuse is located inside the BTL-4000 Topline device. The type of fuse is specified in the chapter **Technical Parameters**. The user should not replace the fuse; for replacement of the fuse, always contact the authorized service of BTL devices.

Transport and Storage

We recommend keeping the original packaging of this equipment to ensure its maximum protection during transportation. Unplug the power supply adapter and the accessories cables. The equipment must be stored or transported as defined in the chapter **Technical Parameters**.

6.1 SAFETY

ATTENTION!



The consumed current or voltage of the connectors marked with this label can exceed safety values.

The protection of the equipment is BF-type floating applied part (only if original accessories including power supply Adapter 60W / Adapter 90W are used).

The equipment does not use any medicaments which would be an integral part or would be applied by means of it.

ATTENTION!

This system has no user-serviceable parts or assemblies. Do not remove the instrument covers under any circumstances. Call your distributor for advice about any malfunction.

The device is equipped with a protection system that prevents connection of accessories other than those supplied from the manufacturer.



General safety precautions:

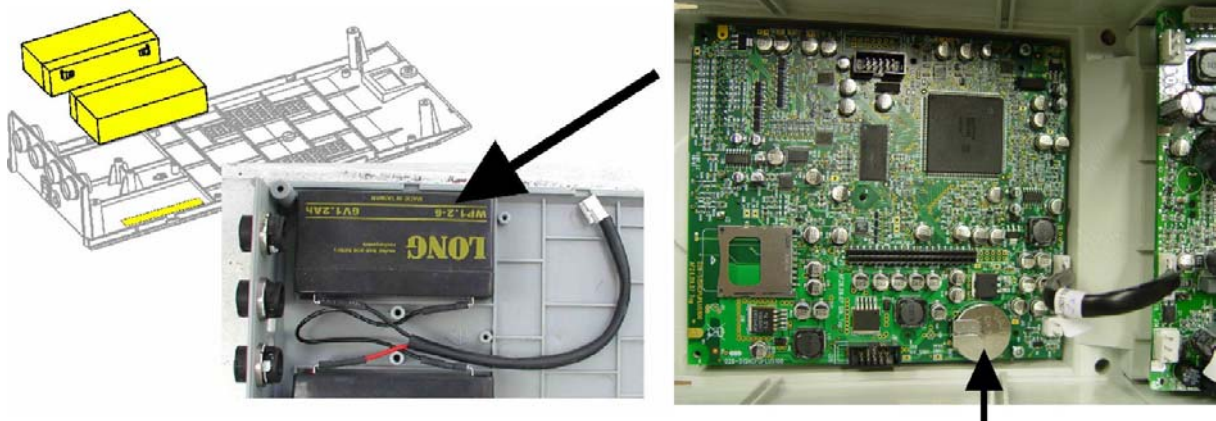
- Before first switch-on of the equipment, carefully read the User's Manual.
- All staff who will use the equipment must be instructed in the way of operation, maintenance and checking of the equipment, and the safety principles.
- The electrical cabling which the equipment will be connected to must be installed and tested according to the existing valid standards (IEC 364). If you are not sure that the mains are completely OK, get them inspected by an inspection engineer.
- Check whether the parameters of the mains correspond to the requirements of the equipment according to the chapter **Technical Parameters**. It must not be used in an environment which implies the danger of explosion or penetration of water into the equipment. It must not be used in connection with flammable anaesthetics or oxidizing gasses (O₂, N₂O, etc.).
- Do not place the equipment in direct sunshine or strong electromagnetic fields so as to prevent undesirable mutual influence. In case this undesirable influence occurs, place the equipment further from the source of interference or contact the authorized service of BTL devices.
- Inspect the equipment thoroughly before each use (loose cables, broken insulation of cables, functions of displays and controls, etc.); in case of any inconsistency, stop using the equipment and contact the authorized BTL service department. If the equipment's behaviour differs from the function described in this Manual, stop using the equipment and contact the BTL service department.
- If the equipment shows any defect or if you have doubts about its correct functioning, terminate therapy immediately. If you do not determine the source of uncertainty after thorough study of the Manual, contact the BTL service department. If the equipment is not used in accord with this Manual or is used even if it shows functional differences from this Manual, the user is responsible for the damage caused by the equipment.
- Do not dismantle the equipment in any case; removal of the protective covers implies the danger of electrical injury. Replacement of the lithium battery, fuses or accumulators may only be done by the authorized BTL service department.

- All material and parts which come into direct contact with the patient's body (as well as, for example, agents for cleaning the electrodes) must comply with the respective standards related to irritability, allergization, toxicity, genotoxicity, carcinogeneity (ISO 10993-1, ISO 10993-3, ISO 10993-5). The user is responsible for all these materials and parts if not supplied by the BTL equipment supplier.
- The connectors for accessories as well as the other connectors must not be used for connection of anything else than they are designed for, otherwise there is a danger of electrical injury and serious damage to the equipment.
- The equipment does not use or produce any toxic substances during its operation, storage or transport under the stated conditions.
- After bringing the equipment from a cold environment into warmth, do not plug it into the mains until the temperatures become equal (i.e. for at least 1 hour).
- Before the start of therapy, check whether all set parameters correspond to your intents.
- Do not apply therapy on damaged skin!
- To terminate the application, do not switch off the mains switch but press the **stop** knob (20). The time interval between switching the mains switch on and off must be at least 3 seconds.
- If after many years of operation it is necessary to discard the equipment, it can be done in a way which is usual for this type of devices after removal of the lithium battery and the lead accumulator. The removed batteries shall be disposed of in the way designated for hazardous waste - not within municipal waste. The equipment does not contain any toxic materials which could harm the environment in case of normal liquidation.

Warning: removal of batteries causes irreversible damage to the unit. Perform only environmental liquidation of the unit!

Procedure:- unscrew the bottom cover of the unit

- remove the batteries with a suitable tool (placing of batteries - see the picture)



The equipment and the accessories must not be used in a way not stated in this User's Manual.

During work with this device, use the recommended protective equipment.

- Keep the equipment out of reach of children.
- The equipment does not contain any components which can be repaired by the user. Do not remove any covers from the equipment. All repairs should be done by the authorized BTL service department.
- Don't connect equipment to the patient when it is still connected to the computer (via service connector).



Safety precautions for electrotherapy:

- When applying DC currents (the **polarity** button is enabled), it is necessary to pay attention to the set intensity and time of application of currents. Wrong values can cause burning of the patient's skin.
- The maximum secure effective value of current density on the electrodes is 2 mA/cm^2 (according to IEC 601-2-10). BTL-4000 Topline Series can exceed this value (according to the place of used electrodes type). In such case it is necessary to pay greater attention to the application of currents! Wrong values can cause burning of the patient's skin.
- Application of electrodes near the thorax may increase the risk of cardiac fibrillation.
- For contraindications, see the chapter **Contraindications**. Use of electrotherapy in cases of contraindication must be approved by a specialist.
- Simultaneous connection of the patient to a high-frequency surgical device may cause burning in the place of the electrodes and possible damage to the electrotherapy device.
- Simultaneous connection of the patient to an ECG monitor or an ECG alarm system may cause temporary malfunctioning of the ECG systems or unreliability of the values measured by the ECG systems.
- Operation of the equipment close to (within 1 m of) a short-wave or micro-wave therapeutic device may cause instability of the equipment's output.
- All supplied electrodes can be used at the maximum intensity of currents and voltage that can be set on the device.



Safety precautions for ultrasound:

- Protect the heads consistently from shocks and frost. Do not unnecessarily bend the mains cable.
- **During therapy, hold the head so that you do not touch its metallic parts.**
- An impact on the metal part of the head as well as an intense impact on the head's case may negatively change the parameters of the therapeutic head.
- For contraindications, see chapter the **Contraindications**. Use of ultrasound therapy in cases of contraindication must be approved by a specialist.
- For therapy, use only the BTL ultrasound gel; the head is not tested for other gels or oils and their use could damage the head. If you still want to use other gels, we recommend them to be only water-based gels. Never use paraffin-based gels.



Safety precautions for laser:

- Mark the laser workplace with the respective warning notices and connect the door switch.
- Equip the laser workplace with an operating code which must be approved by a competent health officer.
- When using a laser probe with an output of 200 mW or more (300 mW, 400 mW) and if the laser power is set higher than 150 mW, the duration of therapy must not exceed 15 min.
- Attention – use of any other than the stated control and setting elements and processes may cause dangerous exposure to radiation.
- The equipment works with laser beam of the 3B class. When working with the beam, follow all the instructions stated in this Manual and in the laser therapy User's Guide. Prevent the laser beam from hitting the eyes, thyroid and other endocrine glands, the head, etc. (see the User's Guide). Both the therapist and the patient must wear the supplied protective goggles during therapy. Incorrect handling of the equipment (not in accord with this Manual) may cause dangerous radiation and even damage to the eyes! In such a case, the user is responsible for all damage.
- During radiation, do not disconnect the probe from the equipment and do not switch the equipment off.
- **Protect the laser probe consistently from impacts!!!! The probe is not waterproof!**
- **Protect yourself and your surroundings from being directly hit by the laser beam.**
- For contraindications, see the chapter **Contraindications**. Use of laser therapy in cases of contraindication must be approved by a specialist.



Safety precautions for magnet:

- Never use damaged applicators. Electric shock to personal or patient may occur.
- Attending personnel should keep away from the patient applicator side when the applicator is in use. The relevant channel should be switched off during necessary manipulation.
- Stop the therapy at once in case of any failure.
- Check all parameters before you start the therapy.
- Place the instrument on an even hard board to assure proper cooling.
- Watches, electronic devices and magnetic recording carriers can be damaged when closely exposed to applicators and cables.
- Do not connect anything else to the connectors – there is a danger of injury by electric shock and / or serious damage to the instrument.
- The instrument must not be used in the presence of pregnant women!



6.2 CONTRAINDICATIONS

The list of contraindications the cases when the manufacturer does not recommend applying the selected therapy. If a specialised medical workplace decides to apply the therapy in spite of it, they bear all the responsibility for this action.

6.2.1 CONTRAINDICATIONS FOR ELECTROTHERAPY

- Active tuberculosis
- Allergy to solutions used for dampening electrode cover sponges
- Applications in the area of the heart and eyes
- Groundless stimulation - "placebo effect"
- Cardiovascular diseases
- Electronic implants (i.e. Cochlear implants, neural implants, pacemaker, defibrillator, chip implants...)
- Metal implants
- Malignancies in the current path
- Skin defects and skin inflammations
- Bleeding conditions
- Menstruation
- Tumour diseases
- Sensitivity disorders (relative KI) in the area of electrode placement
- Psychopathological syndromes and organic psychosyndromes
- Multiple sclerosis
- Pregnancy
- Inflammations of veins and lymphatic paths



6.2.2 CONTRAINDICATIONS FOR ULTRASOUND

- Active tuberculosis
- Allergies to used ultrasound gels
- Applications on peripheral nerves (located on the bone, close to skin surface)
- Applications on glands with inner secretion
- Applications on areas around the eyes, brain, spinal cord
- Blood diseases
- Children - epiphyses of growing bones
- Gonads
- Pregnancy
- Pacemaker
- Cardiovascular diseases
- Cochlear implants
- Metal implants
- Skin defects and skin inflammations
- Bleeding conditions
- Menstruation
- Tumour diseases
- Blood circulation deficiency
- St. p. Laminectomii

6.2.3 CONTRAINDICATIONS FOR LASER THERAPY

- Applications in the area of the eyes – possibility of direct eye irradiation and retina damage
- Menstruation
- Tumour diseases
- Irradiation of malignancies and potentially precancerous growths
- Irradiation of patients with cochlear implants
- Irradiation of glands with inner secretion
- Patients with febrile conditions
- Pulse modes (both red and infrared beam) are not used on patients with anamnesis of epilepsy
- Pregnancy



-

6.2.4 CONTRAINDICATIONS FOR MAGNETOTHERAPY

- Bleeding conditions, hypothalamus and hypophysis disorders
- Electronic implants (i.e. Cochlear implants, neural implants, pacemaker, defibrillator, chip implants...)
- Hyperthyroidism, hyperfunction of adrenals, myasthenia gravis
- Malignancies
- Menstruation
- Metal implants
- Onychomycosis
- Paroxysm neurologic diseases
- Pregnancy
- Psychoses
- Serious mycosis, active tuberculosis, acute virosis
- Special attention must be paid to patients with hypotonia or otherwise with hypertension
- Tumour diseases
- Children – growth discs of bones (epiphysis)

6.3 USEFUL ADDRESSES

The product is manufactured in accordance with the EU Medical Devices Directive by:

BTL Industries Ltd.

161 Cleveland Way

Stevenage

Hertfordshire, SG1 6BU United Kingdom

E-mail: sales@btlnet.com

<http://www.btlnet.com>

For service, please contact the service department at service@btlnet.com.

6.4 WARRANTY

The Manufacturer of this product guarantees the product is free of defects in workmanship and material for the period and conditions defined in the BTL General Service Conditions.



7 TECHNICAL PARAMETERS

7.1 TECHNICAL PARAMETERS OF THE BTL-4000 TOPLINE SERIES DEVICES

Device Type:	BTL-4000 Topline Series – physiotherapy
Display:	LCD
•dimensions:	diagonal: 10.922 cm (4.3")
•resolution:	480 x 272
Low battery indication:	on the display
Design	
Weight – device only	2.9 kg
Dimensions (l x h x w)	160 x 140 x 350mm
Covering grade according to EN 60 529	
Operating conditions:	
Temperature:	+ 10 °C to + 40 °C
Relative humidity:	30 % to 75 %
Atmospheric pressure	700 hPa to 1060 hPa
Position	horizontal – on legs
Type of operation	continuous
Transport and storage conditions:	
Temperature:	- 10 °C to + 55 °C
Relative humidity:	25 % to 85 %
Atmospheric pressure	650 hPa to 1100 hPa
Position	any
Max time of storage:	max. 1 year
Additional conditions:	transport only in the supplied packing recharge the accumulators at least 2x a year
Power supply:	supply only via the external supply Adapter 60W / Adapter 90W
Input max:	60 W / 90 W
Input voltage	24 V DC
Frequency:	50 Hz to 60 Hz
Protection class:	II (according to IEC 536, ČSN 33 0600)
Internal fuse:	T6.3A / 250V, safety fuse on the printed circuit, acc. to IEC 127-2 (replacement may only be done by the authorized service)
Mains switch:	on the rear panel of the device, positions 0 and I
Power switch	on the front panel of the device, marked on/off
Covering:	IP20
Internal chemical sources:	
Battery:	lithium battery CR2032
Lead accumulator:	2x 6 V / 1.2 Ah, maintenance-free
capacity of the accumulator:	20 min. – 45 min. in dependence on the Energy intensiveness of the therapies applied*
charger:	internal, time needed for 100 % charging is approx. 6 hours
Classification	
Applied parts type	BF
Class according to MDD 93/42/EEC	IIb

*the stated values do not apply to Magnet therapy, which always must be supplied from the AC mains.



Therapy duration

For electro and laser therapies

For ultrasound therapies

For magnetotherapies

Step of setting

Accuracy of therapy time

Accuracy of time values

0 to 100 minutes

0 to 30 minutes

0 to 100 minutes

1 second

 $\pm 2\%$ of the set value

5 seconds per day

7.2 TECHNICAL PARAMETERS OF POWER SUPPLY ADAPTER 60W / ADAPTER 90W

Device Type:	Adapter 60W	Adapter 90W
Operating conditions:		
Temperature:	+ 10 °C to + 40 °C	
Relative humidity:	30 % to 75 %	
Atmospheric pressure	700 hPa to 1060 hPa	
Position	horizontal	
Type of operation	continuous, use indoor only	
Transport and storage conditions:		
Temperature:	- 10 °C to + 55 °C	
Relative humidity:	25 % to 85 %	
Atmospheric pressure	650 hPa to 1100 hPa	
Position	any	
Time of storage:	max. 5 years	
Power supply of the device:		
Maximum input:	100 W	120 W
Input mains voltage	100V – 240V ~ (alternating)	
Frequency:	50 – 60 Hz	
Protection class:	II (according to IEC 536, ČSN 33 0600)	
Fuse:	internal	
Covering:	IP20	
Type of connector of the device	mini 2 poles	
Output parameters:		
Output voltage	24V	
Output current	2.5A	3.75A
Output power:	60W	90W
Insulation barriers:		
Mains – output (output connector)	4kV	



7.3 BASIC PARAMETERS OF ELECTROTHERAPY GENERATOR

Output current*	max. 140 mA (maximum instantaneous value)
Output current - HVT**	max. 4 A (maximum instantaneous value)
Output current - microcurrents**	max. 999 μ A (maximum instantaneous value)
Output voltage	max. 130 V (maximum instantaneous value)
Output voltage - HVT**	max. 390 V (maximum instantaneous value)
*maximum value for some currents is limited according to IEC 601-2-10	
**presence of these currents depends on the ordered configuration of the device	
Tolerance of output amplitude	$\pm 10\%$ for 5 mA (5 V, 5 μ A) and higher; otherwise $\pm 30\%$ $\pm 10\%$ for 35 V and higher; otherwise $\pm 30\%$ (for HVT)
Tolerance of time parameters of current	standard $\pm 5\%$; maximum $\pm 15\%$ standard $\pm 20\%$ for modulation of HVT from 5 s; otherwise $\pm 30\%$
Nominal load impedance	500 Ω
Internal output resistance in CV mode	96 $\Omega \pm 10\%$
Internal output resistance in CC mode	47 k $\Omega \pm 10\%$
Output capacity	standard 150 pF
Output polarity – can be selected	positive / negative / with reversal in the middle of therapy
Positive polarity	red banana plug = + = anode; black banana plug = - = cathode
Negative polarity	red banana plug = - = cathode; black banana plug = + = anode

7.4 BASIC PARAMETERS OF ULTRASOUND GENERATOR

Adjustable values

Effective intensity	0.1 to 2 W/cm ² $\pm 20\%$ for output intensity higher than 0.2W/cm ²
Continuous operation	
Pulse operation	0.1 to 3 W/cm ² $\pm 20\%$ for output intensity higher than 0.2W/cm ²
Working frequency	1 MHz $\pm 5\%$ and 3.2 MHz $\pm 5\%$
Modulation frequency	10 to 150 Hz $\pm 5\%$
Duty factor	6 to 100 % $\pm 5\%$ of the set value
Duty factor – default	6.25 % (1:16); 12.5 % (1:8); 25 % (1:4); 50 % (1:2); 100% (1:1) $\pm 5\%$ of the set value
Maximum output power	12W

Parameters of pulses

Duty factor	Frequency 10 Hz period 100 ms		Frequency 50 Hz period 20 ms		Frequency 100Hz period 10 ms		Frequency 150 Hz period 6.67 ms	
	Pulse length	Pause length	Pulse length	Pause length	Pulse length	Pause length	Pulse length	Pause length
50 %	50 ms	50 ms	10 ms	10 ms	5 ms	5 ms	3.33 ms	3.33 ms
25%	25 ms	75 ms	5 ms	15 ms	2.5 ms	7.5 ms	1.67 ms	5 ms
10%	10 ms	90 ms	2 ms	18 ms	1 ms	9 ms	0.67 ms	6 ms
6%	6 ms	94 ms	1.2 ms	18.8 ms	0.6 ms	9.4 ms	0.40 ms	6.27 ms

Steps of adjustable values

Intensity	0.1 W/cm ²
Modulation frequency	10 Hz
Duty factor	1%

7.5 BASIC PARAMETERS OF LASER GENERATOR

Indication of emission of laser radiation	green pilot light on the probe, supplementary lighting of the probe/cluster, sound
Indication of readiness for emission	on the screen
Indication of not being ready for emission	on the screen
Additional safety means	- warning labels on the device case and on the probe/cluster - warning label for the entrance door of the workplace - connector of the remote control

Connector of the remote control (door switch)

input voltage	AC / DC 5 V to 35 V (external power supply) / automatic polarity recognition
input current	max. 10mA
active level	settable positive / negative logic

Adjustable values

Frequency***	0 – 10000 Hz with laser probe BTL-448 0 – 500 Hz with laser cluster BTL-445
accuracy of frequency	± 3 % of the stated value
Dose*	0.1 – 100.0 J/cm ²
accuracy of dose	±20% (according to IEC 60601-2-22)
Area*	0.1 – 100.0 cm ²
accuracy of area	see BNR
Output*	5.0 – 500 mW (depending on the connected laser probe) 20 – 1800 mW (depending on the connected laser cluster)
accuracy of output	±20% (according to IEC 60601-2-22)
Duty factor**	10 – 90 %
accuracy of duty factor	±1% of the range of DF

*) The stated values are maximum. The actual values depend on the type of connected laser generator and on the ordered configuration of the device

**) Can be set only in pulsed mode, in continuous mode it is always 100%

***) Zero frequency means continuous operation

7.6 BASIC PARAMETERS OF MAGNET GENERATOR

Adjustable values

Magnetic field	max. 128 mT / 1280 Gauss* (max. value on the surface of applicator)
Mode of magnetic field	pulses / series of pulses / continuous
Shape of magnetic pulses	rectangular, rectangular protracted, exponential, triangular, sinusoidal
Pulse frequency	0 – 166 Hz
Modulation	none, burst, sine / trapezoid / symmetric surge
Random frequency	yes / no
Accuracy:	
amplitude of magnetic field	±30%
time parameters	±10%

*) The stated value is maximum for disk applicator. The actual value depends on the type of connected applicator and on the settings of the device.

7.7 TECHNICAL PARAMETERS OF ULTRASOUND HEADS

BTL-237-1-13 – small head

Effective radiation area (ERA)	
ERA (EN 61689)	$0.7 \text{ cm}^2 \pm 20\%$
ERA (21 CFR 1050)	$0.9 \text{ cm}^2 \pm 20\%$
Maximum effective intensity	$3 \text{ W/cm}^2 \pm 20\%$
Maximum effective acoustic power	$2.1 \text{ W} \pm 20\%$
Radiation frequency	1 MHz and 3.2 MHz $\pm 5\%$
Type of beam	collimated
BNR	< 8
Covering grade according to EN 60 529	IP 67

BTL-237-4-13 – large head

Effective radiation area (ERA)	
ERA (EN 61689)	$3.2 \text{ cm}^2 \pm 20\%$
ERA (21 CFR 1050)	$4.4 \text{ cm}^2 \pm 20\%$
Maximum effective intensity	$3 \text{ W/cm}^2 \pm 20\%$
Maximum effective acoustic power	$9.6 \text{ W} \pm 20\%$
Radiation frequency	1 MHz and 3.2 MHz $\pm 5\%$
Type of beam	collimated
BNR	< 8
Covering grade according to EN 60 529	IP 67

7.8 TECHNICAL PARAMETERS OF LASER PROBES

Laser probes with red (visible) radiation:

Type:	BTL-448-03RD	BTL-448-03RC	BTL-448-05RD	BTL-448-05RC
Output power:	30 mW $\pm 20\%$	30 mW $\pm 20\%$	50 mW $\pm 20\%$	50 mW $\pm 20\%$
Wavelength:	685 nm	685 nm	685 nm	685 nm
Class*:	3B	3B	3B	3B
Beam:	divergent	collimated	divergent	collimated
Aperture:	$\varnothing 2 \text{ mm}$	$\varnothing 4.4 \text{ mm}$	$\varnothing 2 \text{ mm}$	$\varnothing 4.4 \text{ mm}$
BNR:	0.28 rad $\pm 0.05 \text{ rad}$	0.015 rad $\pm 0.005 \text{ rad}$	0.28 rad $\pm 0.05 \text{ rad}$	0.015 rad $\pm 0.005 \text{ rad}$
NOHD**:	0.2 m	2.3 m	0.2 m	3.4 m

Laser probes with infrared (invisible) radiation:

Type:	BTL-448-05IC	BTL-448-10IC	BTL-448-20IC	BTL-448-30IC
Output power:	50 mW $\pm 20\%$	100 mW $\pm 20\%$	200 mW $\pm 20\%$	300 mW $\pm 20\%$
Wavelength:	830 nm	830 nm	830 nm	830 nm
Class*:	3B	3B	3B	3B
Beam:	collimated	collimated	collimated	collimated
Aperture:	$\varnothing 4.4 \text{ mm}$	$\varnothing 4.4 \text{ mm}$	$\varnothing 4.4 \text{ mm}$	$\varnothing 4.4 \text{ mm}$
BNR:	0.015 rad $\pm 0.005 \text{ rad}$	0.015 rad $\pm 0.005 \text{ rad}$	0.015 rad $\pm 0.005 \text{ rad}$	0.015 rad $\pm 0.005 \text{ rad}$
NOHD**:	8.5 m	12.1 m	12.5 m	16.6 m

Type:	BTL-448-40IC
Output power:	400 mW \pm 20 %
Wavelength:	830 nm
Class*:	3B
Beam:	collimated
Aperture:	\varnothing 4.4 mm
BNR:	0.015 rad \pm 0.005 rad
NOHD**:	19.2 m

* Laser class is classified according to IEC 60601-2-22:1995 and IEC 60825-1:1993/A2:2001.

**NOHD – nominal ocular hazard distance (nominal distance from the laser aperture in which eye damage by laser beam should not happen)

7.9 TECHNICAL PARAMETERS OF LASER CLUSTERS

Laser clusters with red (visible) radiation:

Type:	445-C25R02
Output power:	200 mW \pm 20 % (4x 50 mW)
Wavelength:	4x 685 nm
Class*:	3B
Beam:	4x divergent
Aperture:	4x \varnothing 1.5 mm
Active area:	\varnothing 56 mm (25 cm ²)
BNR:	4x 0.35 rad \pm 0.05 rad
NOHD**:	0.2 m

Laser clusters with infrared (invisible) radiation:

Type:	445-C25I08	445-C25I16
Output power:	800 mW \pm 20 % (4x 200 mW)	1600 mW \pm 20 % (4x 400 mW)
Wavelength:	4x 830 nm	4x 830 nm
Class*:	3B	3B
Beam:	4x divergent	4x divergent
Aperture:	4x \varnothing 3.5 mm	4x \varnothing 3.5 mm
Active area:	\varnothing 56 mm (25 cm ²)	\varnothing 56 mm (25 cm ²)
BNR:	4x 0.52 rad \pm 0.17 rad	4x 0.52 rad \pm 0.17 rad
NOHD**:	8.5 m	12.1 m

Combined laser clusters with red and infrared radiation:

Type:	445-C25RI10	445-C25RI18
Output power:	red: 200 mW \pm 20 % (4x 50 mW) infrared: 800 mW \pm 20 % (4x 200 mW)	red: 200 mW \pm 20 % (4x 50 mW) infrared: 1600 mW \pm 20 % (4x 400 mW)
Wavelength:	red: 4x 685 nm infrared: 4x 830 nm	red: 4x 685 nm infrared: 4x 830 nm
Class*:	3B	3B
Beam:	8x divergent	8x divergent
Aperture:	red: 4x \varnothing 1.5 mm infrared: 4x \varnothing 3.5 mm	red: 4x \varnothing 1.5 mm infrared: 4x \varnothing 3.5 mm
Active area:	\varnothing 56 mm (25 cm ²)	\varnothing 56 mm (25 cm ²)
BNR:	red: 4x 0.35 rad \pm 0.05 rad infrared: 4x 0.52 rad \pm 0.17 rad	red: 4x 0.35 rad \pm 0.05 rad infrared: 4x 0.52 rad \pm 0.17 rad
NOHD**:	8.5 m	12.1 m

* Laser class is classified according to IEC 60601-2-22:1995 and IEC 60825-1:1993/A2:2001.

**NOHD – nominal ocular hazard distance (nominal distance from the laser aperture in which eye damage by laser beam should not happen).

7.10 TECHNICAL PARAMETERS OF MAGNETIC APPLICATORS

Type	Name	Dimension [mm]	Weight [kg]	Max. intensity
BTL-239-1	disk	130 x 130 x 30	1.05	128.0 mT (1280 G)
BTL-239-2	solenoid 30	340 x 340 x 300	5.75	9.0 mT (90 G)
BTL-239-3	solenoid 60	620 x 540 x 300	10.00	8.5 mT (85 G)
BTL-239-4	double disk	2x 130 x 130 x 30	2.15	95.0 mT (950 G)
BTL-239-5	multi disk	4x 130 x 130 x 30	4.30	75.0 mT (750 G)
BTL-239-6	linear	290 x 600 x 30	6.05	46.4 mT (464 G)
BTL-239-8	solenoid 70 with couch	2000x740x1100	67.00	7.6 mT (76 G)

These mentioned parameters for applicators are basic. The exact values and shape of the magnetic field – please see 2nd part of manual – BTL-4000 Topline Magnetotherapy User's Guide.

7.11 APPLICABLE STANDARDS

Name	IEC, EN, ISO, MDD
Medical electrical equipment. Part 1: General requirements for safety	IEC 601-1
Amendments to IEC 601-1	A2, A11, A12
Medical electrical equipment Part 1: General requirements for safety 1.Collateral standard: Safety requirements for medical electrical systems	IEC 60601-1-1
Medical electrical equipment Part 1: General requirements for safety 2. Collateral Standard: Electromagnetic compatibility. Requirements and tests	IEC 60601-1-2
Industrial, scientific and medical (ISM) radio-frequency equipment - Radio disturbance characteristics - Limits and methods of measurement	EN 55011
Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 2: Electrostatic discharge immunity test - Basic EMC Publication	IEC 61000-4-2
Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 3: Radiated, radio frequency, electromagnetic field immunity test	IEC 61000-4-3
Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 4: Electrical fast transients/burst immunity test - Basic EMC Publication	IEC 61000-4-4
Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 5: Surge immunity test	IEC 61000-4-5
Medical electrical equipment Part 1: General requirements for safety 4.Collateral standard: Programmable electrical medical systems	IEC 601-1-4
Medical devices – Risk analysis	EN 1441 / ISO 14971
Biological evaluation of medical devices - Part 1: Evaluation and testing	ISO 10 993-1
The Medical Devices Directive 93/42/EEC	MDD 93/42/EEC
Medical electrical equipment Part 2: Particular requirements for the safety of ultrasonic therapy equipment	IEC 601-2-5
Medical electrical equipment - Part 2: Particular requirements for the safety of nerve and muscle stimulators	IEC 601-2-10
Medical electrical equipment Part 2: Particular requirements for the safety of diagnostic and therapeutic laser equipment	IEC 601-2-22
Safety of laser products. Part 1: Equipment classification, requirements and user's guide	IEC 60 825-1
Amendments to IEC 60 825-1	A1, A2

7.12 INTERCONNECTION OF DEVICES

BTL-4000 Topline Puls can be interconnected with: BTL vac, BTL-4000 Topline Sono, BTL-12, BTL-07p, BTL-4000 Sono, BTL-5000 Sono

BTL-4000 Topline Combi can be interconnected with: BTL vac, BTL-12

BTL-4000 Topline Sono can be interconnected with: BTL-4000 Topline Puls, BTL-4000 Puls, BTL-5000 Sono

Other combinations are not allowed.

7.13 MANUFACTURER

This product is manufactured in accordance with the EU Medical Devices Directive by:

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8 UNITS CONFIGURATIONS

8.1 TABLE OF CONFIGURATIONS OF THE COMBINED DEVICES BTL 4000 TOPLINE SERIES

Type:	4800SL	4810S	4815S	4810L	4815L
Number of therapies	2	2	2	2	2
Electrotherapy		1	1	1	1
Ultrasound therapy	1	1	1		
Laser therapy	1			1	1
Magnetotherapy					
Patient cardfile (positions)	min. 500	min. 500	min. 500	min. 500	min. 500
User programs	min. 500	min. 500	min. 500	min. 500	min. 500
User sequences	min. 150	min. 150	min. 150	min. 150	min. 150
Step of setting of values	fine	fine	fine	fine	fine
Encyclopaedia	x	x	x	x	x
Language versions	x	x	x	x	x
Sound schemes	x	x	x	x	x
Display, diagonal	colour 10.9 cm	colour 10.9 cm	colour 10.9 cm	colour 10.9 cm	colour 10.9 cm
Screen saver	x	x	x	x	x
Colour schemes	x	x	x	x	x
Recently performed therapies	20	20	20	20	20
Electro parameters:					
Channel mode		CC / CV	CC / CV	CC / CV	CC / CV
Galvanic, Iontophoresis		x	x	x	x
Träbert, Farad, Neofarad		x	x	x	x
Diadynamics		x	x	x	x
TENS		x	x	x	x
Rectangular pulses		x	x	x	x
Triangular pulses		x	x	x	x
Exponential pulses		x	x	x	x
Combined pulses		x	x	x	x
Interrupted pulses			x		x
Pulse modulation:		x	x	x	x
random frequency sweep		x	x	x	x
burst, surges		x	x	x	x
Stimulation pulses		x	x	x	x
Russian stimulation		x	x	x	x
2-pole interference		x	x	x	x
4-pole interference					
Isoplanar field (interference)					
Vector field (interference)					
Electrodiagnostics:			x		x
I/t curve (memory position)			min. 50		min. 50
HVT					
H – waves			x		x
Spastic currents					
Microcurrents			x		x
Leduc's current			x		x
Mid-frequency surges			x		x
Ultrasound parameters:					
Head of 4 cm ² , 1 and 3 MHz	x	x	x		
Head of 1 cm ² , 1 and 3 MHz	optional	optional	optional		
Detection of contact	continuous	continuous	continuous		
Continuous operation mode	x	x	x		
Pulse operation mode	x	x	x		
Duty factor	x	x	x	50 mW	50 mW
Laser parameters:				400 mW	400 mW
Max. laser output, 685 nm	50 mW			x	x
Max. laser output, 830 nm	400 mW			x	x
Continuous operation mode	x			x	x
Pulse operation mode	x			x	x
Duty factor	x				
Nogier frequencies	x				
Magnetic parameters:					
Rectangular pulses					
Rectangular protracted					
Exponential					
Triangular					
Sinusoidal					
Continuous mag. field					
Series of pulses					
Random frequency					
Modulation					

Type:	4810M2	4815M2	4800LM2	4800SM2	4820L
Number of therapies	3	3	3	3	3
Electrotherapy	1	1			2
Ultrasound therapy				1	
Laser therapy			1		1
Magnetotherapy	2	2	2	2	
Patient cardfile (positions)	min. 500	min. 500	min. 500	min. 500	min. 500
User programs	min. 500	min. 500	min. 500	min. 500	min. 500
User sequences	min. 150	min. 150	min. 150	min. 150	min. 150
Step of setting of values	fine	fine	fine	fine	fine
Encyclopaedia	x	x	x	x	x
Language versions	x	x	x	x	x
Sound schemes	x	x	x	x	x
Display, diagonal	colour 10.9 cm	colour 10.9 cm	colour 10.9 cm	colour 10.9 cm	colour 10.9 cm
Screen saver	x	x	x	x	x
Colour schemes	x	x	x	x	x
Recently performed therapies	20	20	20	20	20
Electro parameters:					
Channel mode	CC / CV	CC / CV			CC / CV
Galvanic, Iontophoresis	x	x			x
Träbert, Farad, Neofarad	x	x			x
Diadynamics	x	x			x
TENS	x	x			x
Rectangular pulses	x	x			x
Triangular pulses	x	x			x
Exponential pulses	x	x			x
Combined pulses	x	x			x
Interrupted pulses		x			
Pulse modulation:	x	x			x
random frequency sweep	x	x			x
burst, surges	x	x			x
Stimulation pulses	x	x			x
Russian stimulation	x	x			x
2-pole interference	x	x			x
4-pole interference					x
Isoplanar field (interference)					
Vector field (interference)					
Electrodiagnostics:		x			
I/t curve (memory position)		min. 50			
HVT					
H – waves		x			
Spastic currents					
Microcurrents		x			
Leduc's current		x			
Mid-frequency surges		x			
Ultrasound parameters:					
Head of 4 cm ² , 1 and 3 MHz				x	
Head of 1 cm ² , 1 and 3 MHz				optional	
Detection of contact				continuous	
Continuous operation mode				x	
Pulse operation mode				x	
Duty factor				x	
Laser parameters:					
Max. laser output, 685 nm			50 mW		50 mW
Max. laser output, 830 nm			400 mW		400 mW
Continuous operation mode			x		x
Pulse operation mode			x		x
Duty factor			x		x
Nogier frequencies			x		x
Magnetic parameters:					
Rectangular pulses	x	x	x	x	
Rectangular protracted	x	x	x	x	
Exponential	x	x	x	x	
Triangular	x	x	x	x	
Sinusoidal	x	x	x	x	
Continuous mag. field	x	x	x	x	
Series of pulses	x	x	x	x	
Random frequency	x	x	x	x	
Modulation	x	x	x	x	

Type:	4825L	4820S	4825S	4816S	4818S	4816L	4818L
Number of therapies	3	3	3	2	2	2	2
Electrotherapy	2	2	2	1	1	1	1
Ultrasound therapy		1	1	1	1		
Laser therapy	1					1	1
Magnetotherapy							
Patient cardfile (positions)	min. 500	min. 500	min. 500	min. 500	min. 500	min. 500	min. 500
User programs	min. 500	min. 500	min. 500	min. 500	min. 500	min. 500	min. 500
User sequences	min. 150	min. 150	min. 150	min. 150	min. 150	min. 150	min. 150
Step of setting of values	fine	standard	standard	standard	standard	standard	standard
Encyclopaedia	x	x	x	x	x	x	x
Language versions	x	x	x	x	x	x	x
Sound schemes	x	x	x	x	x	x	x
Display, diagonal	colour 10.9 cm	colour 10.9 cm	colour 10.9 cm	colour 10.9 cm	colour 10.9 cm	colour 10.9 cm	colour 10.9 cm
Screen saver	x	x	x	x	x	x	x
Colour schemes	x	x	x	x	x	x	x
Recently performed therapies	20	20	20	20	20	20	20
Electro parameters:							
Channel mode	CC / CV	CC / CV	CC / CV	CC / CV	CC / CV	CC / CV	CC / CV
Galvanic, Iontophoresis	x	x	x	x	x	x	x
Träbert, Farad, Neofarad	x	x	x	x	x	x	x
Diadynamics	x	x	x	x	x	x	x
TENS	x	x	x	x	x	x	x
Rectangular pulses	x	x	x	x	x	x	x
Triangular pulses	x	x	x	x	x	x	x
Exponential pulses	x	x	x	x	x	x	x
Combined pulses	x	x	x	x	x	x	x
Interrupted pulses	x		x		x		x
Pulse modulation:	x	x	x	x	x	x	x
random frequency sweep	x	x	x	x	x	x	x
burst, surges	x	x	x	x	x	x	x
Stimulation pulses	x	x	x	x	x	x	x
Russian stimulation	x	x	x	x	x	x	x
2-pole interference	x	x	x	x	x	x	x
4-pole interference	x	x	x	x	x	x	x
Isoplanar field (interference)	x		x		x		x
Vector field (interference)	x		x		x		x
Electrodiagnostics:	x		x		x		x
I/t curve (memory position)	min. 50		min 50		min 50		min 50
HVT							
H – waves	x		x		x		x
Spastic currents	x		x		x		x
Microcurrents							
Leduc's current	x		x		x		x
Mid-frequency surges	x		x		x		x
Ultrasound parameters:							
Head of 4 cm ² , 1 and 3 MHz		x	x	x	x		
Head of 1 cm ² , 1 and 3 MHz		optional	optional	optional	optional		
Detection of contact		continuous	continuous	continuous	continuous		
Continuous operation mode		x	x	x	x		
Pulse operation mode		x	x	x	x		
Duty factor		x	x	x	x		
Laser parameters:							
Max. laser output, 685 nm	50 mW					50 mW	50 mW
Max. laser output, 830 nm	400 mW					400 mW	400 mW
Continuous operation mode	x					x	x
Pulse operation mode	x					x	x
Duty factor	x					x	x
Nogier frequencies	x					x	x
Magnetic parameters:							
Rectangular pulses							
Rectangular protracted							
Exponential							
Triangular							
Sinusoidal							
Continuous mag. field							
Series of pulses							
Random frequency							
Modulation							

8.2 TABLE OF CONFIGURATIONS OF THE ELECTROTHERAPY DEVICES BTL-4000 TOPLINE PULS

Type:	4610	4615	4620	4625
Number of electrotherapies	1	1	2	2
User programs / diagnoses	min. 500	min. 500	min. 500	min. 500
User sequences	min. 150	min. 150	min. 150	min. 150
Step of setting of values	fine	fine	fine	fine
Encyclopaedia	x	x	x	x
Interconnection with ultrasound	x	x	x	x
Language versions	x	x	x	x
Sound schemes	x	x	x	x
Display, diagonal	colour 10.9 cm	colour 10.9 cm	colour 10.9 cm	colour 10.9 cm
Screen saver	x	x	x	x
Colour schemes	x	x	x	x
Recently performed therapies	20	20	20	20
Electro parameters:				
Channel mode	CC / CV	CC / CV	CC / CV	CC / CV
Galvanic, Iontophoresis	x	x	x	x
Träbert, Farad, Neofarad	x	x	x	x
Diadynamics	x	x	x	x
TENS	x	x	x	x
Rectangular pulses	x	x	x	x
Triangular pulses		x	x	x
Exponential pulses		x	x	x
Combined pulses		x	x	x
Interrupted pulses		x		x
Pulse modulation:	x	x	x	x
random frequency sweep	x	x	x	x
burst, surges	x	x	x	x
Stimulation pulses	x	x	x	x
Russian stimulation	x	x	x	x
2-pole interference	x	x	x	x
4-pole interference			x	x
Isoplanar field (interference)				x
Vector field (interference)				x
Electrodiagnostics:		x		x
I/t curve (memory position)		min. 50		min. 50
HVT	optional	optional		
H – waves		x		x
Spastic currents				x
Microcurrents		x		x
Leduc's current		x		x
Mid-frequency surges		x		x

8.3 TABLE OF CONFIGURATIONS OF THE ULTRASOUND THERAPY DEVICES BTL-4000 TOPLINE SONO

Type:	4710 Topline
Number of ultrasound therapies	1
Patient cardfile (positions)	min. 500
User programs	min. 500
User sequences	min. 150
Step of setting of values	fine
Encyclopaedia	x
Interconnection with BTL-4000 Topline Puls	x
Language versions	x
Sound schemes	x
Display, diagonal	colour 10.9 cm
Screen saver	x
Colour schemes	x
Recently performed therapies	20
Ultrasound parameters:	
Head of 4 cm ² , 1 and 3 MHz	x
Head of 1 cm ² , 1 and 3 MHz	optional
Detection of contact	continuous
Continuous operation mode	x
Pulse operation mode	x
Duty factor	x

8.4 TABLE OF CONFIGURATIONS OF THE LASER THERAPY DEVICES BTL-4000 TOPLINE LASER

Type:	4110 Topline
Number of laser therapies	1
Patient cardfile (positions)	min. 500
User programs	min. 500
User sequences	min. 150
Step of setting of values	fine
Encyclopaedia	x
Language versions	x
Sound schemes	x
Display, diagonal	colour 10.9 cm
Screen saver	x
Colour schemes	x
Recently performed therapies	20
Laser parameters:	
Max. laser output, 685 nm	50 mW
Max. laser output, 830 nm	400 mW
Continuous operation mode	x
Pulse operation mode	x
Duty factor	x
Nogier frequencies	x

8.5 TABLE OF CONFIGURATIONS OF THE MAGNETOTHERAPY DEVICES BTL-4000 TOPLINE MAGNET

Type:	4920 Topline
Number of magnetotherapies	2
Patient cardfile (positions)	min. 500
User programs	min. 500
User sequences	min. 150
Step of setting of values	fine
Encyclopaedia	x
Language versions	x
Sound schemes	x
Display, diagonal	colour 10.9 cm
Screen saver	x
Colour schemes	x
Recently performed therapies	20
Magnetic parameters:	
Rectangular pulses	x
Rectangular protracted	x
Exponential	x
Triangular	x
Sinusoidal	x
Continuous mag. field	x
Series of pulses	x
Random frequency	x
Modulation	x