EFA
Meat Processing Power
Ein Geschäftsbereich von Schmid & Wezel

MUSCLE ELECTROSTIMULATION DEVICE

IMPULSATOR-2 AAB

service manual

Index number: _____ **TEST v2**

Serial number: _____/____/_____

MAULBRONN, 3ST EDITION, Juny 2022

CAUTION!

This user manual is an integral part of the IMPULSATOR-2 muscle electrostimulation device. It is absolutely necessary to read it carefully before installing, commissioning and using the device.

Please contact us in case of any questions or concerns.

The electrostimulation set comes equipped with:

1. power unit **IMPULSATOR-2** (called the ***device***)
2. crocodile clip (called the ***clip***)
3. conveyor rail cable (called the ***rail cable***)

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It is not permitted to touch animals when impulsator is working and electrified.

It is not permitted to touch any components to which the Impulsator is connected to when the device is working. There is a risk of electric shock.

1. WORK SAFETY AND OPERATING RULES

CAUTION!
Read the entire user manual carefully before using the device.
Failure to comply with the safety rules listed below threatens work safety.

- persons who operate and maintain the device must read this manual or undergo training in operating the device as well as health and safety rules at the given workplace;
- the device cannot be used for purposes other than intended;
- all repairs should be carried out by the authorized service centre. Unauthorized modifications or repairs will void the warranty. The manufacturer is not responsible for damages resulting from malfunction of the device in which unauthorized changes have been made;
- maintenance work should be carried out after disconnecting the device from the mains;
- it is forbidden to use the device with visible defects;
- the device must be connected to the grounded mains;
- it is forbidden for minors or untrained persons to operate the device.

It is forbidden to touch the clip connected to the device

CAUTION!
Wires and sockets of the device must not be exposed to water.
After finishing work, it is absolutely necessary to:
- disconnect the device from the mains;
- disconnect all elements of the system and secure them properly;
- put all covers on the device sockets to protect against moisture;

Failure to follow the above recommendations may damage the device.

2. DESCRIPTION AND ASSESSMENT OF RESIDUAL RISK

2.1. Description of residual risk

Although the manufacturer takes responsibility for the construction and proper marking of the device, in order to eliminate hazards during operation and maintenance, certain risk elements cannot be avoided. Residual risk results from incorrect or improper handling of the device by the operator. The greatest danger occurs when performing the following prohibited actions:

- operating the device without reading the user manual or without training in operating the device as well as health and safety rules at the given workplace;
- using the device for purposes other than intended;
- unauthorized modifications or repairs to the device;
- carrying out maintenance work without disconnecting the device from the mains;
- using the device with visible defects;
- connecting the device to the ungrounded mains;
- operating the device by minors or untrained persons.

It is not permitted to touch animals when impulsator is working and electrified.

It is not permitted to touch any components to which the Impulsator is connected to when the device is working. There is a risk of electric shock.

2.2. Assessment of residual risk

Recommendations to minimize residual risk (for people and the environment) when operating the device:

- carefully reading the user manual and undergoing training in operating the device as well as health and safety rules at the given workplace;
- using the device only for its intended purpose;
- carrying out modifications and repairs only by the authorized service centre;
  - carrying out maintenance work only after disconnecting the device from the mains;
  - checking the technical condition of the device always before operation;
  - connecting the device to the grounded mains;
  - preventing minors or untrained persons from accessing the device.

CAUTION!
Residual risk occurs in case of failure to comply with recommendations and guidelines listed above.

3. INFORMATION AND WARNING SIGNS

3.1 Markings on the housing

IMPULSATOR	
02/IMP/22	
Imput	Output
U=230V 50Hz	Uavg<48V
P<100W	I<1A
I<630mA	IP55

Input
U = 230V (rated voltage)
f = 50Hz (frequency)
P < 100W (maximum power)
I < 630mA (maximum current)

Output
Usvg < 48V (maximum output voltage at default settings)
I < 1A (maximum output current)
IP55

3.2 Warning and information pictograms

	Caution		Any repairs, maintenance or technical service must be performed after disconnecting the device from the mains – pull out the plug from the socket
	Read the user manual		Do not touch! Dangerous voltage

	Must not be used by minors		This device is recyclable. It is subject to the selective collection of electrical and electronic equipment
	Do not connect the device to the mains if the connection or socket is damaged		Do not wash with pressure washers

Table 1 *The meaning of warning and information pictograms*

3.3 Signal lights

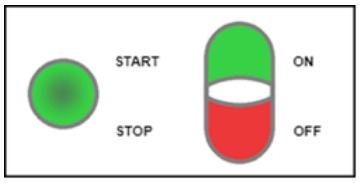
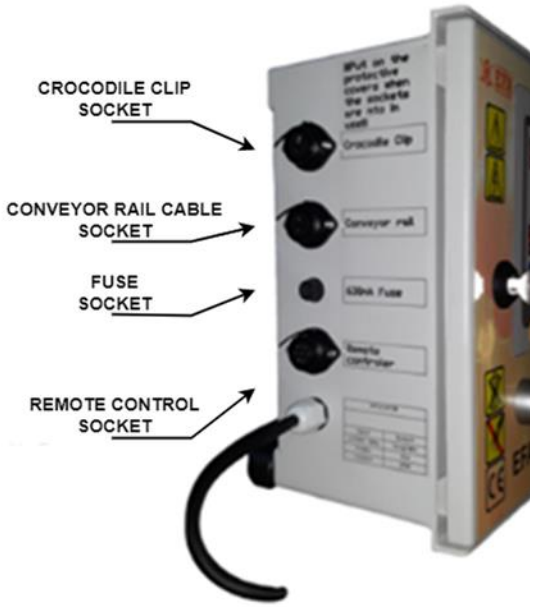


Fig. 2 *Signal lights*

- main switch **ON/OFF** - turns the device on/off
- green button **START/STOP** - starts/stops the electrostimulation process



IMPULSATOR V2_2 SOCKETS

The device's cabinet door is sealed. Breaking the seals will void the warranty

4. DESIGN, TECHNICAL DATA AND PARTS LIST

The power unit is placed in a sealed housing equipped with mounting brackets.

On the side of the device housing there is a socket for connecting the clip.

Detailed technical data and a list of components of the device can be found in:

- **Specification** - ***Appendix 1***;
- **Parameters** - ***Appendix 2***;
- ***Accessories*** - ***Appendix 3***

Fig.2 *Standard connection diagram*

5. INTENDED USE AND OPERATION

The device is intended for muscle electrostimulation in order to improve the quality of meat and its tenderness, and to prevent the consequences of cooling contraction. Electrostimulation - the affection of an electric current on the muscle tissue of the carcass - causes muscle contractions. The biochemical processes taking place in the muscle tissue have a positive effect on the ripening process and the quality of meat.

The device must be used only for its intended purpose

The main controller of the device operates in four modes:

- ***boot mode*** - after turning on. The device checks all settings and prepares for operating;
- ***readiness for operation mode*** - the device has been properly turned on and is ready for use;
- ***electrostimulation mode*** - after pressing the green START button the device automatically starts the electrostimulation process;
- ***programming mode*** - is used to set parameters (general and for selected program). The user can change parameters of the selected program. The method of changing parameters is given in subsection ***8.2***.

The device works according to the selected program containing specific parameters.

The display **[Prog]** shows selected program - it can be changed using the P button.

6. MAIN CONTROLLER

6.1 Control panel - buttons, indicators and displays

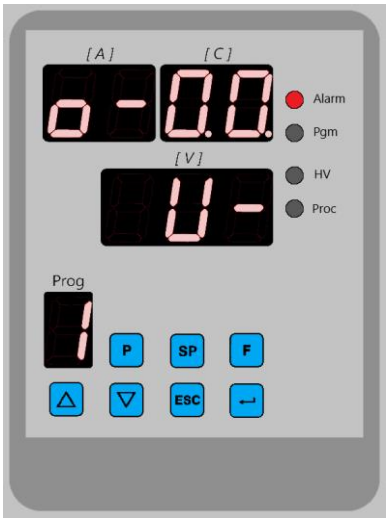


Fig. 3 *Control panel*

Buttons	
△ ▽	switching between parameters / parameter values
↵	enter (confirm)
ESC	escape (exit)
P	switching between programs
SP	service button
F	service button

Signaling indicators		**Displays in readiness for operation and electrostimulation mode**	
[Alarm]	short circuit detected	[Prog]	selected program number
[Pgm]	programming mode	[A]	electrostimulation phase number (**dL1**, **dL2**, **dL3**)
[HV]	inactive	[C]	operation time [s]
[Proc]	high voltage on the clip	[V]	output voltage: **U1** **U2** **U3**

Displays in programming mode	
[A]+[C]	name of the edited parameter
[V]	value of the edited parameter
[Prog]	number of the edited program

Table 2 *Description of the control panel*

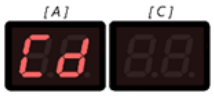
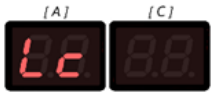
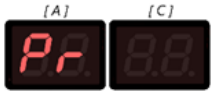
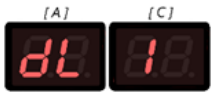
The control panel allows to change following values for individual electrostimulation programs:

- pulse length;

- pulse period;
- voltage [V];
- electrostimulation duration [s].

The control panel also allows you to define new electrostimulation programs.

6.2 Main controller parameters that can be reprogrammed

Parameter available after entering the programming mode	
	Cd - access code, allows access to other parameters
General parameters	
	Lc - allows setting the access code: ● **0** – no access code (all other parameters are visible without entering the access code) ● any value other than **0** activates the **Cd** parameter (entering the other parameters will be possible after entering this value) ● **5** – factory set access code
	Pr - allows to select the electrostimulation program
Parameters of the selected electrostimulation program	
	dELS [s] - electrostimulation start delay
	rEPr - number of repetitions of the electrostimulation cycle after the ***sum of phase durations***. - Number of repetition (0-99). - **On** value loops the electrostimulation cycle into an endless process until ending with **START/STOP** button.
	dL1 [s] - **phase 1** - duration of electrostimulation phase 1 (1 - 30 s). The **On** value loops the dL1 phase
	ti1 [ms] / [s] - duration of a single pulse (1 ms - 6 s): - 1 - 999 ms - the value is displayed in ms and changes every 1 ms - 1.00 s - 6.00 s - the value is displayed in seconds and changes every 10 ms (the dot after the first digit means that the value is displayed in seconds)
	to1 [ms] / [s] - defines the time intervals (1 ms - 6 s) at which the ti pulse should appear: - 1 - 999 ms - the value is displayed in ms and changes every 1 ms - 1.00 s - 6.00 s - the value is displayed in seconds and changes every 10 ms (the dot after the first digit means that the value is displayed in seconds)

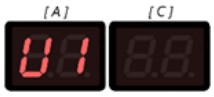
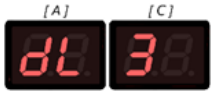
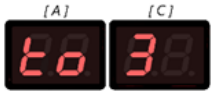
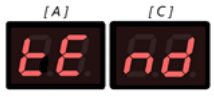
	U1 [V] - voltage of the 1st phase of electrostimulation: **1** - approx. 70V **2** - approx. 85V **3** - approx. 100V these are the maximum values, the average voltage values depend on the parameters **ti** and **to**
	dL2 [s] - **phase 2** - duration of electrostimulation phase 2 (1 - 30 s). The **On** value loops the dL2 phase. Setting dL2 to **0** cancels this phase. The following parameters will then disappear from the menu: ti2; to2; U2
	ti2 [ms] / [s] - duration of a single pulse (1 ms - 6 s): - 1 - 999 ms - the value is displayed in ms and changes every 1 ms - 1.00 s - 6.00 s - the value is displayed in seconds and changes every 10 ms (the dot after the first digit means that the value is displayed in seconds)
	to2 [ms] / [s] - defines the time intervals (1 ms - 6 s) at which the ti pulse should appear: - 1 - 999 ms - the value is displayed in ms and changes every 1 ms - 1.00 s - 6.00 s - the value is displayed in seconds and changes every 10 ms (the dot after the first digit means that the value is displayed in seconds)
	U2 [V] - voltage of the 2nd phase of electrostimulation: **1** - approx. 70V **2** - approx. 85V **3** - approx. 100V. these are the maximum values, the average voltage values depend on the parameters **ti** and **to**
	dL3 [s] - **phase 3** - duration of electrostimulation phase 3 (1 - 30 s). The **On** value loops the dL3 phase. Setting dL3 to **0** cancels this phase. The following parameters will then disappear from the menu: ti3; to3; U3.
	ti3 [ms] / [s] - duration of a single pulse (1 ms - 6 s): - 1 - 999 ms - the value is displayed in ms and changes every 1 ms - 1.00 s - 6.00 s - the value is displayed in seconds and changes every 10 ms (the dot after the first digit means that the value is displayed in seconds)
	to3 [ms] / [s] - defines the time intervals (1 ms - 6 s) at which the ti pulse should appear: - 1 - 999 ms - the value is displayed in ms and changes every 1 ms - 1.00 s - 6.00 s - the value is displayed in seconds and changes every 10 ms (the dot after the first digit means that the value is displayed in seconds)
	U3 [V] - voltage of the 3rd phase of electrostimulation: **1** - approx. 70V **2** - approx. 85V **3** - approx. 100V these are the maximum values, the average voltage values depend on the parameters **ti** and **to**
	tEnd - duration of the length of the acoustic signal indicating the end of the operation process.

Table 3 *Description of the controller parameters that can be reprogrammed*

7. INSTALLING AND TURNING THE DEVICE ON

7.1 Installing the device

CAUTION!
The device should be installed in a room with the lowest possible humidity.
The ON/OFF main switch should always be visible and accessible to the operator.

The device is equipped with an inseparable power cord with a plug that should be connected to a 230 V mains. The mains socket must be protected by a 10 A fuse against short circuit and overload. The cord must not be within reach of animals or be exposed to damage.

7.2 Turning the device on

Turn the device on using the **ON** button on the **ON/OFF** main switch (*Fig. 2*). The white light on the main switch will turn on. The device will automatically enter the *boot mode*:

- display **[V]** will start blinking for about 2 s, indicating the software number;
- for the next 2 s all displays will show **8**.

The device is in *readiness for operation mode*.

7.3 The course of the electrostimulation process

The *length of the stunning process* is determined by the **dL1, dL2** and **dL3** parameters - ***sum of phase durations***. For each of the **dL*** parameters, one of two options can be set:

- time value (from 1 to 30 s);
- **On** value - the phase will be looped (*Diagram 3*) until the electrostimulation process is interrupted (the START button is pressed again).

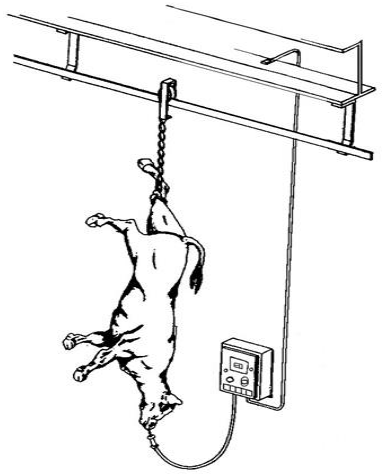


Fig. 4 *Mounting the device and clip*

1. Connect the rail cable to the conveyor rail;
2. Mount the clip according to the diagram shown in *Fig. 4*;
3. After placing the clip on the animal's body, press the green START button (*Fig. 2*) - the device will enter the *electrostimulation mode*. The green light on the START button will turn on:
   - display **[A]** will show the electrostimulation phase number;
   - display **[C]** will show the duration of the electrostimulation;
   - display **[V]** will show the voltage [V] (**U1** - approx.70V; **U2** - approx. 85V; **U3** - approx. 100V) these are the maximum values, the average voltage values depend on the parameters **ti** and **to**;
   - display **[Prog]** will show the program number;
4. After the end of the cycle (after reaching the ***sum of phase durations*** or after pressing the START button again) the device will automatically stop working. The green light on the START button will turn off;
5. Remove the clip from the animal's body and put it in a safe place;
6. After 2 s the device is in *readiness for operation mode* again.

Whenever the device is not used, turn it off using the OFF button on the ON/OFF main switch *(Fig. 2)* **and disconnect it from the mains**

The meaning of t_i and t_o parameters:

- they enable setting the parameters of the pulses generated during each of the 3 phases of the device operation (**dL1**, **dL2**, **dL3**);
- t_o - period duration - determines the time intervals at which the pulses will appear;
- t_i - pulse duration - determines how long the voltage will be applied to the input in the t_o period.

PULSED ELECTROSTIMULATION

To carry out the electrostimulation process with pulses, the pulse duration must be less than the period duration ($t_i < t_o$):

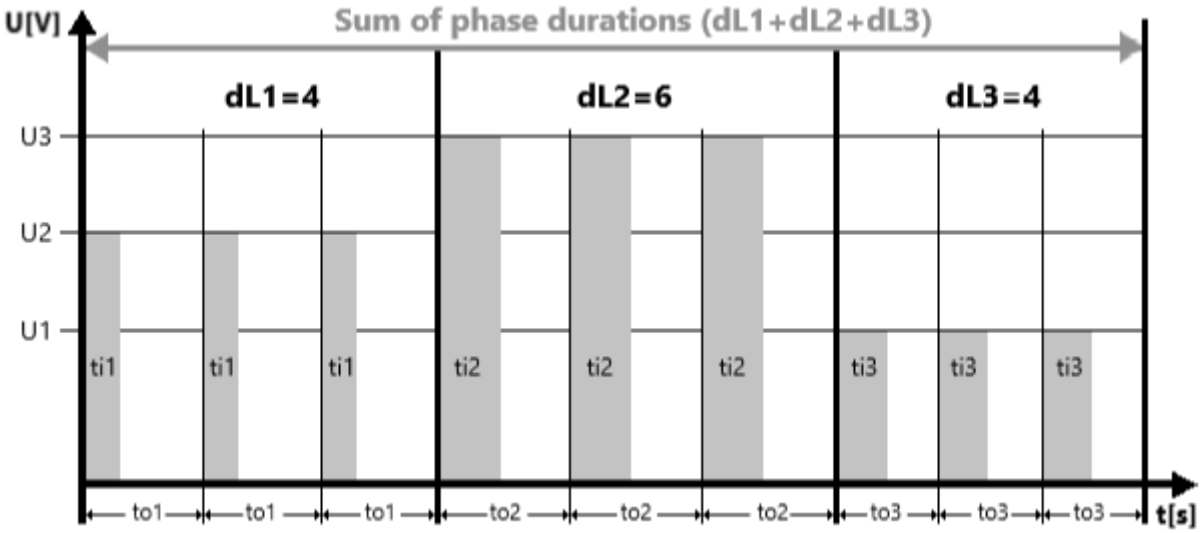


Diagram 1 *The course of the electrostimulation process - pulsing*

CONSTANT ELECTROSTIMULATION

To carry out the constant electrostimulation process, the pulse duration must be equal to or greater than the period duration ($t_i >= t_o$):

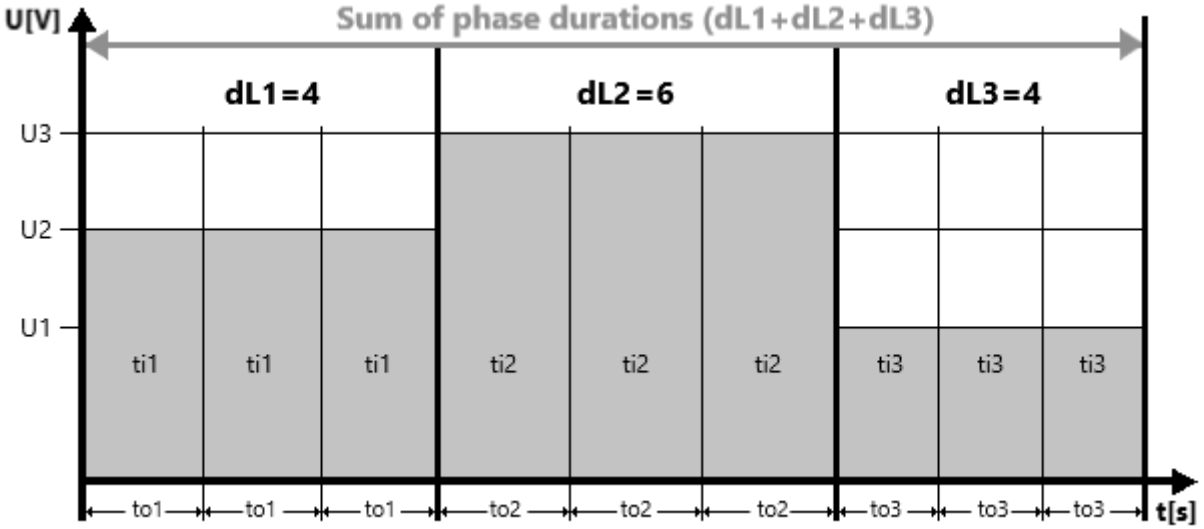


Diagram 2 *The course of the electrostimulation process - constant*

LOOPED ELECTROSTIMULATION

Each phase of the electrostimulation process can be looped by setting the selected **dL*** parameter to **On**. This phase will last until the electrostimulation process is interrupted - the green START button will be pressed again. Phases following the looped phase will be skipped:

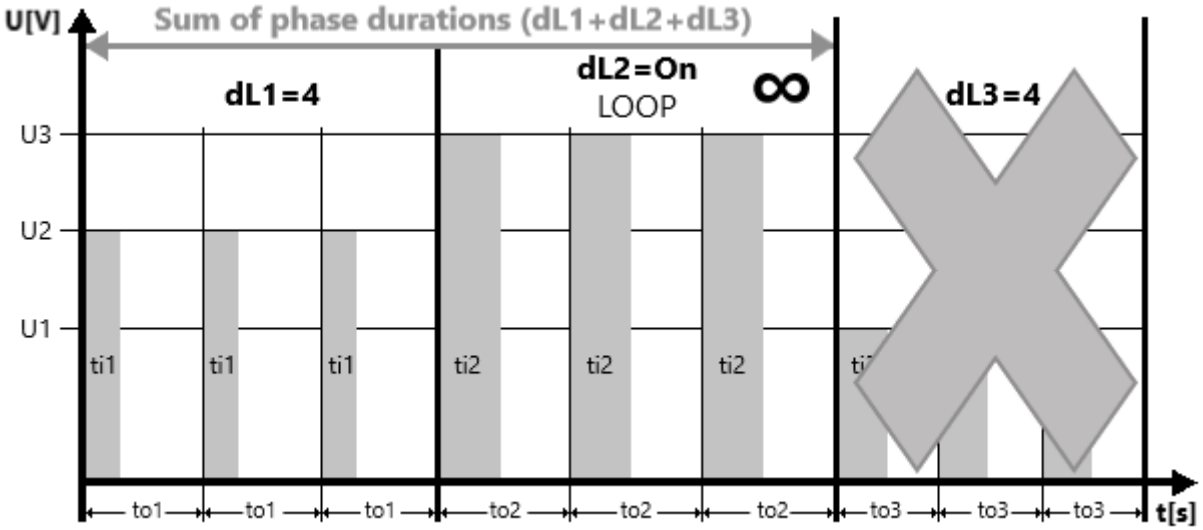


Diagram 3 *The course of the electrostimulation process - looped*

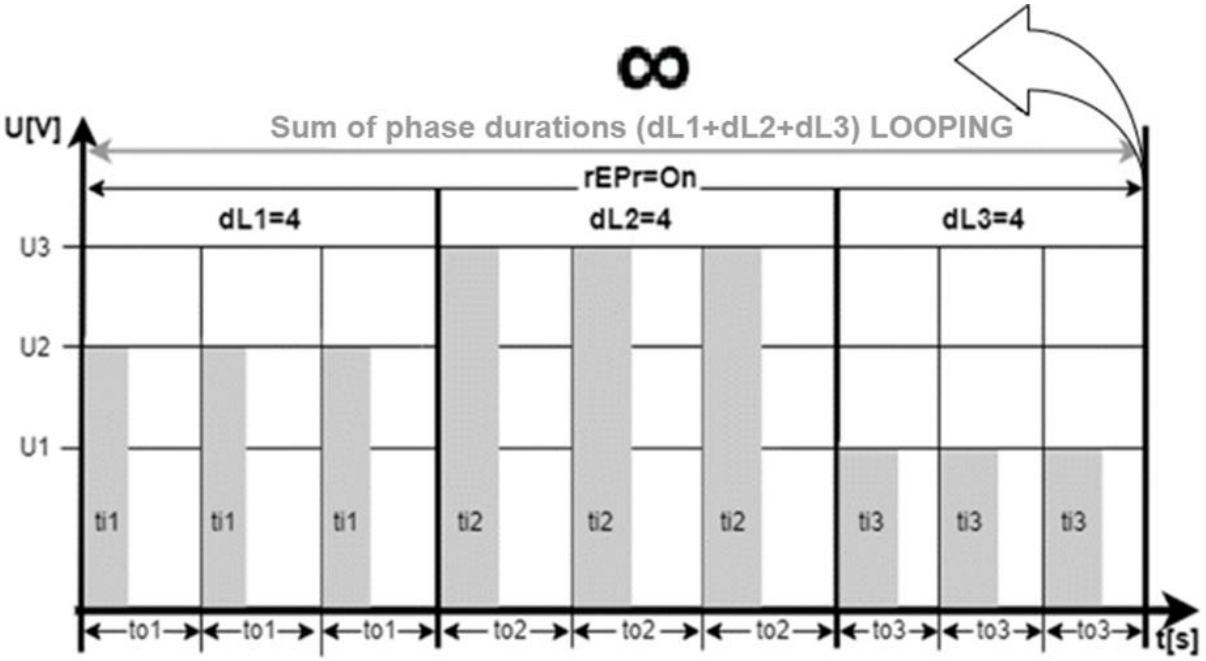


Diagram 4 *The course of the electrostimulation process – infinitely looped*

8. MAIN CONTROLLER OPERATION

8.1 Unlocking parameters

1. To enter the menu press ⟵: the device will enter the *programming mode*
   - the **[Pgm]** (*program*) indicator starts blinking;
   - the display **[A][C]** shows blinking **Cd** letters;
   - the display **[V]** shows **0** value.
2. Confirm by pressing ⟵:
   - the display **[V]** shows blinking **0** value;
3. Using the △▽ buttons select **9** (factory code to unlock other parameters – it can be changed by changing the value of **Lc** parameter).

4. Confirm by pressing ⟵:
   - the **Cd** letters will start blinking again on the display **[A][C]** - it means that the parameters have been unlocked and can be accessed by pressing the △▽ buttons.

8.2 Editing individual parameters

1. Unlock parameters: follow steps listed in subsection ***8.1***.
2. Using the △▽ buttons select the general parameter **Pr** (*Program*):
   - the **Pr** parameter allows you to select the program to be modified.
3. Confirm by pressing ⟵:
   - the value on display **[V]** starts blinking;
4. Using the △▽ buttons select the program to be modified.
5. Confirm by pressing ⟵:
   - the letters on display **[A][C]** start blinking
6. Using the △▽ buttons select the parameter to be modified (list of parameters: ***Table 3*** point ***6.2***).
7. Confirm by pressing ⟵:
   - the value on display **[V]** starts blinking;
8. Using the △▽ buttons select the needed parameter value.
9. Confirm changes by pressing ⟵:
   - the letters on display **[A][C]** start blinking;
   - you can similarly change other parameters starting from step 6.
10. Press ESC to exit the *programming mode*.

9. CLEANING

The device does not require any special maintenance. However, it is necessary to maintain the device in proper technical condition and cleanliness:

- clean it manually taking into account the safety rules of using electrical devices;
- clean the cabinet after each use by wiping with a cloth;
- do not use any detergents;
- always clean the clip thoroughly after work;
- keep the teeth of the clip sharp.

CAUTION!
Do not wash the device with pressure washers.
The device should be protected against moisture and excessive dust.
Always disconnect the device from the mains during cleaning and maintenance.

10. MAINTENANCE, REPAIRS AND DISPOSAL

10.1 Maintenance

The purpose of the maintenance is to keep the device in a state of full technical efficiency. The scope of maintenance activities should comply with guidelines stated below:

- ***Daily maintenance*** – before and after operation:
  - consists in constant monitoring of the technical condition of individual assemblies and parts that impact work safety.
- ***Periodic maintenance***:
  - determining the technical condition of the device;
  - determining the degree of wear of individual assemblies and parts of the device;
  - removal of possible faults and damages.

CAUTION!
It is necessary to calibrate the device at an authorized service center once a year (***Regulation 1099/2009***).
Before shipping, clean the device and properly protect it against any damage in transit.
The service center issues a document confirming that the device has been calibrated and works properly.

10.2 Repairs

- If the device malfunctions, report the defect to the authorized service centre;
- In case of repairs and inspections in unauthorized service centres, the manufacturer is not responsible for the technical condition of the device and its proper functioning;
- In case of any maintenance or repairs of the device, it must be disconnected from the power source.

10.3 Disposal

CAUTION!
The device must be disposed of in an electrical and electronic device recycling plant.

Disposal of the device:

- the crossed-out wheeled bin symbol (placed on the device) indicates that it is strictly forbidden to place the device in a mixed waste container;
- the device was made of materials suitable for secondary raw materials;
- the device is marked as compliant with Directive 2012/19 / EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE);
- correct disposal of the device may contribute to reducing the negative impact on the

natural environment and human health;
- the device must be disposed of in accordance with local regulations regarding the disposal of electrical and electronic waste, at an appropriate collection point;
- it is forbidden to leave the device unattended, because it can be a threat to the natural environment and human health.

Disposal of the packaging:
The device packaging was made of recyclable materials. Individual packaging elements must be disposed of responsibly and in accordance with waste management regulations.

Packaging marked with this symbol should be placed in the blue container (PAPER).

Packaging marked with this symbol should be placed in the yellow container (METAL, PLASTIC MATERIALS).

FOR THE USER

Please read carefully the content of the warranty card and strictly adhere to the terms contained in it, and follow the general rules given in the user manual of the device.

The manufacturer is not responsible for the technical condition of the device, the clip and the rail cable, as well as for their safe functioning when carrying out unauthorized repairs, technical inspections or calibrations.

DECLARATION OF CONFORMITY

We, the Manufacturer: P.P.U.H. KOMA Sp. z o.o.
Address: Słone, ul. Księżycowa 38, 66-008 Świdnica

DECLARE WITH FULL RESPONSIBILITY, that:

Product: **Muscle electrostimulation device Impulsator -2 v2**

Serial number: ……..…/……..…/…..……

Year of manufacture: ……..…….

to which this declaration relates, is in accordance with the provisions of:

Directive 2006/95/EC on Requirements for electrical equipment implemented by the Regulation of the Minister of Economy dated 21 August 2007 on essential requirements for electrical equipment (Polish Journal of Laws No. 155 dated 2007, pos. 1089),
and in particular with the requirements of standards harmonized with the above Directive:

PN-EN 60335-1:2012+A11:2014+**A1:2019-10+A2:2019-11+A14: 2020-05**	Household and similar electrical appliances - Safety - Part 1: General requirements Safety of use - Part 1: General requirements
PN-EN 60335-2-87:2004+A1:2007+A2:2019-10	Household and similar electrical appliances - Safety - Part 2-87: Particular requirements for electric animal stunning equipment.

At the same time we declare compliance with the requirements of the following legal acts:

- Council Regulation (EC) No 1099/2009 of 24 September 2009 on the protection of animals at the time of killing (***Regulation 1099/2009***);
- FSIS Directive 6900.2 of 15 August 2011 - "Humane Handling and Slaughter of Livestock" (***FSIS Directive***).

This Declaration of Conformity applies to the power unit **Muscle electrostimulation device Impulsator -2 v2**
The Declaration of Conformity loses its validity if the product is changed, rebuilt or used in a manner not intended for its use.

Chairman Anna Zaborowska-Łebek

Wilkanowo 10.01.2022.

This device is recyclable. It is subject to the selective collection of electrical and electronic equipment.

Meat Processing Power

Ein Geschäftsbereich von Schmid & Wezel

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