DRAMIŃSKI
TECHNOLOGY

4Vet Slim

Diagnostic ultrasound scanner with a touch panel

Instructions for Use (IFU)

CE

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We wish the users of this product lot of success in taking care of your patients and we are sure that using our product you will provide good service to your patients.

All possible comments and notes of your customers concerning the device and this user manual will be accepted by DRAMINSKI Company with necessary attention.

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1. Introduction

1.1. Information about user manual

Individual chapters of the manual describe the construction, all accessories used during normal use of the device, preparation for work as well as the functions and operation of the ultrasound scanner.

In no way this manual will substitute even a basic ultrasonography course. It is recommended that the user of the device receive appropriate training during authorised ultrasonography courses.

1.2. Warnings and comments used in this user manual

Due to the need of emphasizing important content in this manual, the following ways of highlighting are used:

Warning! - when it is necessary to draw special attention due to safety of the patient or the user of the device.

Attention! - when it is necessary to draw attention due to protection of the device against damage or due to its proper operation.
Bold text - to draw attention to more important parts in the manual or to make them more distinct or visible.
Descriptions of the schemes and figures - to make recognition of some details easier.

Symbols used in the user manual do not fully inform about the safety instructions and that is why it is important to read the instructions (Chapter 2) and follow them!

Symbols used in the manual:
[text] – means name of a button
<x.x.x**>** - link to Chapter x.x.x

1.3. Brief information on ultrasound examination

Ultrasound devices are widely used in medicine. Particularly useful and commonly used is the method of real-time imaging which enables two-dimension graphic presentation of a tissue cross-section in the 256 grey-scale, the so called B-Mode (Brightness Mode). Additionally, coloured Doppler ultrasonography used to evaluate the vascular flows is becoming more and more significant.

Diagnostic effectiveness of ultrasonography is considered to be high, but effects of working with this method are significantly impacted by the quality of the device, individual experience, the user's individual knowledge, as well as observing the ultrasound scanning standards and familiarization with the user manual.

1.4. Basic information about the ultrasound scanner

DRAMIŃSKI 4Vet Slim is a modern device which can be powered from a battery pack or directly from the power grid 110-230 V. The ultrasound scanner operates on the bases of a small-size computer system. The special features of the device are: function control via the touch panel, small size and weight as well as a strong aluminium casing which hides technically advanced electronics which guarantees top quality imaging.

DRAMIŃSKI 4Vet Slim is a unique diagnostic device. Its small size and an additional battery power supply make this ultrasound scanner a modern and ergonomic working tool. It can be used as a desktop or portable device. It has a flat high quality LCD LED monitor which guarantees bright imaging of high resolution, which makes the work easier in almost any conditions.

DRAMIŃSKI 4Vet Slim is an ultrasound scanner designed for diagnostic purposes, to monitor the progression of the disease and to evaluate the physiological condition of the organs. It may be used for:

- examination of abdominal cavity organs,
- gynecological and obstetrical diagnostics,
- vascular flow imaging,
- examination of musculoskeletal system,
- examination of lungs,
- examination of heart.

The user has a black-and-white mode of real-time examination and a mode using the function of the Color Doppler.

2. User's safety

Warning! - The user's and the patient's safety depends on observing the below mentioned instructions!

1. DRAMIŃSKI 4Vet Slim is a device which has to be used for diagnostic purposes only by highly trained personnel – doctors proficient in ultrasound diagnostics.
2. It is necessary to disinfect the probe before each use. Other elements of the ultrasound scanner should be disinfected in reasonable situations as they can have a contact with infectious substances.
3. It is not acceptable to use the ultrasound scanner with high frequency (HF) devices at the same time.
4. The ultrasound scanner cannot be used for trans-thoracic echocardiography (TTE) examinations.
5. In the places where explosive and anesthetic gases are used the use of the ultrasound scanner is prohibited for safety reasons.
6. The device is suitable indoor use.
7. It is recommended the user of the ultrasound scanner perform regular technical inspections every two years at the manufacturer's facility or approved service point. It will guarantee the highest level of safety of the patients.
8. It is forbidden to carry out ultrasound diagnostics when carrying out de-fibrillation.
9. It is forbidden to dismantle the device, repair and adjust it yourself except for the procedures stated in this manual.
10. It is recommended the users of ultrasound scanner check periodically the head cable and the connector in the view of mechanical damages.
11. If mechanical damages of the head, cable or connector are noticed it is necessary to send the device to have it serviced.
12. Even though the ultrasound scanner has a strong construction in order to avoid mechanical damages it is recommended to follow the instructions presented in this manual.
13. Exposing this device to strong solar radiation should be avoided, the temperature range recommended on the labels of the device and its parts should be observed instead.
14. It is forbidden to modify the device by the user.
15. DRAMIŃSKI 4Vet Slim is an electric device which can be a source of electromagnetic radiation. Other electric devices can interfere with its work, which is why it is recommended to limit the number of other electric devices working nearby.
16. When its service life expires in order to avoid risk to the environment, the device and the accessories should be disposed of by specially trained units according to the applicable regulations or sent back to the manufacturer.
17. During the examination the device cannot be connected to the ETHERNET (via LAN).
18. It is recommended to connect external monitors and printers meeting the medical requirements.
19. In order to avoid electric shock the device should be connected to a grounded outlet.

3. The list of DRAMIŃSKI 4Vet Slim elements and equipment

#	Name and description	Quantity
1	Ultrasound scanner DRAMINSKI 4Vet Slim	1
2	Ultrasound probe – one of the compatible probes, as ordered	1
3	DRAMINSKI battery pack	1
4	Battery charger	1
5	AC adapter	1
6	Battery stand	1
7	User manual and warranty card	1
8	Transport case	1
9	Stand on wheels	optional
10	Thermal printer	optional
11	External monitor	optional

4. Construction of DRAMIŃSKI 4Vet Slim ultrasound scanner

The device comprises several main elements:

1. Body of scanner
2. Ultrasound probe
3. AC adapter
4. Table stand

4.1. The casing

The casing is made of high quality aluminum.

At the front side there is a high quality LCD LED monitor, diagonal 10.4 inches. The monitor is characterized with wide view angles and resolution which guarantees high quality ultrasound imaging. It has a touch panel to control the functions of the scanner.

The functions and the buttons on the user panel and their descriptions are presented in the further part of the manual.

At the back side of the casing there is a socket to connect the probes, loudspeaker and the system of fixing the battery pack. There are inlets and outlets of the active ventilation system essential for proper and prolonged functioning of the device.

On the sides of the casing there is a mechanical lock of the probe, a On/Off button, a power supply socket, and a set of multimedia connectors (2xUSB 3.0, LAN and Digital Port) protected by a cover.

Attention!

The ultrasound scanner has a strong construction, however it should be operated and transported with due care in order not to expose the device to strong impacts to avoid potential damage.

The ventilation holes should be protected against penetration of foreign matter.

Elements of the casing

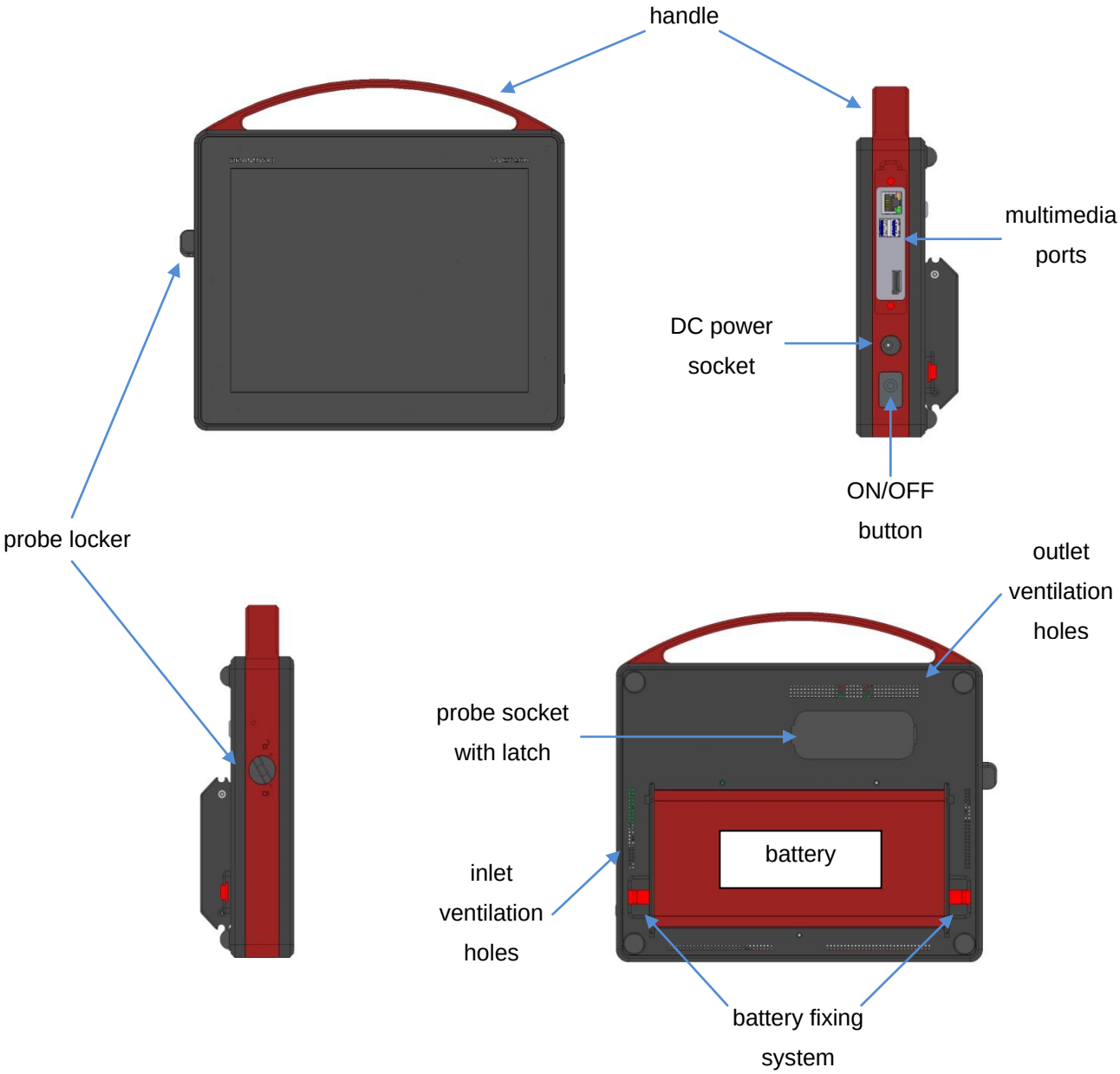


Fig. 1 Casing elements.

Attention!

The ultrasound scanner can be connected to a printer and a monitor meeting specific requirements and having relevant medical certificates.

Warning!

For safety reasons external devices should not be connected to the ultrasound scanner when examination is in progress.
During the examination the ultrasound scanner must not be connected to the ETHERNET network via LAN.

4.2. Ultrasound probe.

The DRAMIŃSKI 4Vet Slim ultrasound scanner can cooperate with different types of electronic probes. The basic types of probes most often used in diagnostic practice are as follows:

1. CONVEX 2-5 MHZ 50R (SH C2-5/60R)
2. CONVEX 2-8 MHZ 50R (SH C2-8/50R)
3. LINEAR 6-14 MHZ 40MM (AL L6-14/40)
4. LINEAR ENDORECTAL 4-9 MHZ 60MM (R A7.0-12860S)
5. MICROCONVEX 4-9 MHz 15R (SH C6.5-128R15S)
6. BACKFAT 3,7 MHz 180MM (SH L3,7-128180)

Protection levels for the probes:
- IPX1 for socket, cable and housing,
- IPX7 for head of the probe.

Attention!

It is possible to use other types of electronic probes. Users interested in other types of ultrasound probes should contact the manufacturer of the DRAMIŃSKI 4Vet Slim ultrasound scanner.

4.3. DRAMIŃSKI battery pack

These are Li-Ion type batteries. They are equipped in a thermal cut-off which protects against overheating while charging. In the pack casing, there are two sockets. One is used for connecting the batteries to the device; the other is used for connecting a charger cable.

The batteries are expected to last for about 500 charging cycles. Due to the use of high capacity batteries, it is possible to work up to 4 hours with one battery. For charging the batteries there is a specially adapted charger with the parameters guaranteeing correct charging of the pack. The charging time of the pack is about 3 hours. The details how to charge and use the batteries are described further in the manual.

4.4. Battery charger

Fig. 5 Battery charger

Attention! The charger is an independent device used **to charge the batteries**. It is not used to supply power to the DRAMINSKI 4Vet Slim device from the outlet.

Attention! To charge the pack, use only the original charger delivered with the ultrasound scanner (*Type: 2440 LI*). The plug of the charger is compatible with the socket at the battery set and cannot be connected to the power socket.

4.5. AC adapter

The adapter is used to power the DRAMINSKI 4Vet Slim device only. The parameters of the adapter guarantee safe operation for the user, the patient and for the device itself.

Fig. 6 AC adapter
XP Power - Model AFM60US 18

Input: 100-240V/ 50-60Hz max 1.5 A
Output: 18.0V, 3.34A

Warning!
The device can be powered from the mains only by using attached certified adapter. The use of another adapter can cause damage to the user and can permanently damage the device.

All service repairs must be performed with the power off.
If there is necessary to interrupt the work of the device the power ON/OFF button should be pressed or the adapter cable should be plugged out.

Warning!

In order to avoid electric shock the device should be connected to the grounded mains.

5. Technical data:

Use	ultrasound scanning diagnostics
Imaging modes	B B+B 4B M B+M Color Doppler Power Doppler Pulse Wave Doppler
Frequency	2-14 MHz (depends on probe)
Dynamic focus	yes
Image managing	Freeze Zoom 60 - 300% of the initial image, 20%/step Full screen Saving of images and cine loops (256 frames)
Presets	Needle visualization enhancement; Uterus Mare I, II and III, Mare Pregnancy, Equine tendons, Abdominal Cat, Abdominal Small Dog, Abdominal Medium Dog, Abdominal Large Dog
Grayscale	256 shades of gray
Postprocessing	Yes, On/Off
User interface	Languages: Arabic, Croatian, English, French, German, Korean, Polish, Russian, Spanish;
Image adjustments	Gain 1, Gain 2, Frequency, Depth, Focus, Zoom, Gamma, Invert
Measurements	Basic: Area, Distance, Ellipse, Grid, Stenosis, Volume Obstetric package: aging tables for different species
System	Integrated with PC
Monitor	LCD LED display, diagonal 10,4” , 1000cd/m^2
Functions control	capacitive touch panel

Images and cine loops memory	100 GB images and cine loops with description, patient data and date
Data transfer standard	DICOM 3.0
Data export to external storage media	via USB
External ports	2 x USB 3.0, 1 x LAN, 1 x DP
Power supply	1. AC adapter input : 100-240V AC , 50-60Hz, max 1.5A; output: 18V DC / 3.34A 2. Li-Ion battery pack, 14.4V, 10Ah
Continuous work on battery power supply	up to 4 hours
Battery pack charging time	about 3 hours (charger type: 2440 LI)
Low battery indicator	low battery graphic indicator
Boot up time	Approx. 25s. (cold start)
Housing	Metal: duralumin
External dimensions	width 26,1 cm, height 25.0 cm, depth 5,5 cm
Weight	2,8 kg without probe and battery pack
Battery pack weight	Approx. 780 g
Working temperature	-15 °C to +45 °C
Storage temperature	0 °C to 45 °C
Power consumption	about 2.2 A
Accessories	Wheel stand with height and angle regulation

6. Preliminary starting procedure

Attention!

Function control of the ultrasound scanner is performed via the touch panel. Turning ON and OFF is carried out with the help of the button on the right side of the device.

6.1. General principles of using the touch panel

1. Capacitive touch panel can be operated by a hand in a glove.

2. The panel should be wet-cleaned and disinfected with the help of special sprays or foams.
3. Dry-cleaning of the panel is recommended with the help of soft dusters.
4. Thorough cleaning of the panel should be carried out when the device is switched off.

6.2. Connecting battery pack

Battery pack can be connected to the device using mounting system on the back of the device (see below).

Fig. 7 Battery connecting diagram

1. Fit the upper side of battery to the row in the back side of the scanner
2. Push the lower part of the battery towards the scanner until you hear “click”.
3. Make sure that battery is connected properly.

6.3. Table stand installation on the 1 battery pack

Connect battery pack to the device. Slide the table stand on the battery in the direction indicated by the arrows on the stand. 2

6.4. Connecting the probe.

Attention!

The probe connector is a technologically advanced mechanism. It should be protected against mechanical damage, dirt and moisture. The probe cable should be protected from excessive loads, strong and repeated bending and shaking.

After fitting the probe connector tightly in the socket, adjust the lock to prevent the probe from being released and ensure that the probe connector fits fully and properly in the socket.

The DRAMIŃSKI 4Vet Slim ultrasound scanner is equipped with one port for connecting the probes. In order to replace the probe, you should not switch off the device; you should just turn the connector lock which is on the side wall of the casing. Then pull out the probe connector, plug in a new one and then re-lock the connector to prevent the probe from being released from the socket. When this operation is being performed the screen will show the following messages:

„Probe OFF" – probe is unlocked (the lock is released**,** the switch is in the horizontal position)
and
„Probe ON" – **probe is locked** (the lock is engaged, the switch is in the vertical position)

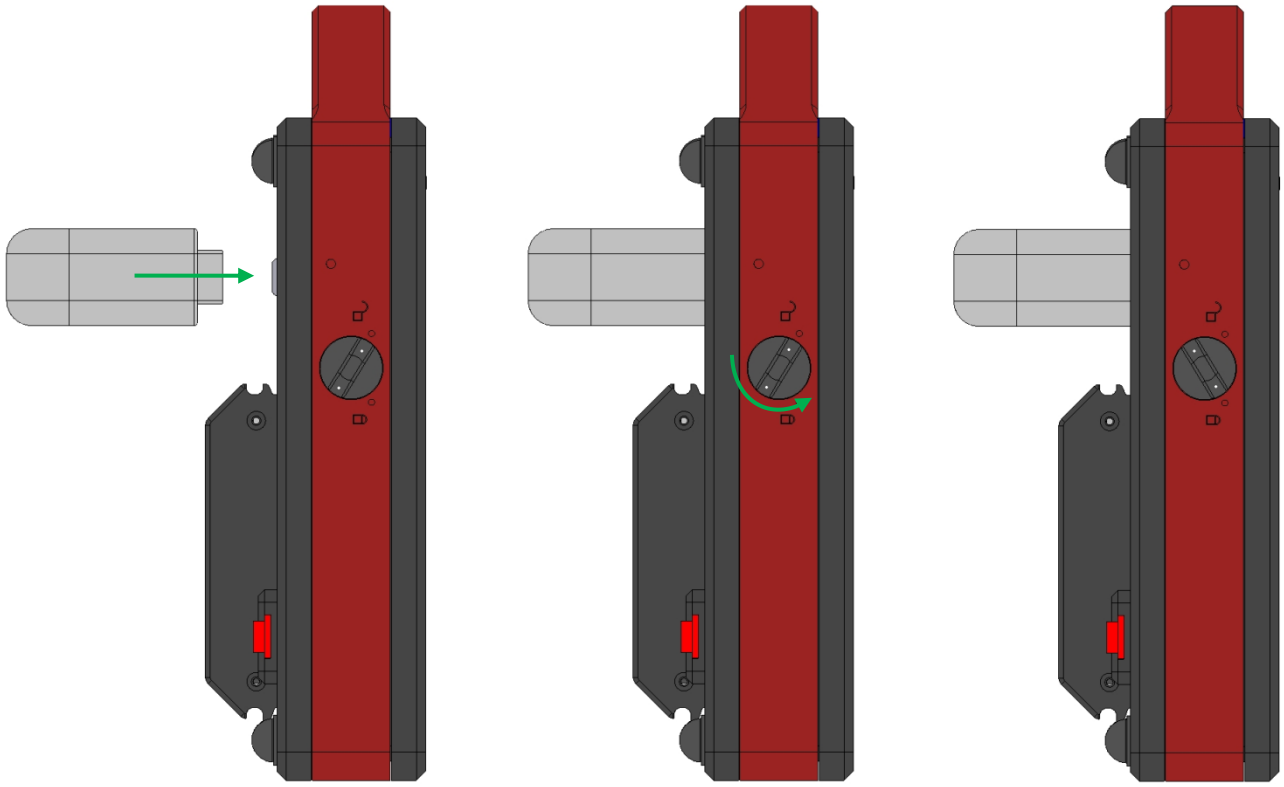


Fig. 8 Connecting the probe

Warning!

Regarding the complicated construction of probes it is necessary to treat them with due caution and protect against falls or damage. The active surface (the front of the probe) should be protected against mechanical damage, for example, avoid scratches.

The probe is the element of the ultrasound scanner which should be disinfected before each use.

6.5. Starting the device using the mains supply.

1. Connect the adapter to the 110-230 V / 50-60 Hz grounded outlet
2. Connect the adapter's connector to the socket on the device casing
3. Switch on the device pressing the power button ⏻ which is on the right side of the casing
4. Wait while the system of the ultrasound scanner uploads and the user panel appears on the screen
5. Check if the connected probe is adequate with the symbol appearing on the screen (Fig. 11, no 9) and check if there is a response when you touch the head of the probe.

6.6. Starting the device using battery power supply

1. Connect and lock the battery back at the back side of the casing < 6.4. >.
2. Switch on the device pressing the power button ⏻ which is on the right side of the casing
3. Wait while the system of the ultrasound scanner uploads and the user panel appears on the screen
4. Check if the connected probe is adequate with the symbol appearing on the screen (Fig. 11, no 9) and check if there is a response when you touch the head of the probe.

Attention! The battery supply is cut off automatically when the mains power supply is connected to the device.

6.7. Finishing work

In order to finish work press the power button ⏻. When the monitor blanks out it is necessary to carry out cleaning and disinfection of the device according to the recommendations given in the part "Maintenance of the device" (Chapter 12).

If you would like to stop the device working immediately press the power button ⏻ .

To protect the probe against damages it should preserved from falling on the floor.

6.8. Transportation of the device

The aluminum casing of the device is very strong. However, when transporting the device it is necessary to handle it with due care; especially protect the ultrasound head against falling on the ground.
The shipment of the device should be prioritized by thorough protection of the device and its accessories against damage by proper packing of particular elements.
The ultrasound head and the monitor with the touch panel require special protection.

7. Preparation to perform ultrasound examination

Before starting work it is necessary to prepare the device and the accessories:

1. Switch on the power and check if the indicator does not show low battery state (in the case of battery power supply).
2. Prepare the patient's skin in the zone of the carried out diagnostics. It is recommended to cut hair and wipe the skin with a disinfectant – it will guarantee antiseptic conditions and degrease the skin.
3. To carry out the test it is necessary to use special gel – it is recommended to use certified gels used for ultrasound examinations. Put the gel on patient's skin.

Warning! – The use of other substances can be dangerous for the patient and may cause adverse effects. It can also have a negative impact on the elements of the head. Good gelling will definitely increase penetration of the signals and will allow obtaining correct and more legible images.

4. During the examination the below described buttons on the user panel are used to set the best working parameters in particular conditions.
   In order to limit the impact of the acoustic energy emitted by the ultrasound head on the operator and on the patient, recommended standards of ultrasound tests should be followed.

Attention!
Even though ultrasound diagnostics is thought to be a safe means of imaging a harmful level of the working parameters should be avoided. Exceeding the margin of safety can present risk for the operator and the patient.
The device has the ranges of the parameters regulation limited by the manufacturer in order to guarantee safety of the user and the patient.

5. Examinations should be performed by qualified and specially trained personnel. It is recommended that the user of the device take part in advanced and specialized courses. Having read the user manual is not enough to diagnose correctly.

8. Description of the user panel and available functions

8.1. Basic panel (B, B+B, B+M modes)

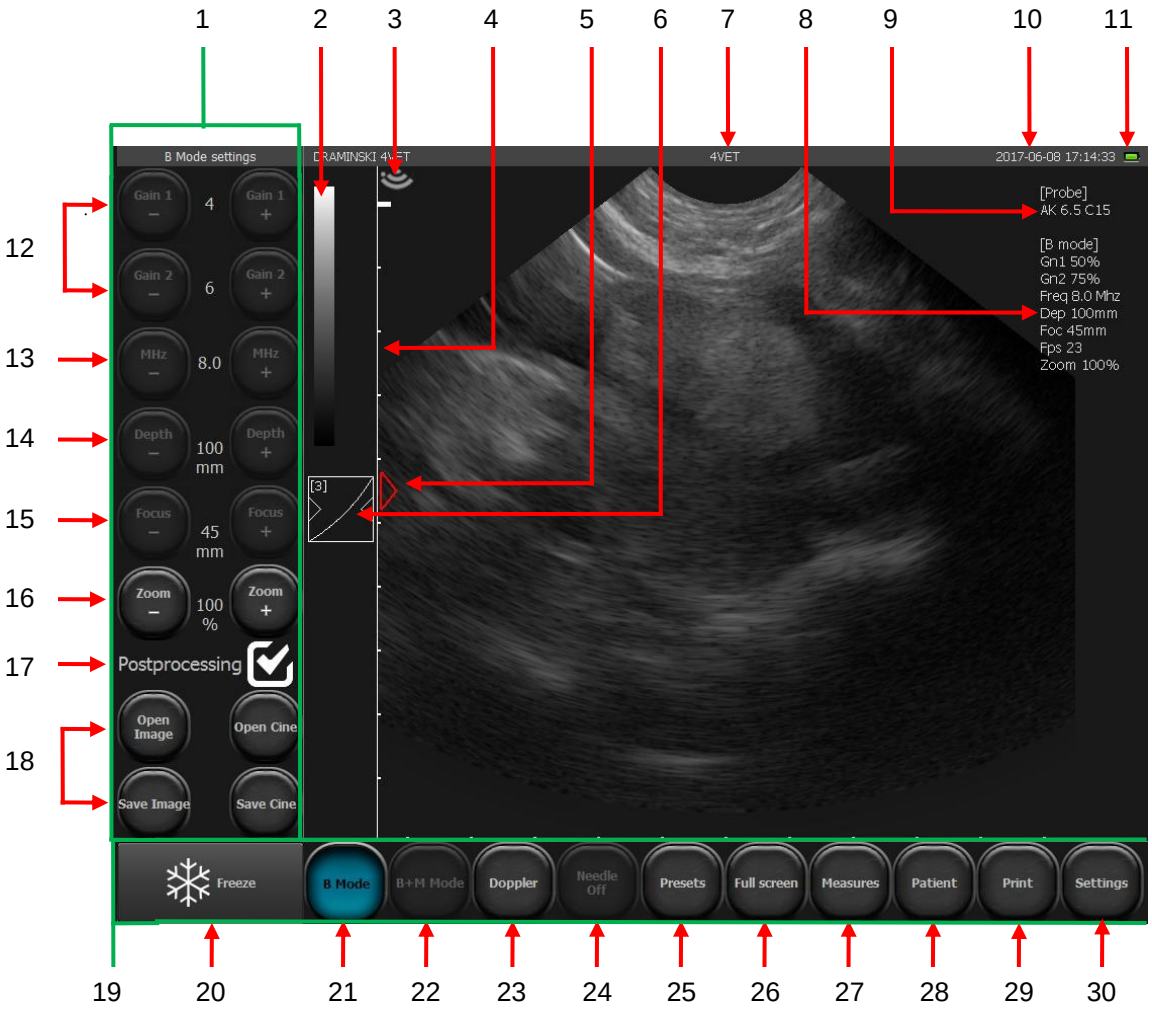


Fig. 11 Elements of the basic panel

1. Tools panel
2. Indicator of the grey scale / change negative image - positive image
3. Indicator responsive to the marker on the probe
4. Ruler
5. Focus level indicator
6. Gamma setting button
7. Name of clinic or user / currently used preset

8. List of current parameters of operation
9. Symbol of the used probe
10. Date and time
11. Battery level indicator
12. Gain regulation: [Gain 1] - near field gain; [Gain 2] - far field gain
13. Probe frequency adjustment
14. Scanning depth adjustment
15. Focus level adjustment
16. Zoom level adjustment
17. Post-processing ON / OFF
18. Loading and saving the images and cine loops
19. Imaging modes panel
20. Freeze button (freeze / unfreeze image
21. Selection of the imaging mode: B, B+B, 4B
22. Selection of the imaging mode: M, B+M
23. Selection of the imaging mode: Doppler
24. Needle echo enhancement function
25. Presets
26. Full screen mode
27. Measurements menu
28. Function of entering the patient's data before the examination
29. Image printing
30. System settings

8.2. Active fields

Active fields are zones in the image which serve to change some parameters skipping the buttons on the tools panel.

In the image sector there are four periphery active zones which are used to change:

- near field gain,
- far field gain,
- focus level,
- range of scanning.

The fifth central active field enables moving the image in the zoom mode.

In B+B and 4B modes active fields are placed alike in each separate window.

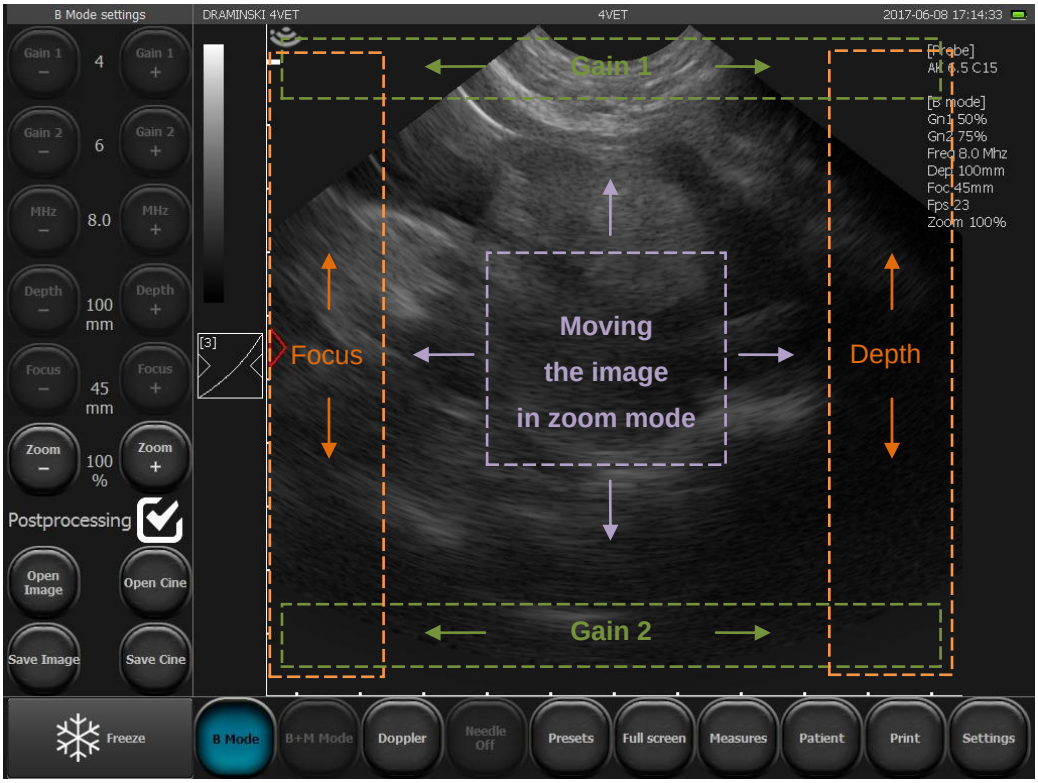


Fig. 12 Active fields.

8.3. Panel in Color Doppler mode

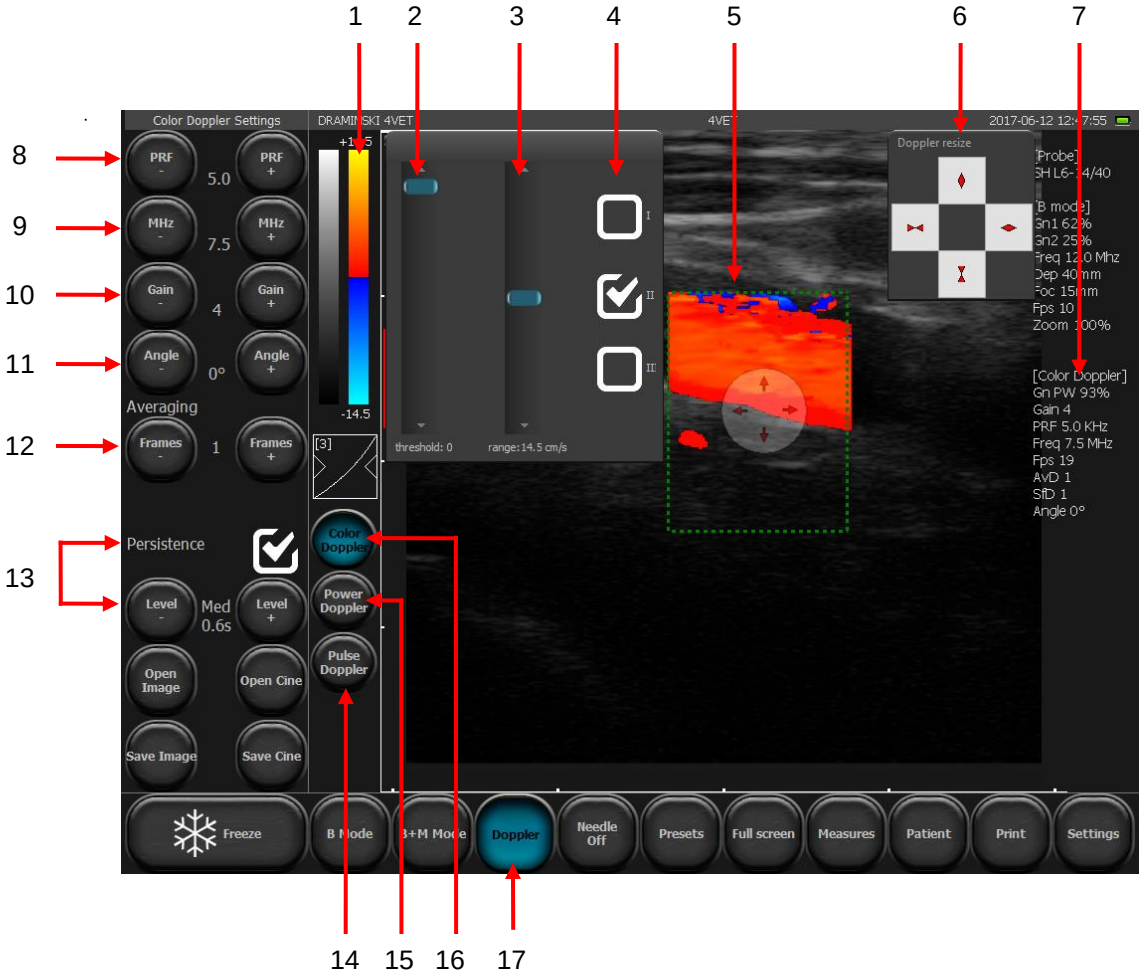


Fig. 13 Elements of the user panel in Color Doppler Mode

1. Color scale indicator / inverting the colors / displaying the tools Chromatic threshold and Chromatic range
2. Setting the chromatic threshold
3. Setting the chromatic range
4. Setting the color map
5. Doppler frame
6. Setting the frame size panel
7. Current parameters for Doppler mode
8. Setting the level of frequency of the emitted signals (PRF - Pulse Repetition Frequency)
9. Setting the level of frequency of Doppler signal
10. Setting the level of amplifying Doppler signal (Color Gain)
11. Tilt angle of the frame (option visible only for linear probes)
12. Adjustment of the frames for Doppler signal
13. Persistence - ON/OFF and level adjustment

14. Switching on Pulse Wave Doppler mode (Pulse Doppler / Spectral Doppler)
15. Switching on Power Doppler mode
16. Switching on Color Doppler mode
17. Switching Doppler mode on and off

Other buttons and information displayed on the screen are the same as for mode B.

8.4. Power Doppler mode panel

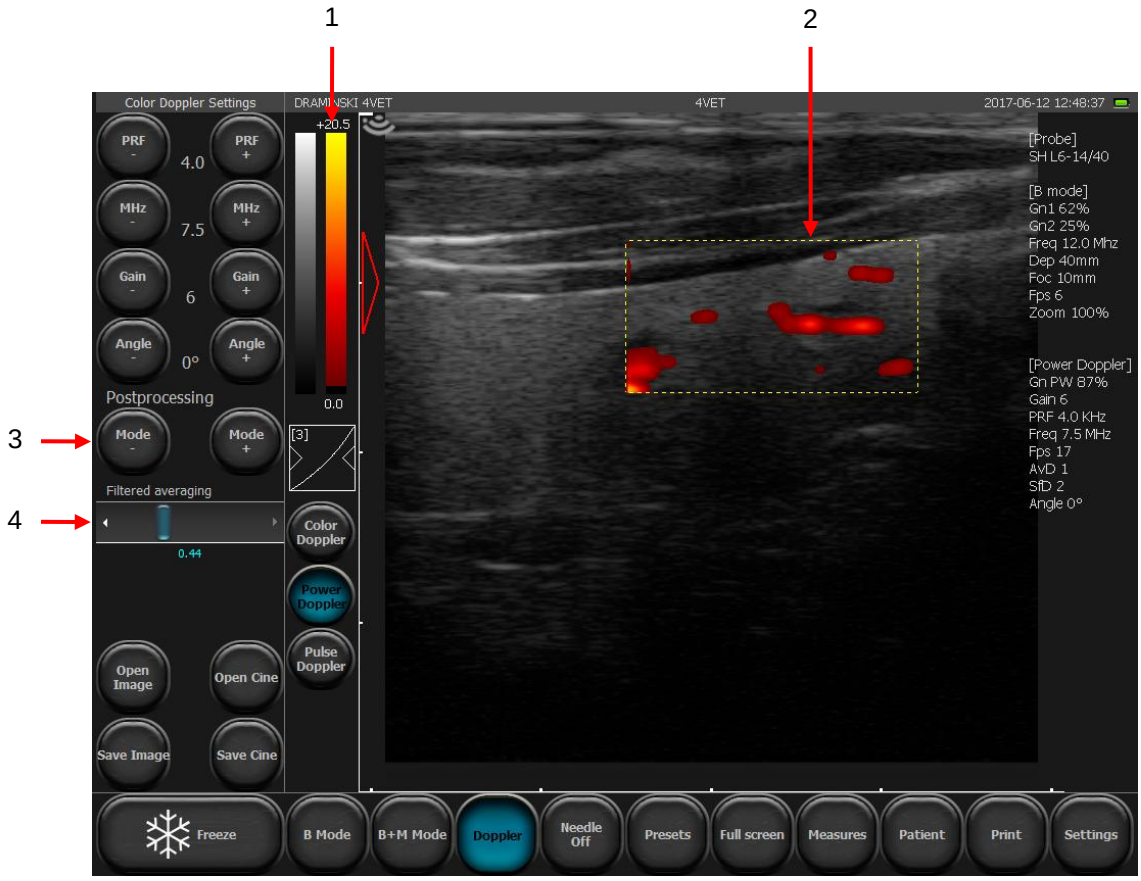


Fig. 14 Elements of the user panel in Power Doppler mode

1. Color scale / chromatic threshold / chromatic range
2. Doppler frame
3. Switching on/off of the image post-processing in the Power Doppler mode
4. Slider to adjust the level of averaging frames for Power Doppler mode

Other buttons and information displayed on the screen are the same as for Color Doppler mode.

8.5. Pulse Wave Doppler mode panel

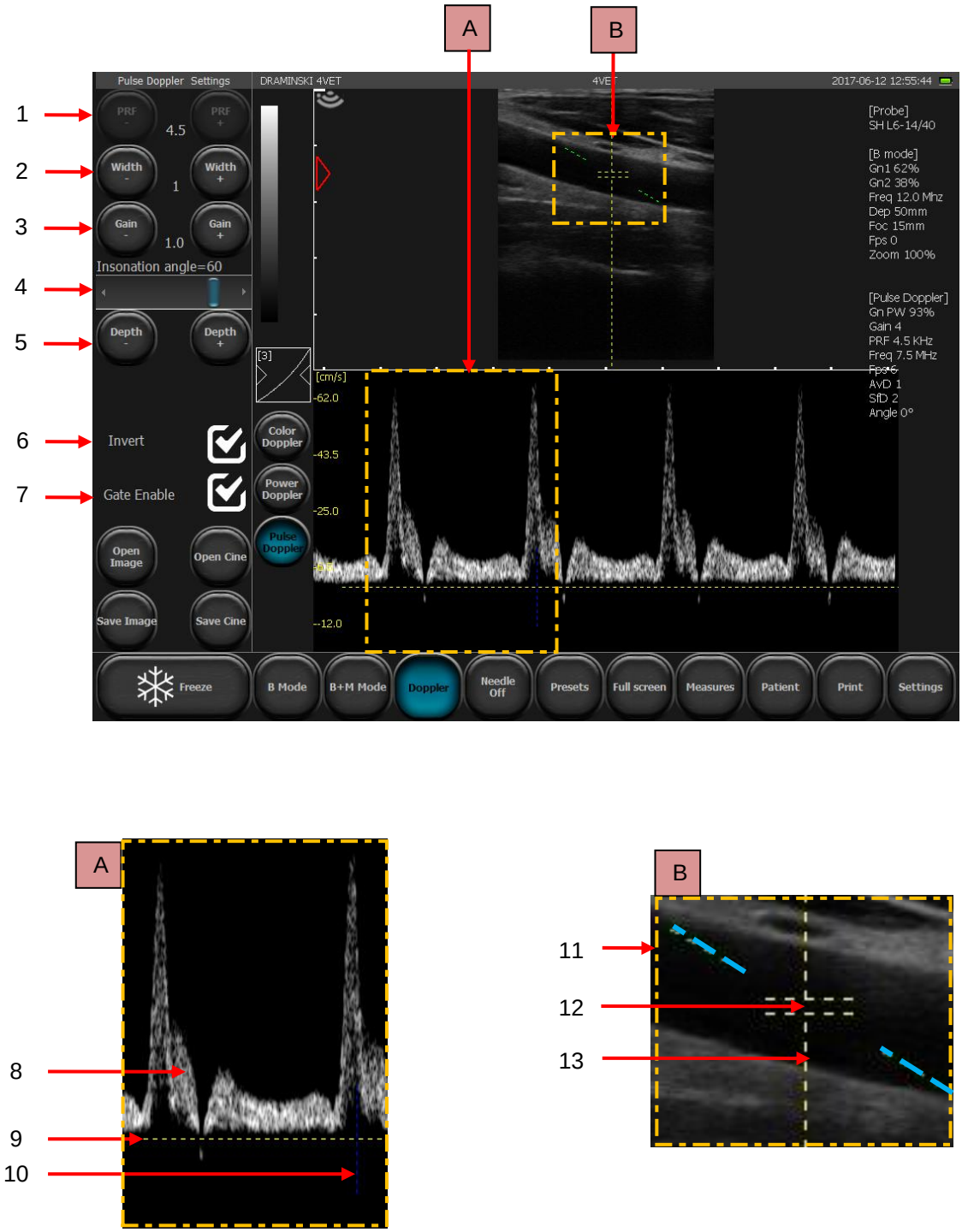


Fig. 15 Elements of the user panel in Pulse Wave Doppler mode

1. Setting the level of frequency of the emitted signals (PRF)
2. Setting the width of the sample frame
3. Setting the value of the Doppler signal gain for Pulse Wave Doppler mode
4. Adjustment of the insonation angle
5. Adjustment of depth of sample gate

6. Orientation change of the spectral diagram in relation to the base line
7. Switching on/off the registration parameters of flow

A. Enlarged part of the window with the spectral diagram of hemodynamic parameters

8. Spectral flow
9. Base line
10. Diagram guiding line

B. Enlarged image of the Doppler frame

11. Indicator of the insonation angle
12. Sample gate
13. Central line

Warning! - Only qualified and specially trained personnel can operate the system and carry out ultrasound examinations.

9. Imaging modes

This chapter describes basic steps on how to switch between imaging modes. Change of each imaging mode settings is described in Chapter 10.

9.1. Choosing imaging mode

9.1.1. B, B+B and 4B modes

To choose one of the B modes please click:

[B] – turns B mode on,

[B B] – turns B+B mode on with windows horizontally adjacent,

[B/B] – turns B+B mode on with windows vertically adjacent

[BB/BB] – turns 4B mode on

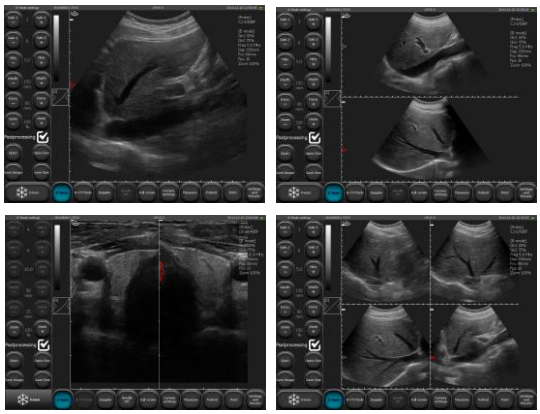


Fig. 16 Imaging modes: B, B+B and 4B

9.1.1.1. Switching windows between B+B and 4B modes.

In order to activate the second window you should double click in its field. If this procedure will be done during the examination, the image in previous window will freeze.

When the image is freezed in both windows, switching the window will cause moving freezed image from currently active window to the new activated window.

9.1.2. M and B+M

In order to start B+M mode press the [B+M mode] button on the mode panel.
In order to switch between B+M and M modes press [B+M Mode] button and choose [M/B+M] from submenu.

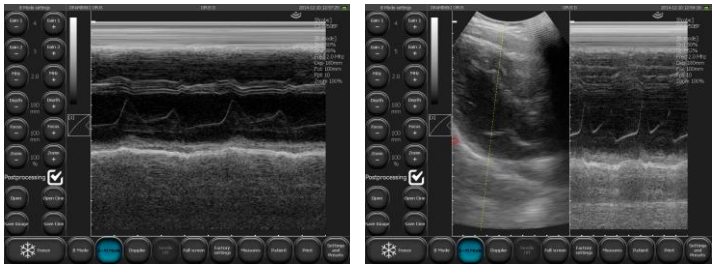


Fig. 17 Imaging modes: M and B+M

9.1.3. Doppler modes: Color Doppler, Power Doppler and Pulse Wave Doppler

To start the Doppler mode press the [Doppler] button on the modes bar. The Color Doppler mode turns on automatically. To turn Doppler off, press the [Doppler] again.

9.1.3.1. Switching between Color Doppler, Power Doppler and Pulse Wave Doppler modes

After starting Doppler modes additional buttons will appear on the screen (Fig. 13, no 14-16). These are used to switch between the modes and turning Doppler mode off:
[Color Doppler] – turns Color Doppler mode on
[Power Doppler] – turns Power Doppler mode on
[Pulse Doppler] – turns Pulse Wave Doppler mode on

10. Description of the ultrasound scanner functions

10.1. Optimizing the image parameters

10.1.1. Adjustment of signal gain [Gain 1] and [Gain 2].

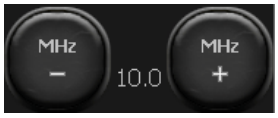
[Gain 1] = overall gain

[Gain 2] = far field gain

The gain levels are presented in the form of numbers located between the buttons (as shown above). For gain 1 and 2 regulation is possible in the range from 1 to 8.
An increase of the gain value results in a brighter image. The gains are changed depending on the user's needs, the kind of examination, the penetration depth and external light conditions.

The level change [Gain 1] can also be used by moving the finger in the active field which is at the top of the scanning sector. Level [Gain 2] changes the same at the bottom of the sector (Fig. 12).

10.1.2. Selection of the probe's frequency



The probes which work with the 4Vet Slim device have broadband convectors, which allow each one to emit signals of different frequencies. Thanks to this function the probes guarantee a wide range of diagnostic abilities. The more the signal frequency is the greater is the image resolution.

The range of available frequencies depends on the probe type and is available in its technical documentation.

In order to change the signal frequency you should use the keys [MHz -] and [MHz +] in the tool panel.

10.1.3. Change of the penetration depth:

The penetration range is set with the use of the [Depth -] and [Depth +] buttons. The scanning depth is set depending on the position of the examined organs. It should be remembered that the penetration range of the beam depends on its frequency – the higher frequency means the lower range of penetration.

Additionally, it is possible to change the depth by moving the finger in the active field at the right edge of the scanning sector (Fig. 12).

10.1.4. Focus-setting (focusing the beam):

These buttons are used to set the focus of the ultrasound beam (Focus). The image presented on the screen is the clearest in the place where the beam focuses. The focus level is indicated by a red triangle on the left side of the sector. In order to obtain the best effects it is necessary to set the focus on the depth corresponding to the position of the examined object.

It is possible to adjust the focus using the horizontal active field on the left side of the sector (the same as depth, Fig. 12).

Additionally the device has an automatic dynamic focus, thanks to which the image is clear in the full range of scanning.

10.1.5. Zoom:

This function is used to magnify the image in real time and after freezing. The user has the following zoom levels: 120, 140, 160, 180, 200, 220, 240, 260, 280, 300%. It is also possible to minimize the sector to 60% and 80% of the standard size.

10.1.6. Gamma level correction

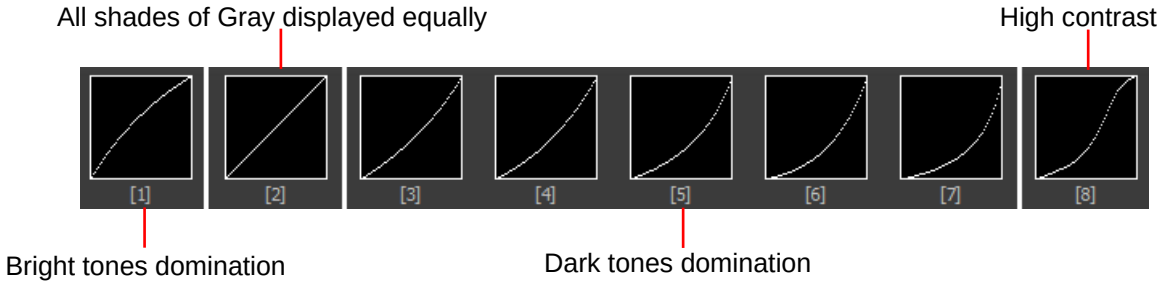


Fig.18 Gamma correction.

Gamma correction enables the change the grey-scale level of the image in real time and after freezing or after loading the saved image or cine loop to the screen.
When you click the [Gamma] button the list of available grey-scale settings appears. The selection is made by clicking a random image. The current grey-scale is presented in the form of a bar above the [Gamma] button (Fig. 11, no 2).

10.1.7. Invert color

In order to invert colors from the positive to the negative it is necessary to double click the bar which shows the grey-scale.(Fig. 11, no 2).

10.2. Freeze

To freeze the image, use the [Freeze] button. When you press this button the image immediately freezes and the button changes its color. In order to de-freeze the image and return to scanning you should press the [Freeze] button again.

When the image is frozen the device enables to replay approx. the last 30 seconds of examination frame-by-frame or in a loop.

10.3. Cine loop – continuous and frame-by-frame replay

When the image is frozen a set of buttons appears at the bottom part of the monitor. These buttons are used to manage the cine loop. Each loop can last for about 30 seconds.

In order to play the cine loop you should press and hold the [I>] button. Viewing the cine loop frame by frame happens when you press the [I>] button shortly.

In order to playback or rewind the cine loop by frame, press [<I].

10.4. Measurements

Attention! Measuring rules in Pulse Wave Doppler mode were described in <10.8.4.>.

Permanently at the imaging sector there is a ruler with 1 cm calibration which enables understanding the dimensions of the shown image in real time.
When the image freezes the option of distance measuring appears automatically.
The presented object can be measured by other methods as well; they are available when you click the [Measure] button **on the mode panel.**

Measuring buttons:
1. [Grid] - approximate measuring on the basis of the grid placed on the object (its resolution is 1 cm)
2. [Stenosis] - measuring which determines the stenosis given in percent
3. [Volume] - measuring of the volume (calculated from 3 measures)
4. [Length] - measuring the distance between the indicators
5. [Area] - measuring the area of the examined object of any shape
6. [Ellipse area] - measuring the area by laying the ellipse
7. [Clear] - clears the screen from the measuring elements
8. [OB/GYN] – set of biometric measurements used during pregnancy check and monitoring.

10.4.1. Length

It is the most frequently used method of measuring. When you freeze the image, the distance measuring option switches on automatically. You can perform 5 different measuring on one image.
When you press point A and then point B the ruler appears which connects both points and the number determining this measuring.
You can use a magnifier to make measuring of small structures easier, it appears at the placed measuring point when you hold the finger longer on the screen. This function enables a precise location of the measuring point without getting the finger off from the screen. When you get the finger off the magnifier disappears, this enables marking the second point.
Other numbers of the results are presented in the sector "Imaging". The measures are given in mm with the precision of up to 0.1 mm.

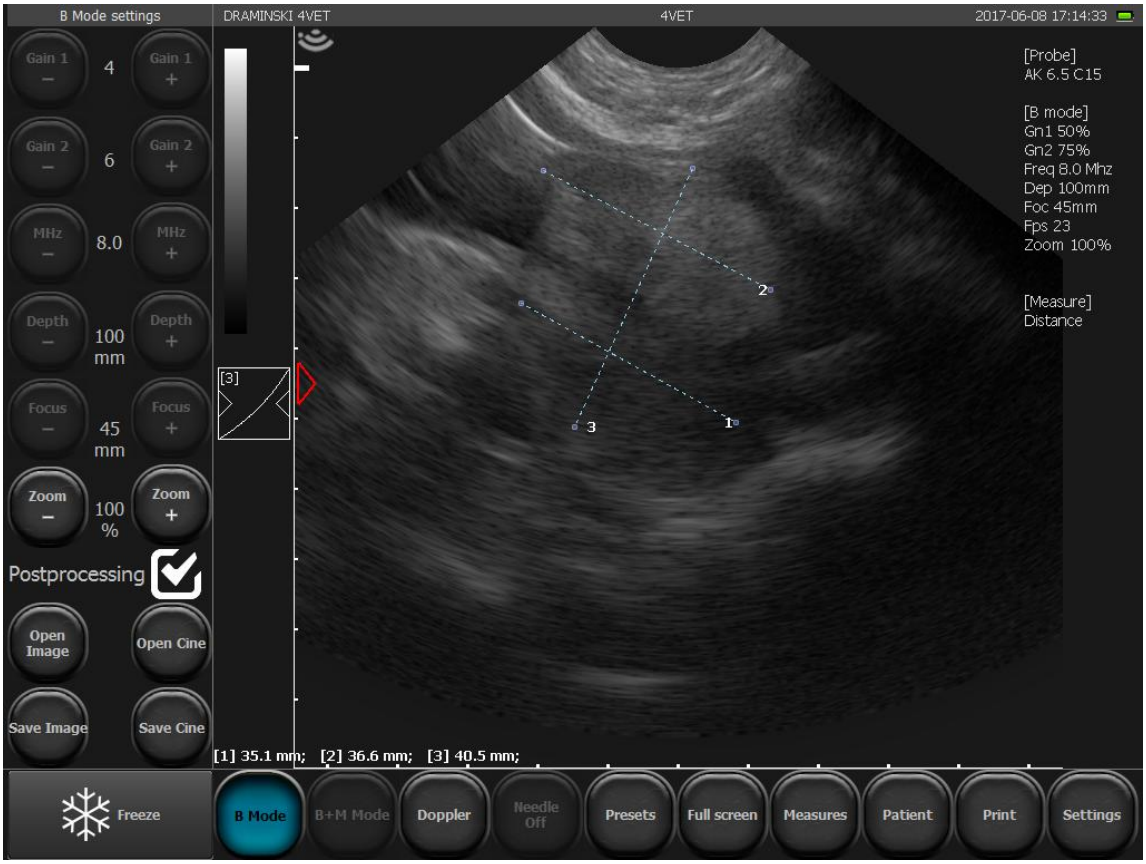


Fig. 19 Measuring the length. Prostate gland in Golden Labrador dog.

10.4.2. Grid

It is necessary to select Grid from the Measure menu. The window appears in which you can select the grid. When you select this option on the imaging sector the grid will be placed on the image (the scale is 1 cm).

10.4.3. Stenosis

In order to determine the stenosis it is necessary to obtain the lengthwise section of the narrowing object. Then you should take two measures in its diametrical planes. The result is given automatically in percents. This option is used, for example, when evaluating blood vessels.

10.4.4. Volume

In order to measure the volume correctly it is necessary to measure the length, depth and width of the object. For this purpose you should obtain sections in horizontal and vertical planes. In order to obtain two planes in one image you can use B+B mode. The device automatically calculates the volume of the object taking into account the performed measuring. The result is presented in cm^3.

10.4.5. Area

To measure the area you should outline the object on the touch panel without taking off the stylus or the finger until you finish the loop. In order to finish the outline you should click into the point from which you started drawing the line. The result is given in sq. cm and is shown below the image sector.

10.4.6. The area of ellipse

The measuring is performed by laying the ellipse on the object clicking in three points (as shown in the diagram). The first two points should be on the poles of the long axis, the third one should be on one of the poles of the short axis. The result is given in sq. cm and is shown below the image sector.

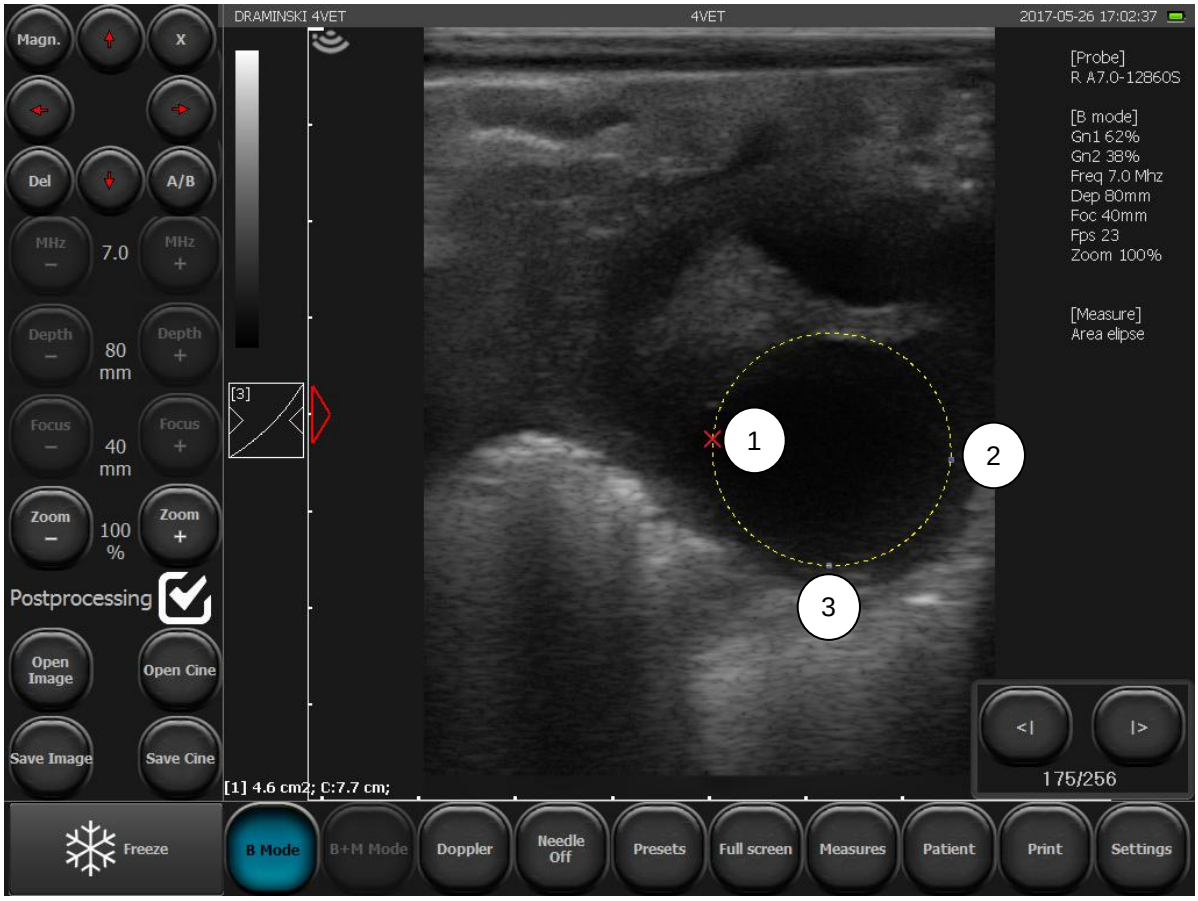


Fig. 20 Measuring the area field by laying the ellipse

10.4.7. Gynecological and obstetric measurements

In order to perform Gynecological and obstetric measurements choose [Measurements] button, click [OB./GYN] and select measurement from the list.

10.4.7.1. [Horse DC] – horse head circumference

Place the diameter where cross-section of head is at its widest.

On this basis the system will calculate the circumference of the head.

Result given in mm.

10.4.7.2. [Horse DO] – diameter of eyeball

Result given in days.

10.4.7.3. [Horse DSG] - horse gestational sac diameter

Place the diameter where cross-section of gestational sac is at its widest.

Result given in days.

10.4.7.4. [Sheep LCC] - sheep crown – rump length

Result given in days.

10.4.7.5. [Lama BPD] - lama biparietal diameter

Result given in days.

10.4.7.6. [Sows LCC] - pig crown – rump length

Result given in days.

10.4.7.7. [Cow BPD] - cow biparietal diameter

Result given in days.

10.4.7.8. [Cow LCC] – cow crown – rump length

Result given in days.

10.4.7.9. [DOG GS small] – gestational sac diameter – small dog

Result given in days.

Measurement effective between 24th and 40th day of pregnancy.

10.4.7.10. [DOG GS medium] – gestational sac diameter – medium dog

Result given in days.

Measurement effective between 24th and 40th day of pregnancy.

10.4.7.11. [DOG BPD small] – biparietal diameter – small dog

Result given in days.

Measurement effective between 24th and 40th day of pregnancy.

10.4.7.12. [DOG BPD medium] – biparietal diameter – medium dog

Result given in mm and days.

Measurement effective over 40th day of pregnancy.

10.4.7.13. [Cat >30 HD] – head diameter – cat

Result given in mm and days.

Measurement effective over 30th day . Perform the measurement in the same plane CRL; over 35th day use the same plane as for biparietal measurement.

10.4.7.14. [Cat >30 BD] – body diameter – cat

Result given in mm and days.

Measurement effective over 30th day of pregnancy. Perform measurement on the level of the liver.

10.4.7.15. [Cat <30 CRL] – crown – rump length – cat

Result given in mm and days.

Measurement effective between 26th and 30th day of pregnancy.

10.4.7.16. [Cat <30 GSD] – gestational sac diameter - cat

Wynik podawany w mm i dniach.

Measurement effective between 16th and 30th day of pregnancy.

10.4.8. Edition of the measurements

The user can change the positions of the measuring points.

While marking the points the window with navigation buttons appears in the top left corner of the screen. Editable measuring line is marked with yellow color.

Using the direction buttons it is possible to change the position of the point marked by a red cross. In order to change to the other measuring point it is necessary to use A/B keys.

If you would like to switch on the magnifier, press [Magn.]

In order to delete one measure you should use the [Del.] key. After performing this operation the previously made measure becomes active.

If you would like to deactivate the navigation buttons, click [X].

The measure editing panel can be moved at any position on the screen by "catching" its middle with the finger.

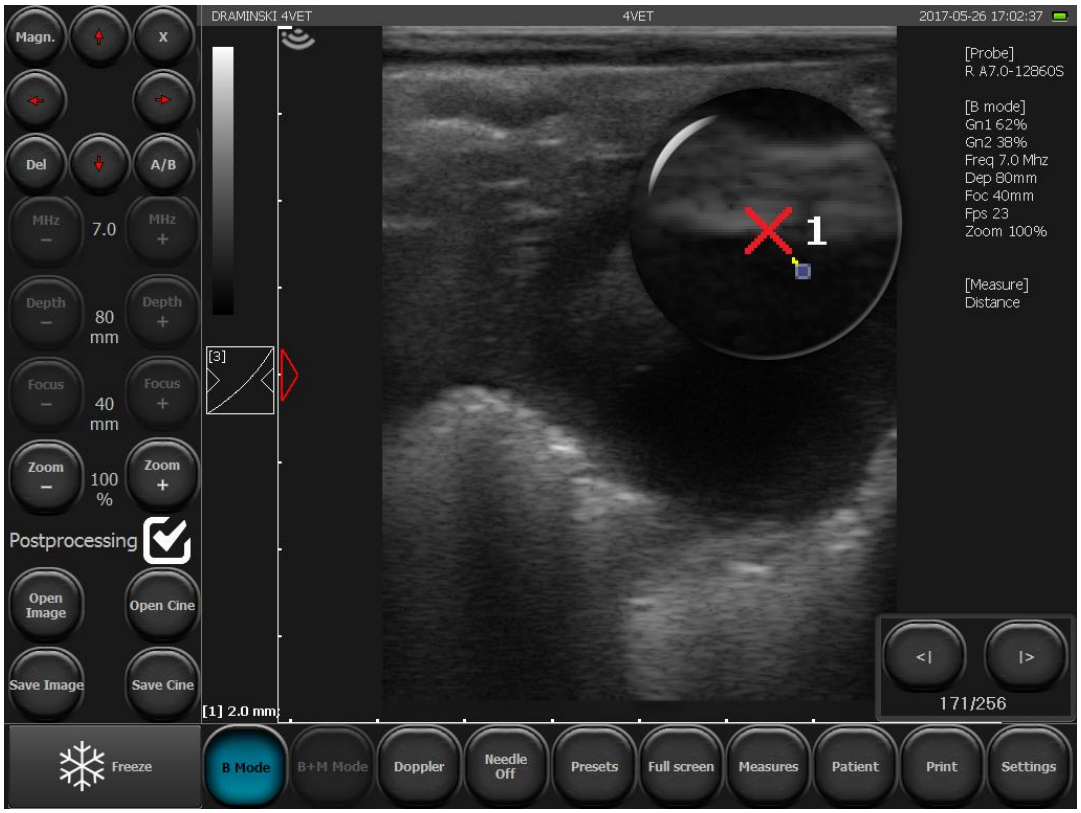


Fig. 23 Measurements edition

10.4.9. [Clear]

When you press the button all the elements of the measuring and the results will be deleted from the screen. Deleting the elements of the measuring also takes place after unfreezing the image in B mode or switching to B mode from other modes.

10.5. Optimization of B+M and M modes

10.5.1. Graph drawing speed selection in M mode

In order to activate B+M mode press [B+M Mode] button. The submenu will appear over the button, where you can select graph drawing speed in M mode. Available values: 1s, 2s, 3s, 4s.

10.5.2. Setting the cutting line in B+M / M modes

Setting the cutting line is based on B mode image. In order to change its position only need to move it in the right place using your finger.

10.5.3. Switching between M and B+M modes

After pressing [B+M mode] button new submenu will appear, where on the top there is [M/B+M] button. It is used for switching between B+M and M modes.

10.6. Imaging with the function of color Doppler

The color Doppler function allows viewing the blood vessel flow with the background image in B-mode in real time. The blood flow is coded by the color depending on its direction. The red color corresponds to the stream flowing to the head of the probe. Blue color means the reverse direction.

Attention! By double click on color bar (Fig. 13, no 1) reverse colors option is activated (stream flowing to the head of the probe will be coded with blue color, red color means the reverse direction).

10.6.1. Starting color Doppler imaging

Remember that preparing patient to examination has great influence on results. Use of an appropriate amount of gel is essential for obtaining a good result.

Before starting Doppler function you should find the clearest image of the organ in B-Mode, showing the vessels. Too high Gamma and Gain setting the image in B-Mode will have a negative influence on the quality of the Doppler image.

In order to start this mode you should click [Doppler] button in the mode panel.
The screen will show the active panel managing the Color Doppler function and Doppler frame.

10.6.2. Switching between the Doppler modes: Color, Power, Pulse Wave; Doppler mode OFF

To switch between Doppler modes use [Color Doppler], [Power Doppler] and [Pulse Doppler] buttons. They are visible after pressing [Doppler] button.

In order to finish work in Doppler mode press [Doppler] button again. The device will automatically return to the B mode.

Color Doppler = Doppler with color coding of the blood vessel flow

Power Doppler = Doppler with coding the power of the flow

Pulse Doppler = Doppler used to measure the flow speed

10.6.3. Setting Doppler frame

The frame placed on the testing sector has the shape depending on the probe. For the probe

- convex - the frame reminds trapezoid ,

- linear - the frame has the shape of a rectangular (rhombus for the angle different from 0°) .

10.6.3.1. Repositioning of Doppler frame

In order to set the frame in the selected point you should press it in the middle. The frame will change its color to green and in the middle the navigation button appears. Then you should press the place where the frame should be. The mode of changing the position of the frame is active until the navigation button disappears.
You can also set the position by dragging the frame with the finger through the screen.

10.6.3.2. Resizing of Doppler frame

After touching the frame, the panel to set the frame sizes appears in the top right corner of the screen.
The keys used to change the size of the frame:

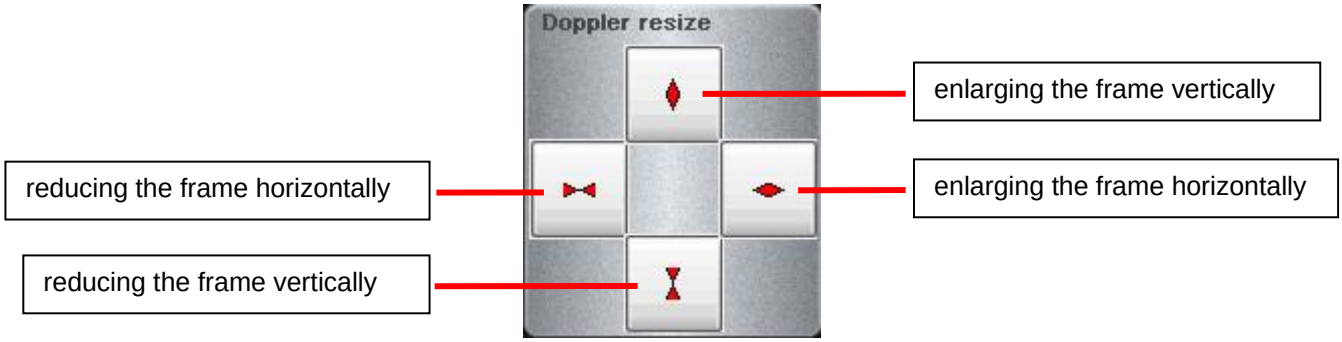


Fig. 24 The panel of setting the size of the frame.

The panel of setting the size of the frame displays for about 3 seconds. In order to display it again, press the frame again.

10.6.3.3. Tilt adjustment of Doppler frame for linear probe

For linear probe it's possible to tilt the frame in the +/- 15° range.
In order to change tilt angle use [Angle -] / [Angle +] buttons (Fig. 13).

10.6.4. Setting parameters for Doppler mode

10.6.4.1. [PRF] - Pulse Repetition Frequency

The PRF setting depends on the speed of the flow. In order to depict fast flows you should set a higher PRF value. When the PRF increases the refresh rate also increases.
In order to depict the blood which flows with a slow speed you should set a lower PRF value. The refresh rate in this case decreases – black-and-white clear motion rate can also decrease.
Thus, when you examine small vessels with low flow rates you should minimize the PRF value. Otherwise it will not be possible to depict the flow in these vessels.

10.6.4.2. [MHz] - Frequency

It is set alike to the MHz frequency of the black-and-white image. The deeper the examined structure is the lower frequency you should set.
Attention! Doppler frequency settings do not influence on probe frequency settings in B mode.

10.6.4.3. [Gain] - Color adjustment

It is necessary to set so high level that there are no "holes" in the colors filling the vessel, and at the same time so low that the color does not "overflows" the vessels.
The range is from 1 to 8 units.

10.6.4.4. [Averaging]

This function allows averaging the number of the depicted frames coded by the color. The increase of the value causes the decrease of the number of artifacts, but can cause worse vessels filling.
When you examine small vessels the parameter of frame averaging should be set to 1. It will make watching the flow easier. At higher values the imaging in these vessels would be limited.

10.6.4.5. [Persistence]

This function is used to prolong the time of showing the flow in the image. It is used in the case of flows which are in high resistance vessels. Switching on the Afterglow function in these cases facilitates observation of quickly disappearing flows by prolonging them in time.
An additional functionality of the Afterglow function is eliminating the interferences and artifacts of short duration from the image.

Parameters:
Persistence time [s] - determines time of prolongation of the flow depicting.

Sensitivity [Low / Med / High] - determines the sensitivity of the persistence activity.

High sensitivity value of the persistence prolongs the time of duration of every, even very small flow. However, it makes noise and artifacts more visible.
The sensitivity set to the value Low and Medium respectively make Persistence less sensitive to artifacts but also slow flows.
The most suitable value which prolongs the time of the flow duration and eliminates the noise is the Medium value.
This function does not have any influence on the character of the flow spectrum in the pulse Doppler.

10.6.4.6. [Angle] - Setting tilt angle of Doppler frame

In the case of using linear heads it is important to set the head of the probe at the angle in relation to the vessel. The flows in the vessels perpendicular to the ultrasound beam would not be registered (it follows from Doppler effect –> cos 90° = 0). In order to facilitate the imaging of the flow in the examined vessel the user can regulate the angle of the frame in the range of +/- 15°. For beginners the recommended angle is max. 10°. This function is used in lengthwise imaging.

10.6.4.7. [Color invert]

Double click on color bar (Fig 13, no. 1) activates the function of color reversal (the flow towards the head will be coded by blue color and in the reverse direction by red color).

10.6.4.8. [Color Threshold]

Press on color bar (color threshold modification window appears). This function enables ignoring the small speed flows in the depicted image (coded with a darker color). When the color threshold increases the image will depict only the flows coded by the color typical for the higher speeds.

10.6.4.9. [Color Range]

Press on color bar (color range modification window appears). This function enables imaging a specified range of speeds in a wider color range. The maximal speed is determined (depends on probe type) which will be coded by the brightest color.
It should be remembered that the preparing of the patient has a huge impact on the test response. A too thin layer of ultrasound gel on the skin can make the test difficult.

10.7. Power Doppler (color coding power flows Doppler)

In the Power Doppler mode the device sums the flows in a particular place and shows in the picture general vascularization of the organ without showing the speed and direction of the flow. Thanks to this function it is possible to show the vascularization of the organ depicting even very slow flows.

10.7.1. Setting Power Doppler

Basic parameters (PRF, frequency, gain, tilt angle frame, color threshold, color range and wall filter) can be set alike in Color Doppler mode <10.6.4.>
The scheme of the keys and functions in Power Doppler mode are shown in Fig.14.

10.7.1.1. Postprocessing

This function is used for smoothing map of colors for Power Doppler mode.
[Mode -] button disables image processing, whereas [Mode +] button enables it.

10.7.1.2. Filtered / Not filtered averaging

This function enables to average data collected from previous frames for enabled and disabled postprocessing <10.7.1.1.>

10.8. Pulse Wave Doppler (spectral pulse Doppler)

The Pulse Wave Doppler function enables measuring the blood flow speed in a selected vessel.
In order to switch on this function you should go to Doppler mode and then press [Pulse Doppler] button.
The scheme of the keys and functions available in Pulse Doppler mode are presented in Fig. 15.

10.8.1. Setting parameters in Pulse Wave Doppler mode

For the best results it is necessary to obtain the sharpest angle to the vessel.
In Color Doppler mode set the test parameters so that to obtain the optimal Doppler spectrum. The examined vessel should be visible in a large part of the screen.

10.8.1.1. [Depth -/+] (sampling gate depth)

Sampling gate (Fig. 15, B 13) should be set to coincide with the flow spectrum.
[Depth -] and [Depth +] buttons can be used to move the gate up and down along sentral line of Doppler frame. You can also use your finger to move whole Doppler frame on the screen.

10.8.1.2. [Insonation Angle]

Set insonation angle line using a slider possibly in parallel to the direction of blood flow.
Remember that exceeding 60° will significantly increase possibility of wrong result!

10.8.1.3. [Width -/+] (sampling gate width)

Set the gate's width using the buttons. Better if it is 50% of the blood vessel diameter.

10.8.2. Spectrum registration of blood flow

In order to register the hemodynamic parameters you should press [Gate enable] button.
A leading line will appear at the bottom window, and then a diagram of hemodynamic blood parameters will appear. At this stage it is important to hold the probe in the initial position until the diagram of parameters comes to the end. Then you can separate the head from the patient's body. At this point the device will stop to register the flow.

10.8.3. Modification of spectral graph

The user can modify the graph after spectrum registration of blood flow is finished.
In order to change graph base line place hold it with a finger until it turns green and then move it up and down on the screen.

[Depth] – allows correcting the depth of the sample gateway position if during the examination the position of the head changes. When the depth changes the device will calculate the parameters depending on the previously registered spectrum, and the guiding line will determine a new diagram.

[Gain] – enables amplification of the signal.

[Invert] - is used to change the spectral diagram orientation regarding the base line.

10.8.4. Measurement in Pulse Wave Doppler mode

10.8.4.1. [HR] - Heart Rate

Put two markers on the spectrum graph selecting two full heart cycles.
Results given in bpm.

10.8.4.2. [AT] - acceleration time

Put two markers on the spectrum graph:
- first one in the place where blood flow speed value in final phase of diastole is the lowest,
- second one in the place where blood flow speed is the highest.

Results given in seconds.

10.8.4.3. [RI PI PSV EDV]

Calculate PSV (peak systolic velocity), end-diastolic velocity (EDV),
average velocity (AVG), pulsation index (PI), resistance index (RI) at a particular section.

Put two markers on the spectrum graph:
- first one in the place where blood flow speed is the highest.,
- second one in the place where blood flow speed value in final phase of diastole is the lowest.

The device will automatically calculate above values.

10.8.4.4. [Doppler Point]

Calculates the flow speed at any point.

10.9. Saving and loading the images and cine loop to the screen

This function allows saving the frozen images and cine loop to internal memory of the device.
You can add the patient's data and the case description.

Attention! Remember to export saved images and cine loops to external medium and clear the device's memory systematically.

10.9.1. Saving the image

In order to save the image in the device you should freeze the image from the examination. When you press [Save Image] a dialogue box appears.

The "Clear data" button enables clearing the fields which are always filed with complicated data from a previous record.

The virtual keyboard enables entering the data in particular fields and the [Save], [Cancel] buttons allow performing the saving operation or abandon it.

Selecting the [Always ask the patient's data] option displays this dialogue box any time when you try to save the image. If this option is deselected, the saved images will be dedicated to previously entered data skipping this dialogue box. In order to enter the patient's data before the test you should use the function Patient <10.11.>

Fig. 25 Dialogue box used to enter patient's data during image / cine loop saving

10.9.2. Saving the Cine loop

When the image has been frozen the user can save the cine loop consisting of approx. last 30 seconds of examination in the memory of the device . In order to save the cine loop follow steps described in <10.9.1.>

10.9.3. Loading the images

In order to load the image saved in the device click [Open Image] button. The screen will show a list of the saved images. Select particular image by clicking on it (it will be highlighted) and then click [Load]

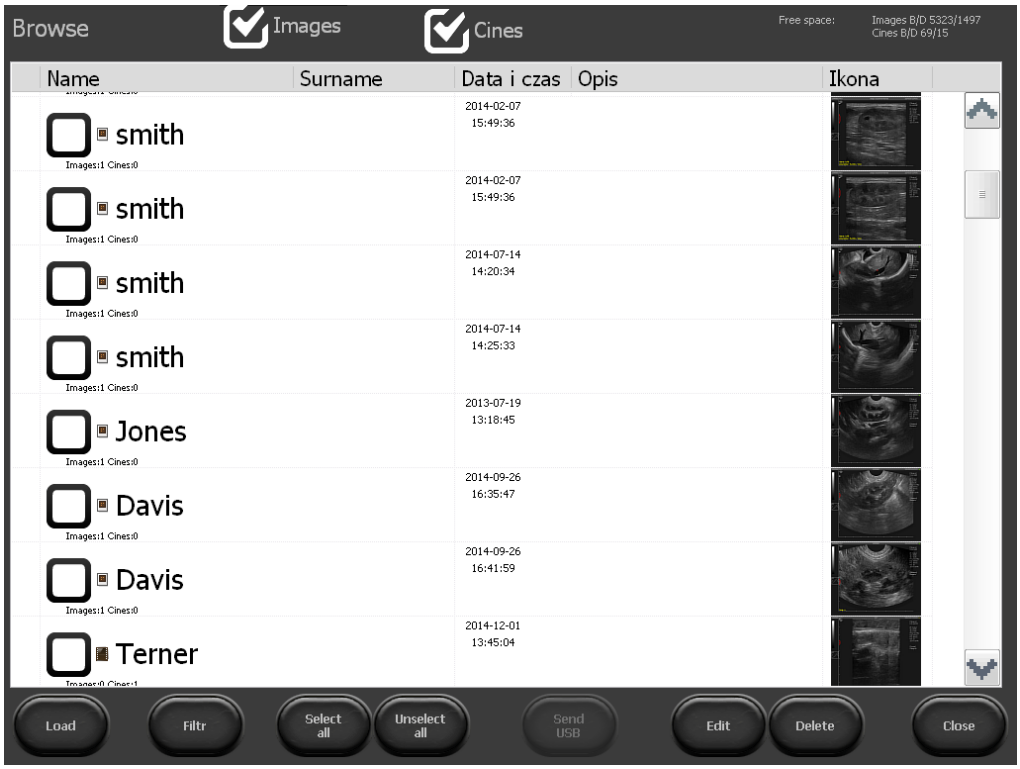


Fig. 26 List of saved images.

The user can manage the saved images using the following buttons:

- [Filter] – enables searching by entered word
- [Select all] - selects all the images from the list
- [Deselect all] - deselects all the images from the list
- [Panorama] – creates panoramic image from previously recorded cine loop
- [Edit] - enables editing the description and the patient's data in the saved image <10.9.6.>,
- [Delete] - deletes selected image from the device memory
- [Close] - back to scanning.

The [Send USB] button activates when external memory is connected to the device. It is used to export data to the external medium <10.10.>.

In order to display saved cine loops on the same list click [Cine] button on the top of the list.

10.9.4. Loading cine loop

Cine loop enables up to 14 second playback of the examination.
In order to load cine loop follow steps described in <10.9.3.>

10.9.5. Filtering stored data

It is possible to change image / cine loop display order: by first name, last name, date and description. In order to do that click column name, e.g. „Surname" – data will be displayed in alphabetic order based on patient's last name. Another click in the same field will reverse the display order.

10.9.6. Edition of stored images and cine loops

This tool allows editing patient's data and description related with the image / cine loop.
In order to edit saved images / cine loops open the list of saved files, select chosen file and click [Edit] button. New window will open where you can enter patient's data and description. Click [Save] when finish.

10.10. Data export to external storage medium

Data export to the computer takes place with the help of external storage media connected via USB. This function enables downloading any number of images / cine loops.

In order to download the data connect the medium to the USB port. Then click [Open Image] or [Open Cine]. In order to download the image you should put mark sign "v" in the bracket next to file's name.

Then click [Send USB]. The box showing the process progress will appear.
When the process is completed the box with the following options will appear:
- [Close] - closes the windows but does not disconnect the external medium, thanks to this further downloading is possible;
- [Close and disconnect] - closes the window and disconnects the external medium.

Attention! The system during files export creates new folder BF32_save on external storage medium, and subfolder named with export date. Separate folders for images and cine loops will be created as well.

10.10.1. Data export in DICOM format

In order to export data in DICOM format press [Settings] button and select DICOM.
Next click [Save cine loop in DICOM format to USB] or [Save image in DICOM format to USB]. Since now data will be exported to the external storage medium also in DICOM format.

10.11. Panoramic image (option)

Panoramic image can be created from cine loop recorded with linear probe.
When recording the cine loop you have to move probe in the direction away from the indicator.

To create panoramic image:

1. Record cine loop
2. Open archive
3. Mark the cine loop
4. Click [Panorama]
5. The window with panorama settings will appear
6. Use red frame to set the area which will be used to create the panoramic image
7. To decide which part of cine loop will be used to create panoramic image rewind the cine to appropriate frame and click *Start frame [Set]*. Then rewind cine loop to the last frame and click *Frame stop [Set]*.
8. Click [Create panoramic image] and wait until the image appears.

10.12. Function "Patient"

This function allows entering the patient's data to the device memory before starting examination. All of the entered data will be automatically added to the saved images and cine loop.

The user can decide wherever the system should ask for patient data each time while saving images / cine loops.
Unlock field [Always ask patient's data] will cause, that the system will not ask for patient's data during saving.
Case description can be modified later on using Edition of stored images and cine loops option <10.9.6.>

In order to restore patient's data asking option go to: [Patient] → tick [Always ask patient's data]] → click [Save].

10.12.1. Retrieve data from DICOM Worklist

In order to retrieve patient's data from Worklist via DICOM server the device must be configured correctly <10.16.8. >.

1. Open patient's data sheet by clicking [Patient] button.
2. Choose [Dicom WML] – Worklist of patient's waiting for examination incl.
3. The list with their data will open.
4. Select patient.
5. Click [Load].
6. The data of the patient will be imported to the scanner.

10.13. Function "Needle"

This option is available only if linear probe is connected to the device.
It allows the needle to be more visible on the patient's body ultrasound image. This option is applicable during "in plane" biopsy method.
In order to start this function press [Needle On]. The button will change its name into [Needle in plane right]. The image will lean. This option improves the visibility of the needle from the right sector of the image.
When you click the button again the [Needle in plane left] option appears which improves the needle's visibility from the left sector of the image.
To switch it off, press [Needle in plane left].

10.14. Full screen function

It is used to hide user panel and mode panel, the sector of examination spreads on the whole screen.

In full screen mode the user can use:
- active fields: gain, focus and scanning depth (Fig. 12),
- gamma settings
- image freezing,
- image and cine loop saving,
- measurements.

10.15. Image printing

In order to print images it is necessary to install printer drivers.
There are drivers for Mitshubishi P95D printer already installed.

In case of multiple printers working with the device, choose a printer from the list before starting the work <10.16.3.2. >

10.15.1. Printing during examination

In order to print an image during examination, press [Freeze] to freeze it and then click [Print].
In the right bottom corner print preview window will appear with image miniature and [Print] and [Clear] buttons.

Press [Print] button in print preview window to print the image or [Clear] button to exit.

Fig. 27 Print preview window

10.15.2. Printing of stored images

In order to print earlier saved images, load it to the screen and press [Print].
In the right bottom corner print preview window will appear with image miniature and [Print] and [Clear] buttons.
Press [Print] button in print preview window to print the image or [Clear] button to exit.

10.15.3. Printing multiple images on one sheet

The user can print up to 4 images on one sheet.
In order to print more than one image follow the steps:
Freeze the image -> press [Print] -> unfreeze the image and continue examination -> freeze image -> press [Print]...
Repeat this sequence of steps until proper image quantity appears in print preview window. Next press [Print] button in print preview window.

10.16. Presets

10.16.1. Presets activation

Standard presets are for examination of Abdominal Cat, Abdominal Small Dog, Abdominal Medium Dog, Abdominal Large Dog, Equine tendons, Uterus Mare, Mare pregnancy.

In order to activate preset, click [Presets]. The list of available presets will appear. Select preset name to activate it.
It is possible to activate preset from Manage Presets window by clicking [Load preset] button.

10.16.2. Presets saving

This option allows saving your favorite settings of the device using a user name. It can also be used to save the settings optimal to examine a particular organ.

In order to add a new preset you should optimize the settings first (Gain 1 and 2, Frequency, Depth, Focus, Zoom and Gamma). Then click the button [Presets] and choose the [Manage presets] option. A dialogue box appears which is used to add, delete, edit and turn on the presents.

Fig. 28 The box of presets selection

On the right side of the box current setting of the device appears to be saved. In order to save it choose option [New preset]. The box to write the preset name appears. After filling the field press [OK]. The preset will be saved and appear on the list in the preset managing box.

In order to cancel the preset open the preset managing box and select the preset by clicking its name. The name highlights. Then select the [Cancel preset] option.

11. Advanced settings

In order to enter the advanced settings menu you should click the [Settings] button. The advanced settings consist of eight sections described below.

11.1. View

The section /View/ has the tools used to modify the user panel.
Available options:
- turn on averaging of the frames,
- change the position of the tool panel from left to right side of the screen
- change of image orientation up-down, right-left. The change of image orientation is signaled by moving the indicator corresponding to the marker on the probe (Fig. 11, no. 3).
- show / hide mouse cursor

- start [Full screen] option
- block the setting menu with PIN
- turn on of „one button” option to save and load files
- select probe
- turn on digital image processing
- change background color
- select skin
- change language

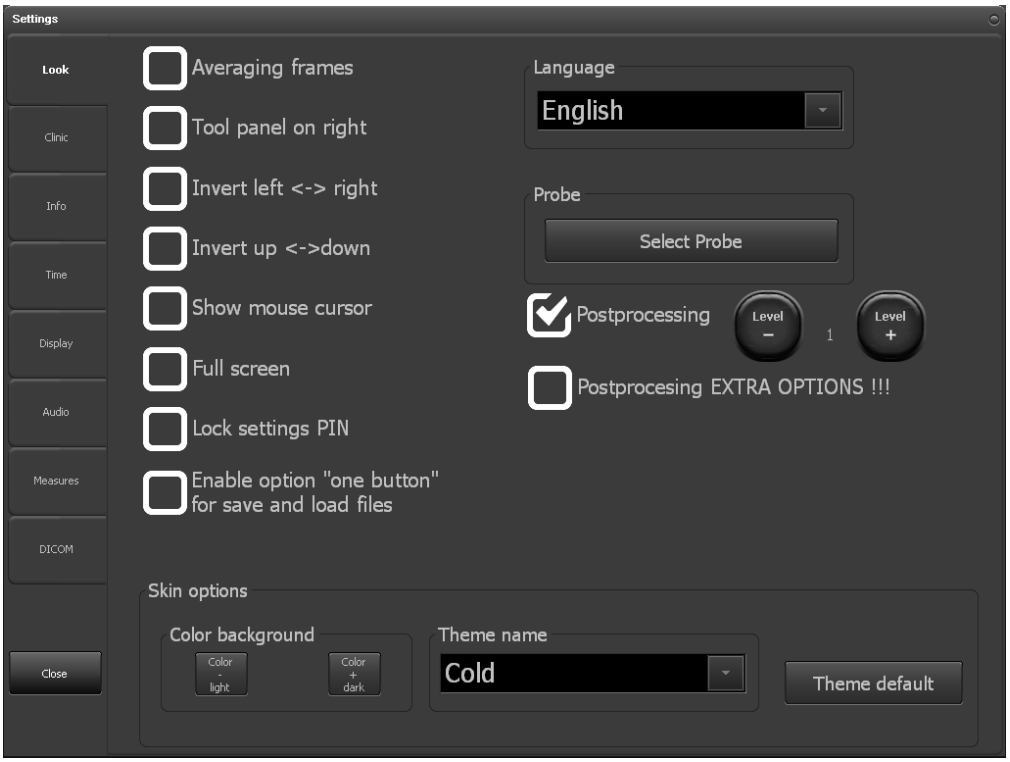


Fig. 29 “Look” section

11.1.1. Option „one button” for save and load files.

After activation the buttons [Load image] and [Load cine] change their function depending on probe activity status.

The buttons allow image or cine loop load during examination.

The same buttons allow saving image or cine loop after freezing the image.

Additionally [Print] and [Quick save] buttons appear on the tool panel.

Printing has been described in <10.14.>.

[Quick save] is used to save freezed image directly to connected external storage medium e.g. flash drive.

11.2. Clinic

In the section /Clinic/ the user can type the name of their clinic or doctor's name. The name will appear on the upper information bar above the sector of examination.

11.3. Info

In the section /Information/ the user can check the software and device version and:

- update software,
- choose printer from the list of available printers,
- choose the style of the exported file name creation,
- restart ultrasound scanner system.

11.3.1. Software update

There are two ways to update the software:

- On-line,
- Via USB flash drive.

Attention! Before software update it is necessary to check current device version. This information can be found in /Information/ section on the right. Each new software version is strictly correlated with device version. You must download only software updates compatible with your device version.

11.3.1.1. On-line update.

In order to update software via Internet connect LAN cable to the appropriate socket (Fig. 2). Next enter [Settings] and choose /Information/ section.

Press [Update over Internet]. New message box will appear. Click [Next]. The update will start. New software will install automatically. Wait until system restart.

If the device doesn’t start to download update files, please check Internet connection.

11.3.1.2. Update using USB flash drive.

In order to update software via USB flash drive please contact DRAMINSKI Representative to acquire file with newest software version.

Create “update_opus” folder on flash drive. Copy received software update file to this folder.

Next connect flash drive to the USG socket of the scanner. New message „Update over USB?” will appear on the screen. Press [Yes]. The update will start automatically. Wait until system restart.

11.3.2. Choosing printer

If there are more than one printer drivers installed in the device, the user has to choose the connected printer before printing. In order to do that enter [Settings], choose /Information/ section, find and select connected printer in the „Set printer" field.
You can set the scanner to ask for a printer before printing.
In order to do that select 'Choose printer during printing' in the „Set printer" field.

11.3.3. Choosing the file name creation style of the exported files

The System can name exported files.
Default file name is date of examination, e.g. *20140112_14081415837*, where *20140112* means date and *14081415837* means time.
File names can be generated in following styles:
- <Date_Time>,
- <Date_Time><Last Name><First Name>,
- <Date_Time><First Name><Last Name>
- <Date_Time><Last Name><First Name><Description>,
- <Data_Czas><First Name><Last Name><Description>.

In order to choose the file name creation style of the exported files enter [Settings] and /Information/ section. In the „File name creation style " field choose style name. The device will automatically save the settings.

11.4. Date and time settings

Enter [Settings]. Section /Time/ is used to update system date and time.
Enter actual date and time. Next click [Save date and time] button.

11.5. Display

In section /Display/ brightness and touch panel calibration options are available.

11.5.1. Measurements settings

Section /Measurements/ is used to modify list of measurements displayed in aging tables.
In order to activate display of measurement tick the field next to its name.

11.6. DICOM settings

11.6.1. DICOM printer configuration

In order to configure connection with DICOM printer enter [Settings and choose /DICOM/ section.
Enter the following data in the DICOM printer field:
Host – DICOM server address, where printer is connected,
Port – port name on DICOM server, which the device should connect with,
AET – service name on DICOM server. This field can be blank, unless service name is strictly set on the server.
After data enter, choose [Turn on DICOM printer]. Confirm changes with [Save DICOM settings] button.

11.6.2. [MWL] – Modality worklist configuration

In order to configure connection with Worklist on DICOM server enter [Settings] and choose /DICOM/ section. In DICOM Modality Worklist (MWL) field enter similar data as during printer configuration <10.16.8.1.>
In the „Coding" field choose code type used by DICOM server. It's available at DICOM provider.
When all dialog boxes are filled press [Enable MWL]. Confirm changes with [Save DICOM settings] button.

11.6.3. Configuration of data export to the DICOM server

In order to configure data export to the DICOM server enter [Settings] and choose /DICOM/ section.
In DICOM Storage field enter similar data as during Worklist configuration <10.16.8.2.>
When all dialog boxes are filled press [Enable Dicom Storage]. Confirm changes with [Save DICOM settings] button.

12. Charging and exploitation of the batteries

DRAMIŃSKI battery pack is an efficient Li-Ion pack for multiple charging.
The lifetime of the battery pack depends on the way it is used. It is best when it works full cycles, i.e. full charging – full discharging. Battery connected to the device while powered from the mains is not charging.
This solution allows prolonging the lifetime of the battery.

DRAMINSKI 4Vet Slim has an indicator which shows a low battery level. In the bottom left corner of the screen there is a graphic indicator of the battery. A fully charged pack guarantees 4-hour of work of the ultrasound scanner.
Observation of the graphic indicator allows monitoring the state of the battery:
1. When the color of the indicator changes from green to yellow it means that the battery will continue its work for about 45 minutes.
2. When the color changes from yellow to red it means that the battery will work for about 10 minutes.
The "Low battery" message in the middle of the screen means that you have to charge the batteries. If the device is still turned on, a full discharge takes place and the device turns off automatically.

12.1. Charging DRAMIŃSKI battery pack

Attention! To charge the battery use a special battery charged with specially selected current parameters. It is advised to use the charger recommended by the ultrasound scanner producer.

Attention! The charger is an auxiliary device exclusively used to charge batteries. It is not an integrated part of the DRAMIŃSKI 4Vet Slim ultrasound scanner used for everyday work.

In order to charge the battery pack you should:

1. switch off the device using the [ON/OFF] button (if automatic switch off does not happen),
2. disconnect battery pack from the device,
3. connect the charger to the 110-240 V / 60 Hz mains ,
4. connect the charger cable to the battery pack socket.

Fig. 30 Battery charger

The change of color into green means full charge of the battery.

Charging of a fully discharged battery takes about 3 hours. When the battery is fully charged the charging automatically stops.

Warning! – After a full discharge of the battery the charger first boosts the battery and the diode is orange, then there is a supercharging phase and the diode changes its color to yellow. A full charge is reached when the diode is green.

Lifetime of the DRAMIINSKI BATTERY PACK is about 500 charging cycles. **When the working time is too short it means that the battery shows a high degree of wear and should be replaced with a new one.**

13. Maintenance of the device

When the device is used it becomes dirty, including different infective factors. Directly after work, the device should be cleaned with a damp, wet cloth or paper towel, using a mild detergent. When cleaning, protect slots in the casing from moisture.

The surface of the device should be disinfected with a special agent for disinfecting medical equipment. It is recommended to use foam or spray agents or tissues soaked in disinfecting agent.

Attention! Ultrasonic probes must be carefully disinfected after each use.

After cleaning with a damp cloth, the ultrasound scanner should be wiped dry with a paper towel, if necessary. While cleaning the personnel performing these tasks should wear protective clothing.

The touch panel requires regular cleaning. For this purpose use relevant agents (foams, aerosols, cleaning tissues for touch screens) which guarantee thorough cleaning and at the same time protect the surface of the panel again mechanical damage.

The carrying case should be cleaned externally with water and detergent. The foam insert should be vacuumed regularly and cleaned with water and a mild detergent. A disinfectant solution, e.g. Virkon S, may be used for disinfection. Before using the carrying case, make sure that the foam insert is completely dry.

Warning! – It is forbidden to use highly concentrated, aggressive agents and abrasives. These agents can damage the surface of the panel or the casing. When cleaning, protect all the slots, sockets and holes in the casing from moisture.

The life expectancy of the device is about 10 years, but it can be prolonged by the manufacturer after a periodic technical inspection and making a special decision.

It is recommended the user of the ultrasound scanner perform regular technical inspections every two years at the manufacturer's facility. It will guarantee the highest level of safety of the patients.

14. Troubleshooting

Symptoms	Remedy
The device will not turn on	1. Check if the power supply cable is properly connected. 2. When battery supply - check the operation with the charged Dramiński Battery Pack because it may be a symptom of a full discharge of the battery.
The device switches on but the operation system will not start	1. Check it an external medium is connected to the USB port. If yes, disconnect it and then turn off and turn on the device again.
Improper image or lack of image	1. Check if the head is properly connected - disconnect and connect the probe again. 2. Check is the probe is locked properly 3. Check if the symbol displayed in the information bar corresponds to the symbol of the connected probe.
Image is too dark or too bright	1. Check if gain and gamma levels are set correctly.
There are fringes in the image	Probably there are interferences from the power supply network. 1. Change to battery supply 2. Plug in the AC feeder to another socket.
No charging signal in the charger	1. Check connections of all cables and their condition. 2. Check power supply 110-240 V / 60Hz
Short battery operating time	1. Battery is not charged 2. Low ambient temperature 3. battery is worn (a normal symptom resulting from the battery's construction and rules of using the battery)
Message on the screen "Probe OFF" disabling examination	1. Check if the ultrasound head is properly connected. Disconnect and connect the head again. Make sure that the head is properly blocked (the "Probe ON" message will appear which will automatically disappear and enable performing the examination).
Messages on the screen disable performing examination	1. Turn off and turn on the device again. If the symptoms continue contact the producer or authorized service centre.
Mechanical damage of the casing, its elements of cables.	1. Examine the device and after having contacted the authorized service centre or the producer follow their recommendations.

If any of the basic activities do not help or other problems appear contact DRAMINSKI service, call +48 89 675 26 00 or e-mail: sales@draminski.com

15. Symbols and marks used on the labels

CE	CE means that the product complies with the valid Directives.
	Attention, familiarize yourself with the user manual
	Warnings regarding user safety
2013	Date of production
DRAMIŃSKI	Producer name and address
	Dispose of separately from other domestic wastes in accordance with Directive of the EU Committee UE 93/86/EEC or local regulations.
IP30	Level of casing resistance to external factors – penetration of solid bodies and dust, level of water resistance.
SN-	Serial number
MAX 40°C MIN 10°C	Storage temperature
	Careful, fragile

16. Warranty

The manufacturer hereby grants the buyer a 24-month warranty for a trouble-free operation of the product (body of scanner and probe) if it is used in accordance with the attached user manual.
The battery for the device has a 6-month warranty.

In case of any failure occurring at no fault of the user, the manufacturer undertakes to repair the product not later than within working 14 days from the date of receiving the device at the service centre (Wiktora Steffena 21, 11-036 Sząbruk, Poland) and to return the device in good working order at the manufacturer's cost.

The warranty excludes mechanical damage, damage resulting from improper operation, storage and independent repairs.

The warranty is processed based on a proof of purchase (invoice). To make a complaint, the user should inform the Dramiński Company immediately of any suspected fault.

To make a complaint on account of warranty the user should show:

1. Notify DRAMIŃSKI S.A. of the device malfunction immediately after it occurs.
2. Send the device to the Service Department (no later than before the warranty expiration date) or deliver it in person together with the proof of purchase, which should include the seller's and purchaser's details, the date and place of purchase, the device name, and its serial number.
3. A description of the malfunction must be enclosed with the device sent to the Service Department to ensure efficient diagnosis and repair of the damage:

- Before shipping, the ultrasound device, carrying case, and all included accessories must be cleaned and disinfected (*in accordance with the Cleaning and Disinfection section),
- Please pay particular attention when packaging the device to ensure that it is properly secured, as the manufacturer shall not be held liable for any damage incurred during transport.

The warrant is:
DRAMIŃSKI S.A.
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11-036 Sząbruk, Poland
Phone + 48 89 675 26 00
e-mail: serwis@draminski.com
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