WOUND IMAGINING
ARCHIVING AND
PLANIMETRY ASSEMBLY
2D/3D

producer: ALFA STUDIO
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software: MEDICAL PLANIMETRY 2D /3D
SYSTEM FOR PLANIMETRY 2D

The system registers high quality images taken during subsequent visits (examinations) and performs their planimetric treatment. Software contained in the system allows to evaluate and register changes in the analyzed object. This process allows to decide whether the changes are progressive or regressive. The system applies a high quality photographic equipment which facilitates taking photos with full capture of colours and shadowless illumination. The process of planimetric measurement of objects is non-invasive and automated. Computer planimetry is an important tool in evaluation and monitoring of field measurement of the examined object area. Local wound or skin lesion assessment should be dynamic, with description of changes taking place in the wound. Therefore, the application of such a system in order to monitor and compare facilitates better diagnostics of the patient.

Digital 2D basic

The camera (digital reflex camera) equipped with ring, shadowless flash lamp and a set of area measurement sensors. The device automatically sends photos and measurements "in the background" to the computer and the software locates it in the current examination. It contains planimetry software Medical Planimetry 2D.

Digital 2D basic plus

Assembly to take photos using a tripod. Photo camera (digital reflex camera) and shadowless lamp of constant illumination. The entire process of photo registration takes place in the computer which controls the camera. The operator does not need to possess any specialist knowledge about photography. Cropping is done by the operator on the computer screen during real camera preview. The process and selection of parameters is performed by the software. The assembly contains planimetry software Medical Planimetry 2D Thermo 2.0.

Digital 2D Thermo

This is an enhanced set of "tripod" kind. Additional equipment of the assembly in the thermal camera allows to take both a photo and thermal image of examined object automatically. Thermal image displays a precise spread of temperature on the surface of examined object with the precision up to 0.01 degrees. Planimetry software in the version Medical Planimetry 2D Thermo 2.0 allows to perform planimetric analysis of both photos separately as well as together in interpenetration of the image, which allows to define the contour of the object precisely on the planimetrically analyzed thermal image.
SOFTWARE FEATURES MEDICAL PLANIMETRY

Multilanguage,
Patient registration
Visit (examination) registration
Registration of many examined places (objects) of one patient
Chronological registration of photos and descriptions within one object
Automatic taking and copying of photos from camera to computer with setting in present examination / visit
Full control over correctness of examination procedure while it is performed
Planimetry performance (calculation of the area and circumference of objects) for many sub-areas of the given object with the subtraction opportunity of internal areas (isles)
Summing up within one examination of planimetry results from many images
Simultaneous viewing and comparing results of many examinations
Graphic analysis of changes of object area size from chronological examination results
Import of images to planimetry from other media
Export of images with planimetric measurements onto external media with generally accessible formats.

MEDICAL PLANIMETRY
Spread of wound temperature brings a lot of interesting information. Increased temperature areas signify inflammations. On the other hand, decreased temperature areas may point out the lack of metabolic processes and the lack of process of blood flow indicating e.g. the condition of necrosis. Lowered temperature in the area of necrosis happens much earlier than its visual change on skin surface, which allows to define precisely where tissue necrosis really starts and finishes, which is not visible in normal wound images. It has been proven scientifically (histopathologically) that thermal techniques allow to discover undeskin 'cancer' which generates higher temperature on skin surface through its metabolic processes. Thermal images are widely usable in inflammation discovery in veterinary, where animal skin analysis may quickly define pathogenic areas about which the animal is unable to "tell" us. Blood is a natural heat carrier in the body, therefore thermal image through temperature spread allows to define blood flow in analysed areas.

The program is enhanced by controlling using the head as well as thermal camera in order to take simultaneously the photo and thermal image of examined object. Both images are taken precisely with automatic cropping so that later they could be overlapped. Temperature spread in thermal image is blurred, with invisible edges of particular areas. Overlapping of a photo and thermal image with appropriate interpenetration of both images and reduction of colours in the photo leads to the possibility of operator defining the location of subareas of given temperature and the ability to perform their planimetry properly. The software uses special algorithms for connection of images, so that the information about temperature spread overlapping with a photo did not change.
2D MEASUREMENT TECHNOLOGY

Systems of distance (area) measurement in case of skin tissue cannot apply just one technology to perform proper measurement. In order to obtain correct results for different types of wounds several technologies must be connected. Systems based on light beams such as lasers or IR diodes (infrared), or structural light from projectors are disadvantageous due to their physical properties. The quality of these systems depends on the area they examine. The beam of light will be completely absorbed e.g. by black, charred areas after the burn, also glassy, watery wound areas, which reflect the light like a mirror do not allow proper measurement. Neither laser nor other light sensors can manage a certain surface groups a wound consists of.

The measurement quality is also impacted by the light beam resolution. Assuming that in the distance of 50cm from the object the laser beam is 3mm (depending on the area inclination it can be wider or more narrow), in order to avoid overlapping of two beams in one measurement (using hand, not tripod), they must be separated and the surfaces must be examined on the mesh size c. 8 mm. Therefore, light measurement systems are limited to a large degree and their 3D measurement is largely interpolated by computer software and not really measured. Systems based on tripods offer more opportunities, as such measurements consist of many readings from sensors in short intervals, constructed in such a way as not to allow the beams to overlap in subsequent measurements.

More details can be found in technical documentations of companies manufacturing high quality laser sensors for distance measurement. Our distance measurement system applies a variety of technologies simultaneously in order to eliminate the faults of illumination measurement systems. We connect light sensors with ultrasound sensors which are free of these faults, but have some other disadvantages (wide measurement beam), but applied together they create technology which allows to measure a wide variety of wounds.
Another extremely important aspect is to take the highest possible resolution photo, in which the wound fits the entire photo frame. So, systems which require setting a constant distance from the object are not appropriate to take high-resolution photos of wounds. This method is highly ineffective, as we always see the same area on the frame, e.g. 30 cm of width. This is a major disadvantage because the photo of, say, burnt finger taken from 40 cm will occupy 1/30th part of the frame, which means that the matrix of our camera will take a photo in which 90% will show a wound surrounding and not the examined wound itself. Our wound will be just a small fragment of the photo and with small resolution of the camera, our wound will be of low quality and pixelation will take place. The same refers to more serious wounds, such as burning wounds, for which such a solution will not allow to photograph the surface in one frame. Therefore, in our system we apply professional, high-quality cameras of very high resolution of matrix from 18Mpx and changeable lens optics. Only application of such equipment will allow to photograph in full frame both very small surfaces and entire persons with the smallest possible distortions resulting from the camera optics.

A similar problem refers to illumination. A proper high-quality photo cannot be taken without appropriate illumination. Our system features shadowless illumination for professional photos from a short distance - macro type.

Planimetry software has fully automatic system of photos uploading from the camera. It detects that the photo was taken by the camera and automatically uploads it and located in the given examination with information from area measurement sensors.
3D MEASUREMENT TECHNOLOGY

3D technology is achieved through the connection of 2D system and additional accessories facilitating the wound depth measurement. This measurement is achieved by the application of structural light technology. The mounted projector illuminates examined object with structural light and specialist software on the basis of light bands diffraction calculated the depth and recreated the shape of wound creating a virtual 3D wound image in the computer. Planimetry measurement is much more precise as it takes into account the 3D shape and depth of the wound and archived wound image allows to make analysis in spatial dimensions. Constructors of the device designed an advanced software for structural light analysis in the application of wound measurement. The program, on the basis of one photo allows 3D planimetric wound measurement in any place on the body and its anatomical movements, such as wound moving on the stomach while breathing. Such opportunities are not offered by 3D scanners of other companies, where the examined object must not be moving.
# PRICE LIST

<table>
<thead>
<tr>
<th>Software</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>Medical Planimetry 2D basic</td>
<td>749 EUR net</td>
</tr>
<tr>
<td>Kit ,,Digital 2D basic”</td>
<td>7857 EUR net</td>
</tr>
<tr>
<td>Kit ,,Digital 2D basic plus”</td>
<td>7857 EUR net</td>
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<tr>
<td>Kit ,,Digital 2D Thermo”</td>
<td>16500 EUR net</td>
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<tr>
<td>Kit ,,Digital 3D basic”</td>
<td>10300 EUR net</td>
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<tr>
<td>Kit ,,Digital 3D basic plus”</td>
<td>10300 EUR net</td>
</tr>
<tr>
<td>Kit ,,Digital 3D Thermo”</td>
<td>19200 EUR net</td>
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</tbody>
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The price includes a 12-month warranty. The price does not include VAT tax.

**Additional charges:**

- Access to the client training / assembly: 0.5 EUR for km net
- Training: 30 EUR for an hour net
- Warranty extension for further 12 months: 10% of assembly value

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