

TIVITA™ Tissue

» High Performance Hyperspectral Imaging
Continuous real-time VIS/NIR hyperspectral camera



» Data sheet

NON-INVASIVE ACQUISITION OF TISSUE OXYGENATION, NIR PERFUSION, TISSUE-HEMOGLOBIN-INDEX AND TISSUE WATER INDEX

The innovative TIVITA™ Tissue System is a highly integrated, hyperspectral camera system. It enables the non-invasive acquisition of the following parameters – in real-time and above larger areas:

- Tissue Oxygenation (StO₂)
- Near Infrared (NIR) Perfusion
- Tissue-Hemoglobin-Index (THI)
- Tissue-Water-Index (TWI)

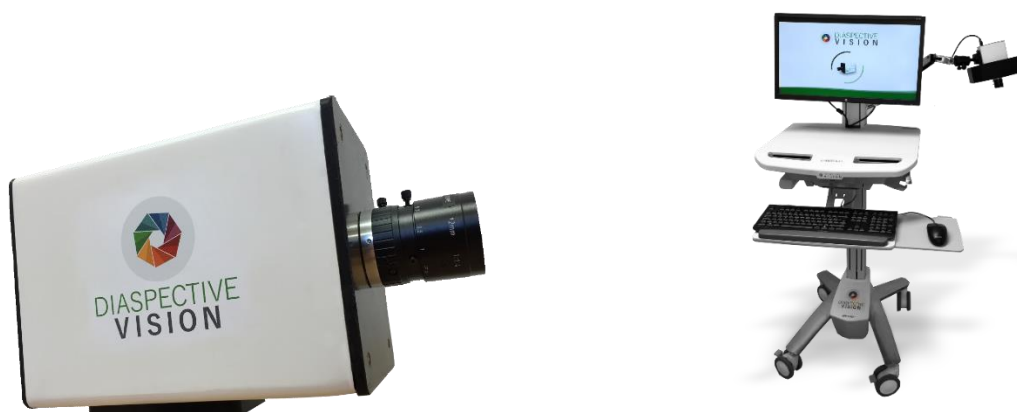


Fig. 1 left: The TIVITA™ Tissue; dimensions: 125 x 60 x 86 mm (L x W x H), weight: ca. 600 g; right: TIVITA™ Tissue System, consisting of a TIVITA™ Tissue camera with integrated lighting unit, mounted onto a medical cart with swivel arm; the cart is equipped with a high-performance Box-PC, computer monitor, keyboard and mouse

The acquisition of the full spectroscopic data from the integrated absorption spectra in the range from 500 to 1000 nm only takes a view seconds.

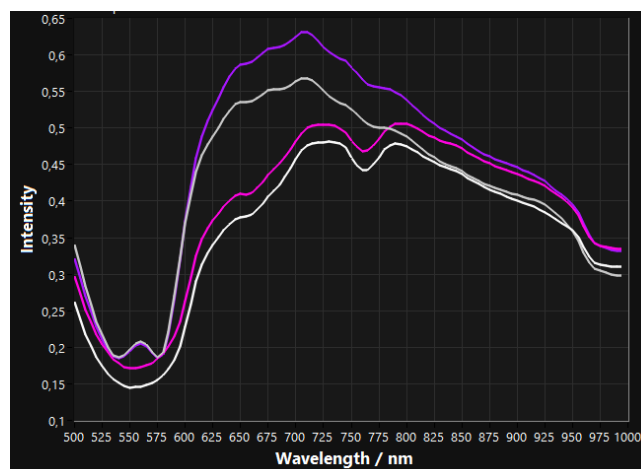


Fig. 2 Typical spectra of human tissue as recorded by the TIVITA™ Tissue; upper graphs: oxygenated tissue, lower graphs: deoxygenated tissue; the parameters StO₂, NIR Perfusion, THI and TWI are calculated from these spectra

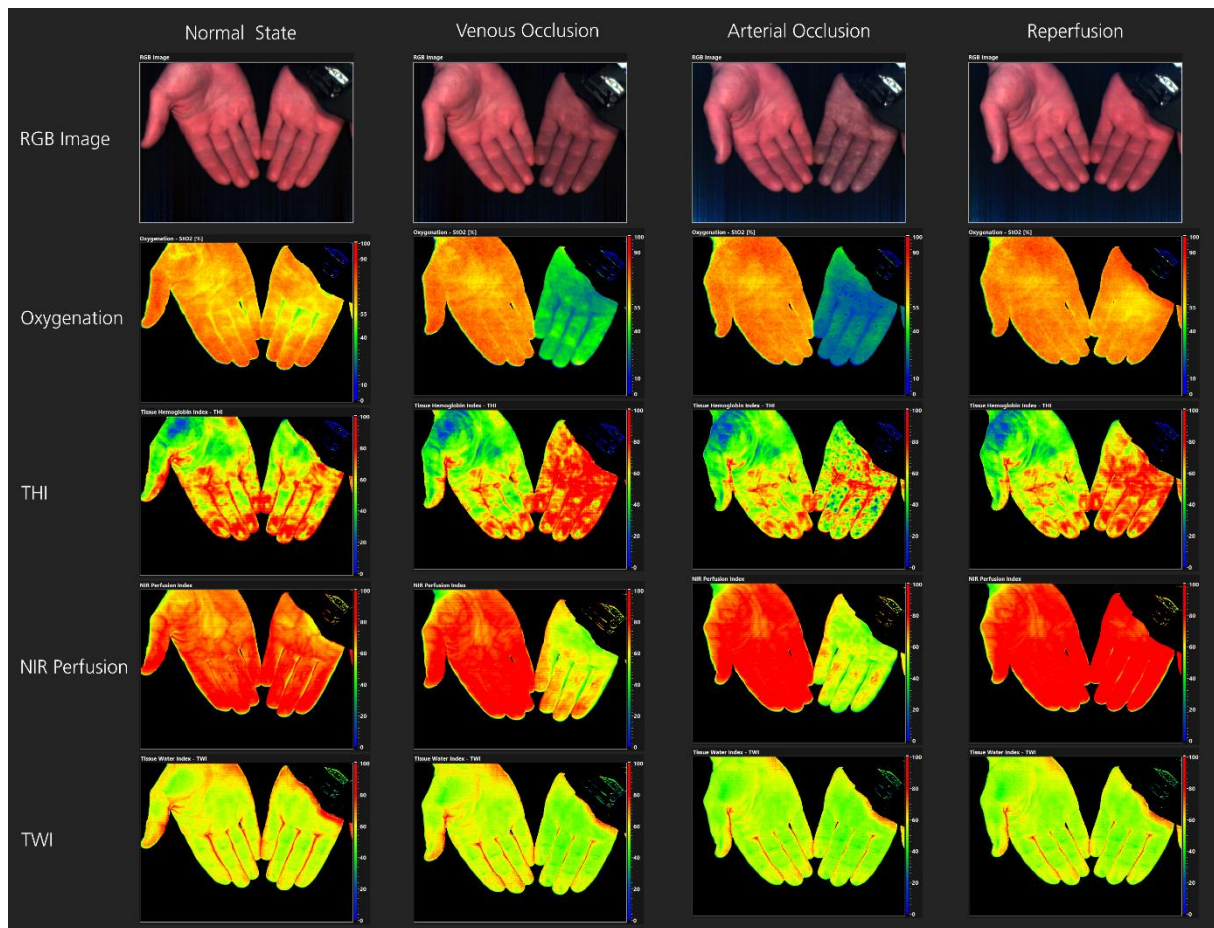


Fig. 3 Example images of an occlusion test. Images were taken during the normal state, the artificially created venous occlusion as well as arterial occlusion and reperfusion. The TIVITA™ Tissue functions as an imaging tissue oximeter.

THE TIVITA™ TISSUE PRODUCT LINE

TIVITA™ Tissue Product Line	Item No.	Description
TIVITA™ Tissue Camera	40-05-02-0118	<i>TIVITA™ Tissue Perfusion Spectral Camera</i> incl. USB 3 connecting cable, power supply and core software package
TIVITA™ Tissue Camera with Halogen Lighting Unit	40-05-02-0119	<i>TIVITA™ Tissue Perfusion Spectral Camera with Integrated Halogen Lighting Unit</i> incl. USB 3 connecting cable, power supply and core software package
TIVITA™ Tissue System	40-05-02-0120	<i>TIVITA™ Tissue Perfusion Spectral Camera with Integrated Lighting Unit and Medical Cart</i> incl. USB 3 connecting cable, power supply, Box-PC, computer screen, keyboard, PC mouse and core software package

TIVITA™ SUITE – THE CORE SOFTWARE

The TIVITA™ Tissue Perfusion Spectral Camera is operated with a special software: the TIVITA™ Suite.

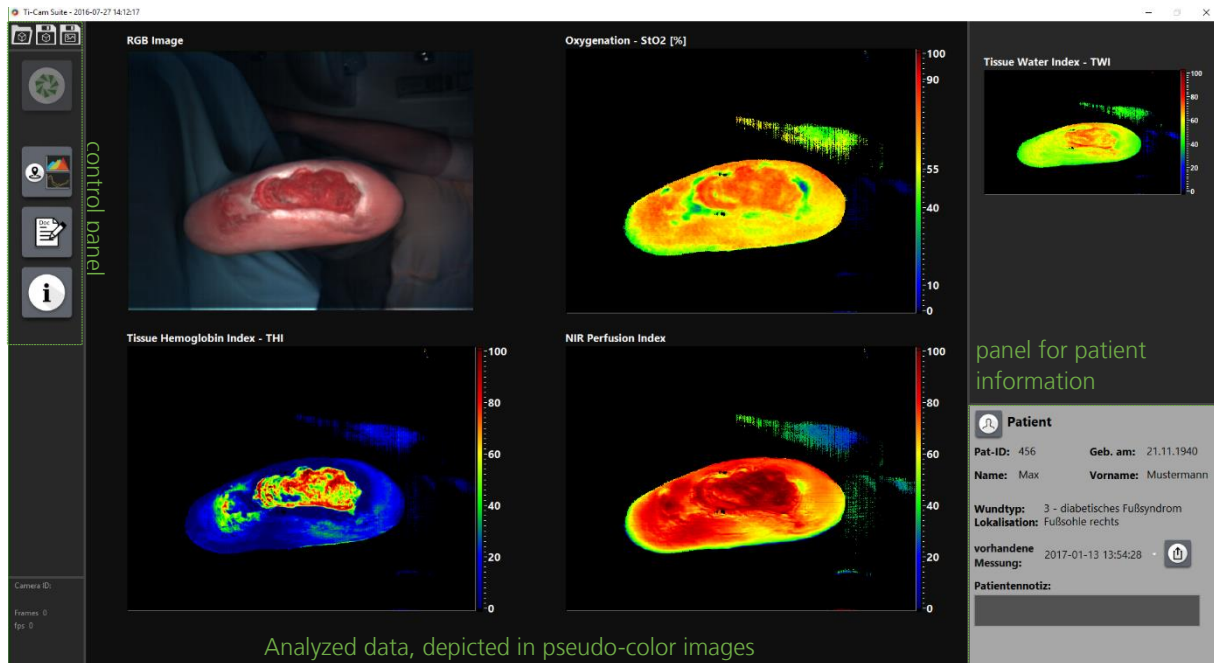


Fig. 4 Screenshot of the user interface of the TIVITA™ Suite. Top left: control panel, e.g. with buttons “Record”, “Documentation Tool” and “Information”. Middle: pseudo-color images as calculated by the TIVITA™: parameters oxygenation (top right), THI (bottom left), NIR perfusion (bottom right) and regular RGB image (top left). Top right: further available parameter: TWI (can be relocated to the middle area via drag & drop). Left bottom: Panel for patient information; data input via documentation tool.

TIVITA™ TISSUE PERFUSION SPECTRAL CAMERA – OVERVIEW OF SYSTEM PERFORMANCE

Tissue Oxygenation – StO₂

Range of measured values	10 – 100 %
Resolution	1 %

Tissue-Hemoglobin-Index (THI)

Range of measured values	10 – 100 %
Resolution	1 %

Tissue-Water-Index (TWI)

Range of measured values	10 – 100 %
Resolution	1 %

NIR Perfusion (TWI)

Range of measured values	10 – 100 %
Resolution	1 %

Sophisticated and Compact – The Design of the TIVITA™ Tissue

The technology of the TIVITA™ Tissue is based on the principles of spectroscopy, therefore, it can be equated to an imaging spectrometer. The camera records the light which is reflected by the sample object and from the acquired wavelengths it is able to calculate the chemical composition of the object.

In the process, the visible as well as the invisible spectrum of the near infrared (NIR) range of the light is recorded by the TIVITA™ Tissue.

The visible part of the spectrum serves as a means for the software to create the regular RGB image (color photography) – this image is calculated from standardized data sets, thus it is always looks the same way. A further purpose of the visible part of the spectrum is to provide information on the melanin and hemoglobin content of the tissue in the surface area. Deeper tissue layers can be analyzed with the NIR spectral range, thus revealing hemoglobin, water or fat levels in layers as deep as 6 mm.

Quick and Easy to Handle – The Measuring Process

For the measuring process, the TIVITA™ Tissue is placed approx. 50 cm above the sample object. A measurement with standard image resolution takes about 5 sec.

The data recorded by the camera is processed and provided in easy to interpret pseudo-color images. The analysis and calculation of the data takes ca. 40 sec.

TIVITA™ TISSUE PERFUSION SPECTRAL CAMERA – OVERVIEW OF SYSTEM COMPONENTS

Spectrograph

Spectral range	500 – 1000 nm
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Camera

Sensor	CMOS
Image size	640 x 480 Pixels

Lighting Unit – Halogen [optional]

Technology	Halogen spots
Spectral range	Thermic energy emission
Operation mode	Continuous, on/off

Medical Cart [Optional]

Dimensions (W x H x D)	56 x 150 x 73 cm
Weight	ca. 25 kg
Material	Plastic / Metal

Box-PC [optional]

Operating system	Windows-based
Disk capacity	1 TB / 128 GB SSD
RAM	DDR4 16 GB

Supply

Mains cable	24 V
USB 3 connector	Type A to Micro-B
Serial cable	D-Sub9

Mechanics

Dimensions (L x W x H)	145 x 84 x 107 mm
Casing	Aluminum
Weight	ca. 600 g
Mounting	Adapter plate

Operating range

Temperature – in use	0 – 30 °C
Temperature – transport	-10 – 45 °C
Temperature – long time storage	15 – 26 °C