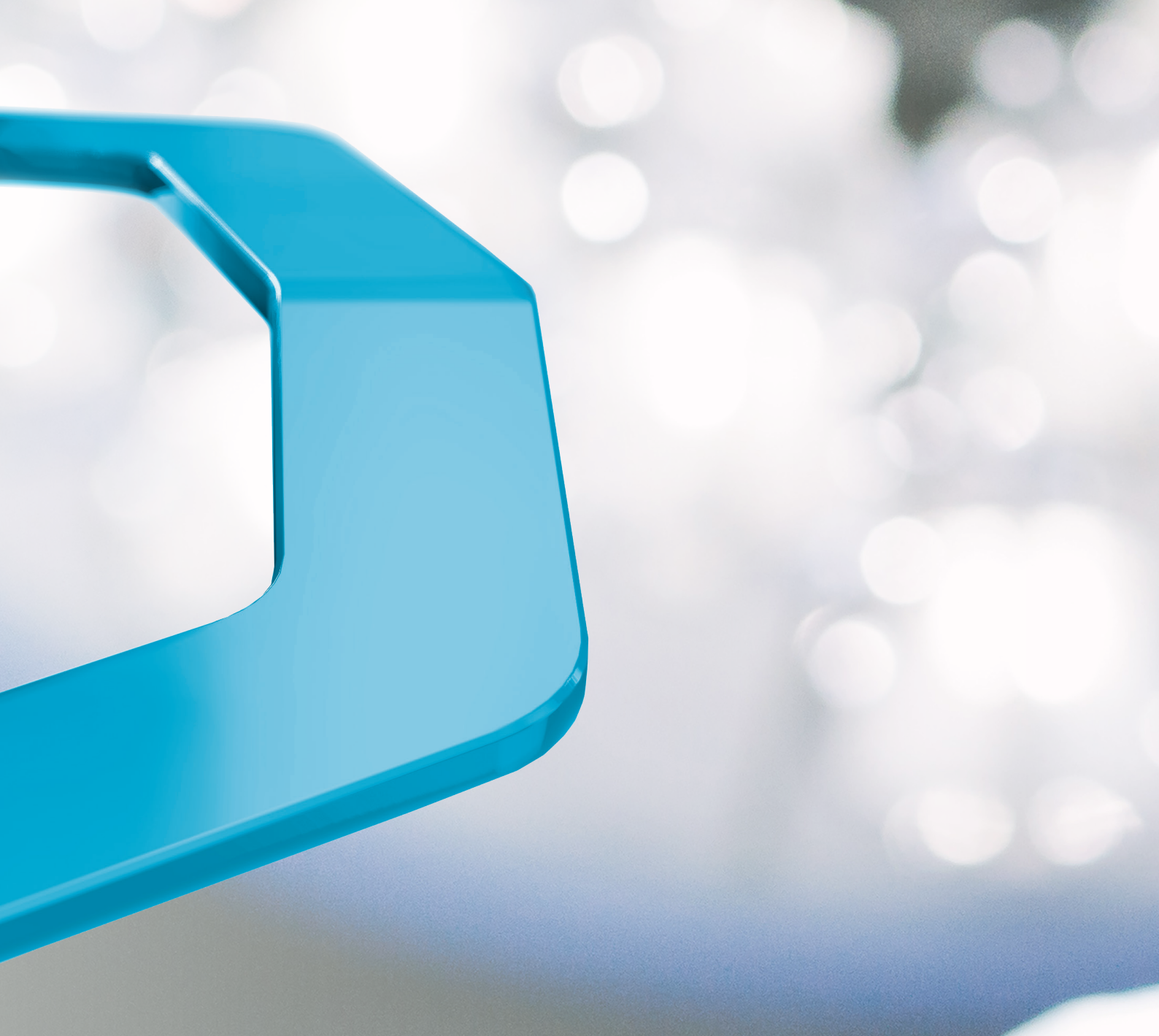


# MiraQ Vascular

Intraoperative Surgical Guidance  
and Quality Assessment



Immediate Feedback

## Improve surgical outcomes & demonstrate quality in vascular surgery

Medistim technology is a versatile tool in various vascular procedures. The Medistim **MiraQ™ Vascular** System offers both transit time flow measurement (TTFM) and high-frequency ultrasound (HFUS) modalities in one system. Surgical findings can be documented through flow tracings and images provided by the system, and surgeons can leave the operating room with the assurance that the construct is functioning well.

Intraoperative quality assessment and ultrasonic surgical guidance can greatly increase the patient's probability of a positive outcome and lessen the chance for additional and unnecessary surgical re-interventions.

### Carotid Endarterectomy (CEA)

HFUS demonstrates completion control every time and has shown to be superior to angiography in detecting defects. Image the CEA to visualize the lumen, look for imperfections that can lead to thrombus formation and

make sure all the relevant obstructions are removed to avoid risk of perioperative stroke. Reveal flow issues after CEA with TTFM and assess risk of hyperperfusion.

### Peripheral bypass surgery

Assess the hemodynamics and vessel morphology intraoperatively with TTFM and HFUS. The primary aim with peripheral bypass surgery is to secure both short- and long-term graft patency and avoid amputation of lower limb. If inadequate flow improvement, investigate causes with HFUS for immediate correction before closure.

### AV Access

Adequate AV flow increases the chance of a successful maturation. If flow is low, you may investigate causes with HFUS for immediate correction. Intraoperative completion control has been demonstrated to reduce the risk of primary failure rate.

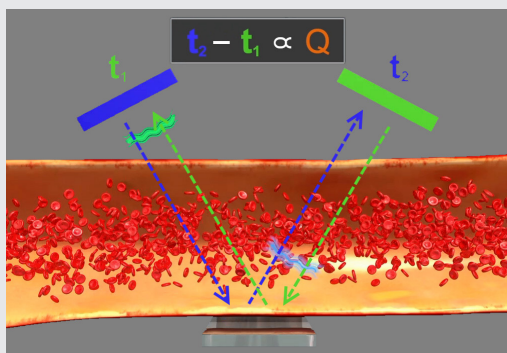
### Dual technology for optimal insights

Medistim's **L15 High-frequency Ultrasound Imaging Probe** provides high-resolution images that allow the surgeon to assess morphology. Medistim's TTFM probes utilize transit time technology to accurately measure blood volume flow intraoperatively. Combining the spatial information from ultrasound imaging and quantitative data from TTFM enables the surgeon to make informed decisions, and revise when necessary.

### TTFM - a proven technology

TTFM technology provides:

- Objective and reliable data
- Robust and user independent
- Easy to use

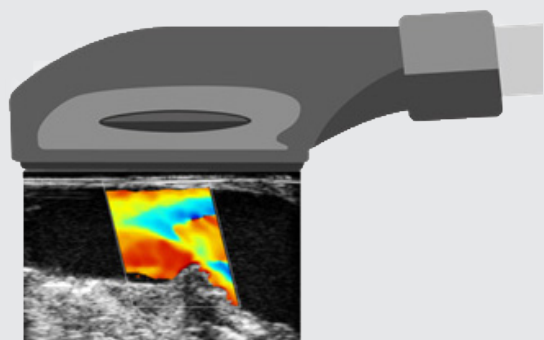


The TTFM principle is based on measuring the difference between upstream and downstream transit time of a wide ultrasound beam. The transit time difference is directly proportional to the blood volume flow. This measurement principle gives an accurate quantification of the real time volume flow that complements the ultrasound imaging.

### High-frequency ultrasound imaging

Medistim HFUS provides:

- High-resolution, near-field images during surgery
- Probe head designed for small incisions
- Reusable and sterilizable probe



Ultrasound imaging generates images by transmitting ultrasound pulses and receiving echoes from the pulses as they travel through the body. The received echoes are used to create an image of the target area. The color flow mode uses the Doppler effect to detect and visualize blood flow. Pulsed Wave (PW) Doppler uses the same principle to estimate blood flow velocity.

# MiraQ Vascular

Specialized design for vascular applications

A flexible monitor display arm provides optimized visibility. The screen can be rotated to suit both the surgeon's and operator's needs.

Connect to external screens and the hospital information systems

Spatially efficient design allows for flexible system placement and movement in the operating room



Easy access to imaging and flow data through optimized screen view and interactive user interface

Use a *Guided Workflow* for a simplified approach

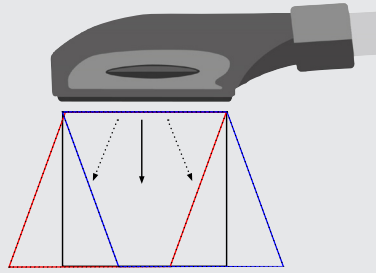
Practical storage for user manual and interface cables

A flexible feature selection allows for tailor-made solutions

The Medistim MiraQ™ Vascular System may be delivered as a 'Flow only' system, but can easily be upgraded on-site to include an imaging module at a later stage

**Spatial compound imaging**

High quality images



**Enhanced image quality**

Spatial compound imaging reduces speckle, improves definition and decreases image noise.

**Reduce imaging artifacts**

Make wall shadowing and enhancements less prominent.

**Easier data interpretation**

By smoothing the speckle in an image, compounding makes it is easier to interpret what you see.

**Vascular adapted interface**

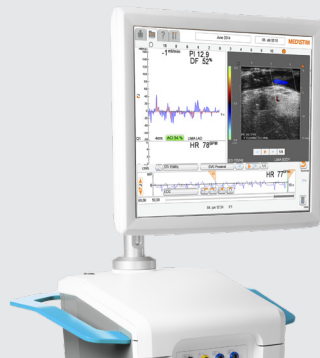
Designed for ease of use



Quick and easy selection of surgical procedure allows for simple measurement setup.

**Side by side comparison**

Before and after



Use the side-by-side feature to compare any measurement against a reference measurement. Evaluate improvement and perform functional tests on the grafts.

Store and report the compared results with all values and indexes easily accessible.

**Upgrade to imaging**

Modular design

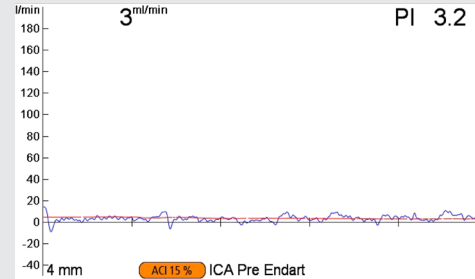
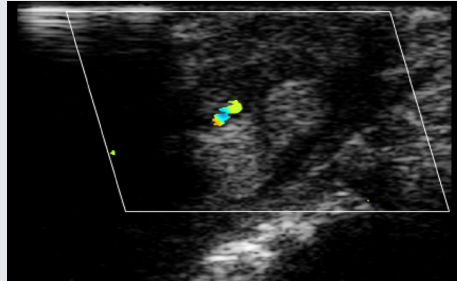


The Medistim **MiraQ™ Vascular** may be delivered as a “Flow only” system, but can easily be upgraded on-site to include an imaging module at a later stage.

# MiraQ™ Vascular gives surgeons ultimate control, enabling planning, navigation and verification during vascular surgery.

## Intraoperative guidance

See and measure



The **MiraQ™ Vascular** System provides a comprehensive overview of the situation at hand.

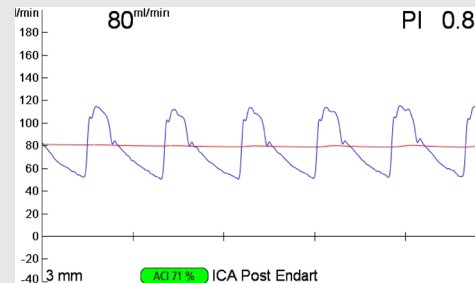
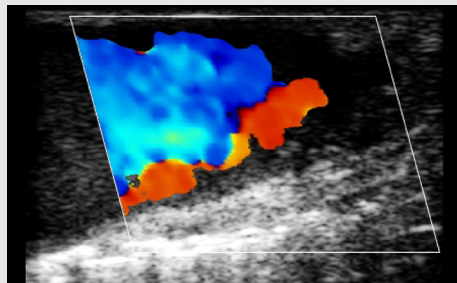
Ultrasound imaging is a valuable tool for visualization and evaluation of the stenosis and the completed endarterectomy.

In the CEA procedure presented here, ultrasound imaging and TTFM was used to verify the location and severity of a stenosis prior to endarterectomy.

The color flow indicates little or no flow, and this is verified by a TTFM measurement.

## Verification

While in the OR



An image of the carotid artery can reveal otherwise unseen imperfections and give the surgeon a chance to take appropriate actions.

The post-endarterectomy measurements above clearly show a successful removal of the stenosis and a greatly improved flow.

## Demonstrate quality

For best surgical outcomes



Using surgical guidance and quality assessment with imaging and TTFM are in line with high quality standards.

**Medistim MiraQ™ Vascular System**

**MQV1 -Standard configuration**

Profile	Channel configuration	System features
Vascular adapted interface with imaging and flow	Imaging 2 Flow 1 Pressure	Ultrasound imaging <ul style="list-style-type: none"> <li>• B-Mode imaging</li> <li>• Color Doppler imaging</li> <li>• Pulsed Wave (PW) Doppler</li> </ul> Transit Time Flow Measurement Pressure Measurement * Guided Workflow

**MQV0 - Standard configuration**

Profile	Channel configuration	System features
Vascular adapted interface with flow only	2 Flow 1 Pressure	Transit Time Flow Measurement Pressure Measurement * Guided Workflow

\* Pressure channels are intended to be connected to a transducer to measure pressure directly.

**Customizable**

Options	MQV1 Factory configuration	MQV0 Factory configuration
2 extra flow channels	✓	✓
1 Doppler channel		✓
1 extra Pressure channel	✓	✓
1 AUX channel	✓	✓
2 AUX channels*	✓	✓
Printer support	✓	✓
Printer support and color printer	✓	✓
DICOM interface	✓	✓



\* AUX channels are designed to receive signals from other monitoring systems, such as ECG and pressure.

**Field Upgrade Module**

Name	System features
Ultrasound Imaging Upgrade Kit*	Add ultrasound imaging module to a flow-only system

\* When a flow system with Doppler is upgraded, an ultrasound imaging module will be substituted in its place.

**References**

1. Burnett MG, Stein SC, Sonnad SS and Zager EL. Cost-effectiveness of intraoperative imaging in carotid endarterectomy. *Neurosurgery*. 2005 Sep;57(3):478-85.
2. Ihlberg L, Albäck A, Lassila R and Lepántalo M. Intraoperative flow predicts the development of stenosis in infrainguinal vein grafts. *J Vasc Surg*. 2001 Aug;34(2):269-76.
3. Lundell A and Bergqvist D. Prediction of Early Graft Occlusion in Femoropopliteal and Femorodistal Reconstruction by Measurement of Volume Flow with a Transit Time Flowmeter and Calculation of Peripheral Resistance. *Eur J Vasc Surg* 7, 704-708 (1993).
4. Zanow J, Petzold K, Petzold M, Krueger U and Scholz H. Flow reduction in high-flow arteriovenous access using intraoperative flow monitoring. *J Vasc Surg*. 2006 Dec;44(6):1273-8.

All products mentioned in this brochure are in compliance with the European Medical Device Directive 93/42/EEC. Please refer to the User Manual for indications, contraindications, warnings, precautions, and further specifications and descriptions. Specifications may be changed without notice. For a list of flow probes for other applications, contact your Medistim representative.

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