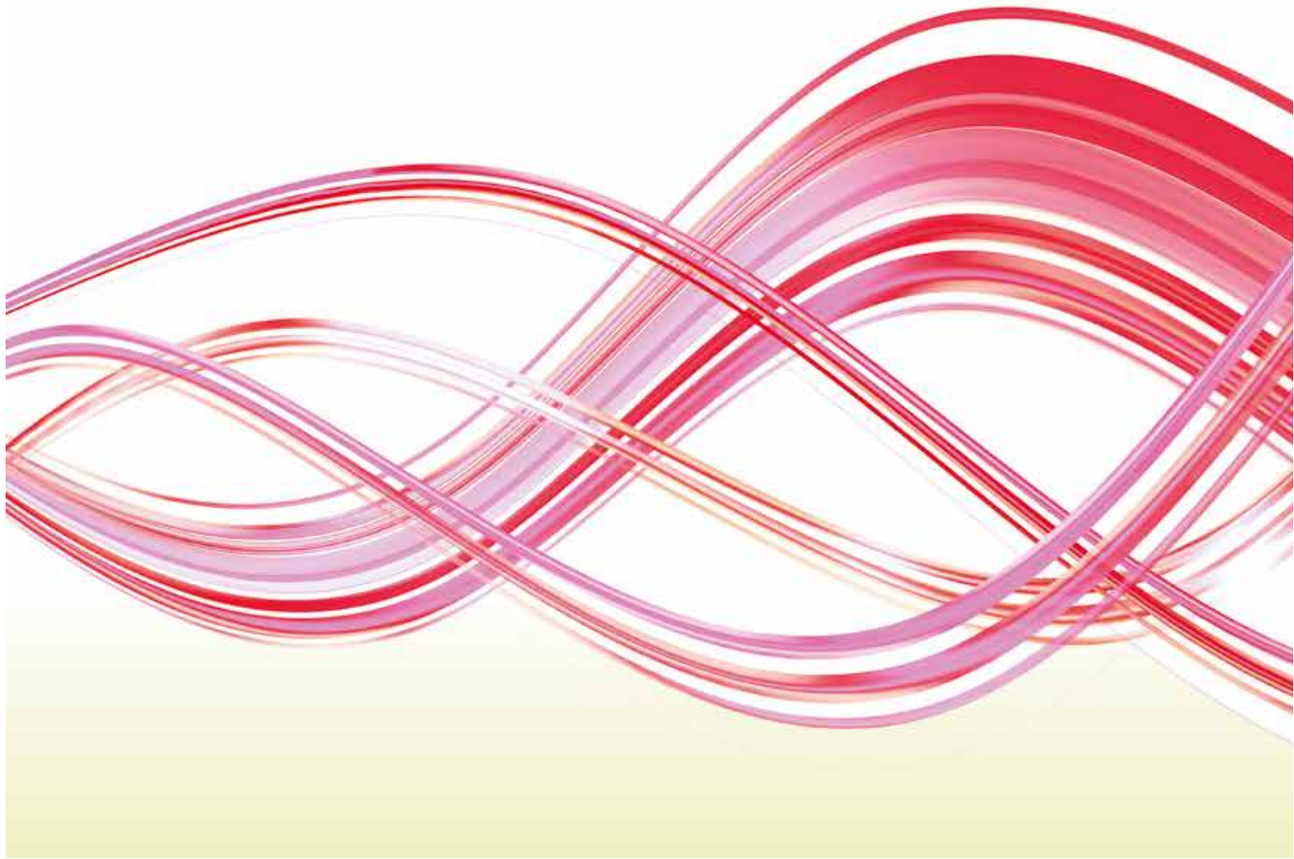
OMEGAFLO-Lab

Nothing measures like the OMEGAFLO-Lab.



Computer-based FFT Laser Blood Flowmeter

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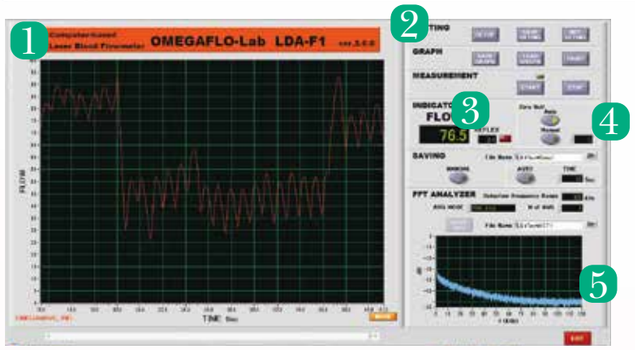
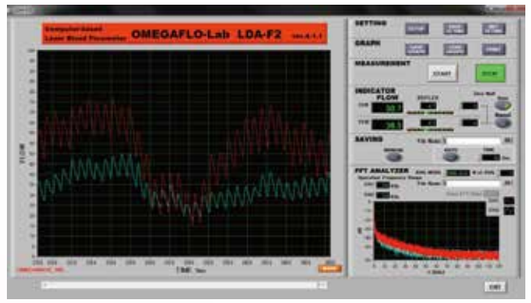


《1 ch type》



《2 ch type 》

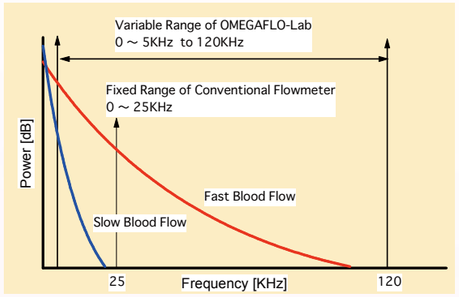
1 Tissue blood flow chart
Change of tissue blood flow is shown.
Minimum potting time is 0.1 sec.

2 SETTING
SET UP for measurement condition and saving

3 Indicator FLOW value is shown.

4 Zero Null Function
Selection of Auto or Manual
Offset caused by the noise is cancelled automatically by Auto.

5 FFT ANALYZER
FFT chart of detected electric signal Range of frequency for calculation Averaging
Saving FFT data



Theory

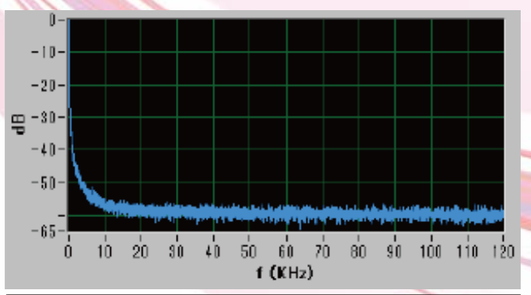
When living tissue is irradiated by laser light, the laser light is scattered by static tissue and red blood cells inside the tissue. The combined scattered laser light from the static tissue and flowing red blood cells fluctuates, and the fluctuation is in almost proportional to the velocity and the number density of the red blood cells.

Laser light is scattered many time by static tissue, and the laser light loses its directionality before colliding red blood cells. Also, the blood flow directions are not unity in microcirculations. Therefore, the detected scattered light does not include the information of the direction, and the electric signal converted from the optical signal has the broad frequency characteristic. The characteristic is in low range of frequency when the blood flow speed is slow, and higher range of frequency when the blood flow speed is fast.

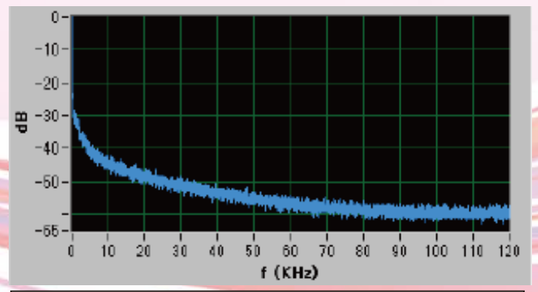
A conventional laser tissue (Doppler) blood flowmeter composed by hardware has a certain detection frequency range (~ about 25KHz). When slow speed blood flow tissue is measured by the conventional blood flowmeter, the frequency signal from slow speed is in lower range of about 10 KHz, and the noise over 10KHz decreases the S/N ratio. Therefore, small blood flow change cannot be observed. When fast speed blood flow tissue is measured, the frequency signal exists over 25 Hz and the blood flow value is underestimated.

OMEGAFLO-Lab shows the frequency characteristic of a raw electric signal by FFT, and the most suitable detection frequency range for the calculation of tissue blood flow can be set by users. The maximum detection frequency range of OMEGAFLO-Lab is 120 KHz, and the range can be set ever 5 KHz from 5KHz.

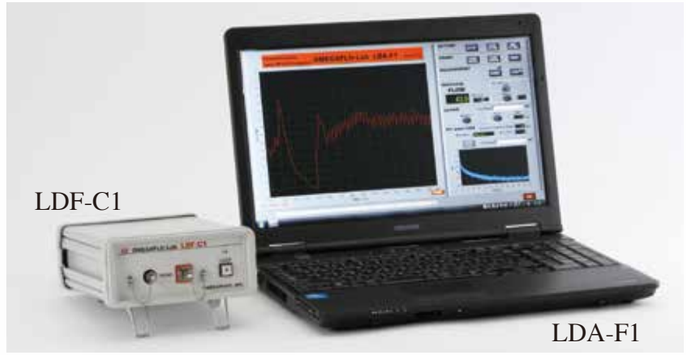
This function enables to measure slow speed blood flow in high S/N ratio, and to prevent the underestimation for fast speed blood flow.



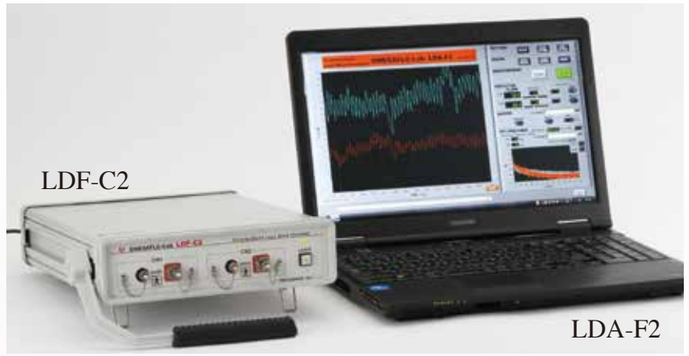
FFT graph of forearm skin blood flow



FFT graph of finger skin blood flow



《1 ch type》



《2 ch type 》

Special Feature

1. Setting function of frequency range
Operation frequency range of detected signal can be set by confirming FFT chart, and high S/N ratio measurement is possible.

2. 120 KHz range of detection frequency
Higher frequency can be detected compared with a conventional laser blood flowmeter, and fast blood flow tissue is measured.

3. Auto zero adjustment
Offset noise generated from the laser - detector unit, LDF-C1, is automatically cancelled.

4. Easy saving of data
System is compact because the calculation, display and saving are operated by the computer-based signal processor, and no data acquisition is needed.

5. Saving of FFT data
FFT data of the detected light signal can be saved, and it is used for confirmation of the raw data.

6. USB power supply
The power for FLO-Lab is supplied from USB output of the computer-based signal processor. AC power is just needed for the computer-based signal processor.

7. Channel selection function for 2ch type.

8. Probes for FLO series can be used.

Patent No. 6045100 (Japan)

Hardware

Computer-based signal processor	
Power	100~240 VAC, 50/60Hz、about 15W
Size	about 380 × 40 × 250 mm(W×H×D)
Weight	2.6 Kg
OS	Windows 11
CPU	Intel Core or AMD Ryzen
Memory	over 8GB
Hard disk drive	512GB
DVD	Multi (external)
Display size	15 ~ 17 inch
Resolution	1920×1080
Laser unit box	
Laser	Wavelength : 780nm, semiconductor laser, CLASS 1M, 2ch type has two lasers
A/D converter	16 bit, USB
Optical connector	FC
Fiber optic probe	100/140 μm、Silica GI
Power	1 ch type : 5V DC, 0.4A, 2 ch type : 5VDC, 0.8A
Size	1 ch type : 155 x 58 x 202(W×H×D) 2 ch type : 370 x 66 x 280(W×H×D)
Weight	1 ch type : 1kg 2 ch type : 1.5kg

Measurement

Measurement	Tissue blood flow (FLOW) 0 - 1000 (mL/min/100g corresponding)
Detection frequency range	0Hz ~ 120kHz
Operating frequency range	5kHz ~ 120kHz every 5kHz pitch
Plot interval	0.1, 0.2, 0.5, 1, 2, 5, 10 sec
FLOW display time	10 ~ 600 sec selectable
Analog output	FLOW : 0 - 10 V
Measurement area	inside about 1 mm circle
Measurement depth	about 0.5mm - 1mm frtom surface (depends on tissue)

Application

- Cerebral blood flow
- Blood flow of internal organs
- Skin blood flow
- Spinal cord blood flow
- Gingiva blood flow
- Vasodilation and ischemia
- Environmental effect