

# BLF22 Technical Note

## Data Recording from Tissue Perfusion Monitors

### WAVEFORM VS. POINT RECORDING

Before selecting a means of recording, it is important to establish the purpose. If the purpose is to learn the maximum about the system under study, waveform recording should be the choice. If, however, the purpose is to monitor the relative perfusion to a site for gross changes, periodic single point sampling (or periodic waveform recordings) may be the right choice.

Viewing or recording the signal waveform can help to validate averaged measurement readings by differentiating spiky waveform aberrations that are likely the result of motion artifact from regular heart beat synchronous pulsatility that is indicative of tissue perfusion measurements from most vascular beds. Generated from the analog or digital output, the waveform is updated continuously, whereas the front panel display is only updated 2.5 times per second.

### HAND RECORDING

For some procedures, hand recording of data from the digital display will suffice. One way of doing this is to watch the display for a set period (example, 30 seconds) and to record the lowest value seen during that period. The reason to use the lowest value is that all artifacts cause the reading to increase. Taking the lowest reading does cut off "normal" elevations in perfusion that are not artifacts, but this is an acceptable method as long as the user understands this assumption.

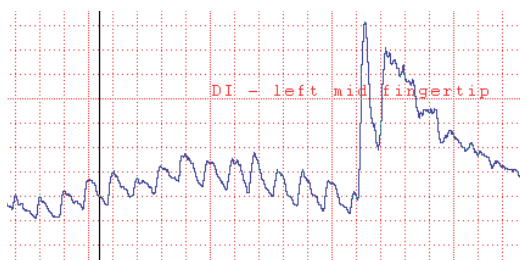


Chart recording of fingertip perfusion

### DIRECT DIGITAL RECORDING

The BLF22 has a USB port for digital data recording using a PC Computer with optional WinDaq data acquisition software. Instructions for setting up and using the BLF22 with WinDaq Transonic® Data Acquisition Software by DATAQ are in the Research Supplement (LD-1-hb).

### CHART RECORDER

For recording waveforms as well as instantaneous voltage output, a chart recorder may be used. Connect the BLF22 rear panel analog (DC voltage) BNC output port(s) to the recorder. In order to set up the recorder one needs to realize that the output is in DC voltage and that the absolute quantity of the voltage must be recorded. Select "0 CAL" mode ( $0.00 \pm 0.01$  V) on the BLF22 and adjust the recorder position so that the pen is at the lower edge of the chart paper. Use the [Mode] switch to select "+ CAL", this sends a  $1.00 \pm 0.01$  volt signal which corresponds to 10% of full scale (10.0 TPU). Adjust gain for desired TPU range. The recorder must be set up correctly, or risk loss of data (off scale readings: too much gain), loss of resolution (not enough gain) or "overlapping" waveforms (too slow chart speed). Among the settings may be:

- AC or DC voltage (select DC)
- Gain or Sensitivity (volts/div) selected for anticipated readings
- Zero position
- Chart speed

## Analog-to-Digital Converters

A variety of Analog-to-Digital Converters with accompanying software maybe used to acquire data from the BLF Monitors. ADInstrument's PowerLab® with LabChart® works well with the BLF22; however, it is important to choose a system which best meets the user's specific research or clinical needs.

Factors to consider when choosing an A/D Converter include:

- Number of channels
- Available sample rates
- Bit conversion factor (12-bit minimum)
- Software functions
- GLP or GCP compliance

Setting up the A/D Converter to work with the BLF Tissue Perfusion Monitor.

1. Connect the Monitor's back panel analog output(s) to the A/D Converter.
  - a. Flow (BLF21 and BLF22)
  - b. Mass (BLF22 only)
  - c. Velocity (BLF22 only)
  - d. Received light is an indication of signal strength (BLF22 only). This is not controlled by a time constant switch. The received light output is a useful indicator of continuity of Probe placement.
2. Put the time constant switches in their desired position (0.1, 1, 3 sec.).
3. Prepare the A/D Converter for operation by selecting a sample rate high enough to not clip data peaks.
4. Calibrate the signal transfer. Turn the Monitor **[Power]** switch on. Turn on the A/C Converter and computer.
  - a. Push the **[Mode]** button to engage the "0 CAL" indicator. The front panel display shows "0". Select the 2 point calibration feature of your software and set each channel to calibrate  $0 \pm 0.01$  V to 0 TPU (flow).
  - b. Push the **[Mode]** button in the "+ CAL" position. Similarly, select the 2nd referecne point calibration:  $1 \pm 0.01$  volts is equal to 10% of full scale reading of flow/mass/velocity as indicated on the front panel digital display (flow = 10 TPUs, mass = 200, velocity = 1).
5. Switch to "MEA" **[Mode]** to begin data acquisition.



Transonic Systems Inc. is a global manufacturer of innovative biomedical measurement equipment. Founded in 1983, Transonic sells "gold standard" transit-time ultrasound flowmeters and monitors for surgical, hemodialysis, pediatric critical care, perfusion, interventional radiology and research applications. In addition, Transonic provides pressure and pressure volume systems, laser Doppler flowmeters and telemetry systems.

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