

## Introduction

Thank you for purchasing UltraSoundGate 416. This device allows high-speed data acquisition at sampling rates of up to 750 kHz. In conjunction with the accompanying software Avisoft-RECORDER USG, sound-activated direct-to-disk recording and real-time spectrogram display is supported. The integrated high-quality analog-to-digital converter with adaptive anti-aliasing filter provides best performance. The trigger button supports remote-controlled harddisk recording. The rugged and compact design and the USB interface make this device the optimal choice for portable ultrasound recording in the field.

## Installation procedure

### Hardware Installation

Simply connect the UltraSoundGate to an USB port. An **USB Audio Device** and a **HID device** will be detected automatically. On the device, the green **POWER** LED should light and the amber LED labeled **REC** should flash once it is connected to the PC. There is no further user-interaction required. Only in Windows 98, the **Add New Hardware Wizard** dialog box will appear and you should follow the the instructions. To check, whether the device has successfully been installed you may go to "Start->Settings->Control Panel->System->Device Manager". Check the "USB Audio Device" under "Sound, video and game controllers" and the "Input devices (Human Interface Device)". There should appear an "USB-HID (Human Interface Device)" representing the trigger button.

### Software installation

If you have also purchased the recording software "Avisoft-RECORDER USG", that is required to use the trigger button, you will need to install the Avisoft software from the accompanying CD-ROM. In Windows 2000 and XP you have to log on as Administrator. The installation program setup.exe (which usually starts automatically) will install both the Avisoft-RECORDER and the SASLab Pro software.

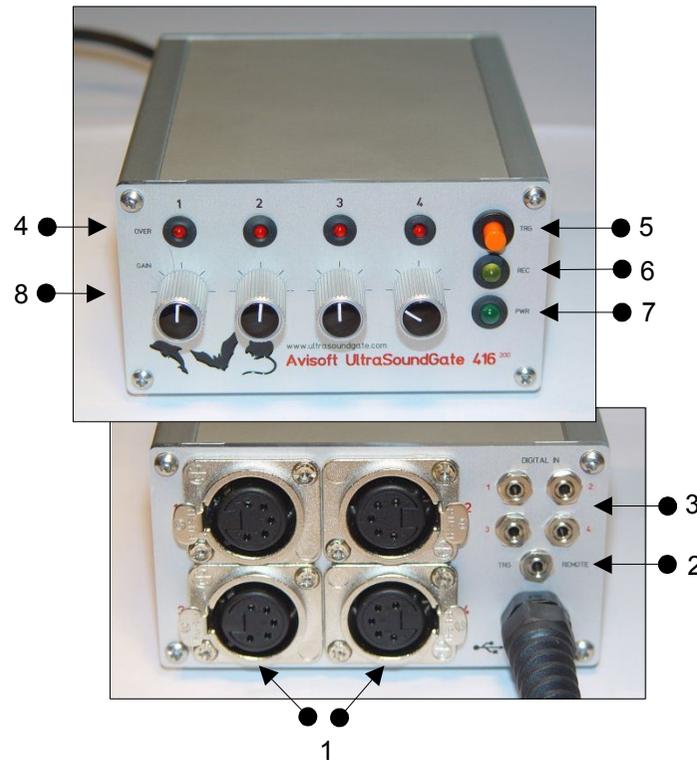
## Getting started

The UltraSoundGate device appears to the PC as a standard audio recording interface. Therefore, any sound recording application can be used to operate this device. However, please note, that only certain sampling frequencies are supported (see table *Sampling rates, resolutions & oversampling*).

The recording software **Avisoft-RECORDER USG** is specifically adopted to this device and will support all UltraSoundGate features. After installation, this software can be launched from **Start / Programs / Avisoft / RECORDER USG (rec\_usg.exe)**.

First go to **Options / Configuration** and select the desired sampling rate from **Input-Device Settings / Sampling rate**. Click **Ok**. Then click at the Pause button (**Monitoring/Pause**) and the Start button (**Monitoring/Start**). You will then see the real-time spectrogram displaying data acquired by the UltraSoundGate. For details on the operation of the RECORDER software see the Avisoft-RECORDER manual and the section **Software Settings** in this guide.

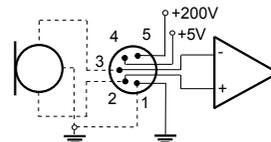
## Components of the UltraSoundGate 416-200



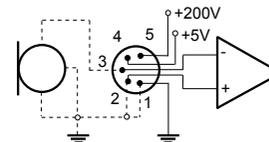
### 1 XLR input connectors

The 5-pole XLR input connectors represent the analog inputs of the recording device and provide power supply voltages for external amplifiers and microphones. The connector scheme is as follows:

- 1 Ground
- 2 Positive input
- 3 Negative input
- 4 +5V supply voltage (max current 20 mA)
- 5 +200V polarization voltage (only model 416-200)



differential source



single-ended source

### 2 TRG REMOTE

This 2-pole (mono) 2.5 mm mini-jack connector is electrically connected to the TRIGGER button (5) and allows connecting an external trigger. This input is TTL-compatible (there is an internal pull-up resistor of 10 kOhm to +5V). Pulling this input to ground (e.g. by closing a switch) will activate the internal virtual joystick button.

### 3 DIGITAL INs

These 2-pole 2.5mm mini-jack connectors allow to connect external digital signals. These inputs are TTL-compatible (internal pull-up resistor of 10 kOhm to +5V). The status of the digital inputs is stored in the LSB (bit 0) of the 16-bit data words that are transmitted over the USB and can be extracted afterwards by the Avisoft-SASLab Pro sound analysis software (e.g. for creating labels). The digital input is not available in the 8-bit recording mode. Once a plug is connected to this digital input, the available resolution is reduced to 15 bits (the LSB is discarded).

### 4 Overload indicators

These red LEDs indicate clipping (over-modulation).

### 5 TRIGGER button

The silver-colored trigger joystick button is represented to the operating system as a standard joystick button that can be used to start and stop hard-disk recording in conjunction with the Avisoft-RECORDER software. To enable this mode of operation, the trigger type **Joystick button1 / USG Button** must be selected from the Configuration dialog (menu **Options/Configuration**). If the TRIGGER button is pressed for more than two seconds, the virtual joystick button1 will be activated permanently. This is indicated by the flashing REC indicator (6). The virtual button1 can then be reset (stop recording) by pressing the TRIGGER button again (the amber LED will be switched off). This feature may be useful for recording longer sequences. If this auto-hold behavior is not desired, one of the other virtual joystick buttons may be used instead:

- button1: represents the state of the button for the first 2 seconds, then auto-hold mode
- button2: represents the state of the TRIGGER button (no auto-hold)
- button3: represents the inverse state of the TRIGGER button (no auto-hold)
- button4: changes its state each time the TRIGGER button is pressed (toggle mode)

### 6 REC indicator

This amber LED will flash once the device is connected to the PC. It will be switched off permanently when a sound recording application is streaming audio data. It will light again permanently as long as the TRIGGER button is being pressed (representing the state of the joystick button). If the TRIGGER button is pressed for more than 2 seconds, it will start to flash.

### 7 POWER indicator

This green LED will light as long as the device is connected to the USB. In case the computer or HUB is unable to provide the required supply current (because there are other devices connected or the batteries of the laptop are empty), this LED will be switched off.

### 8 Recording level controls

These control knobs adjust the analog input recording levels for each channel.

### 9 USB connector cable

Connect the UltraSoundGate 416 to a USB 1.1 or USB 2.0 port of a computer.

## Software Settings

### Avisoft-RECORDER

For higher sampling rates it may be useful to reduce the buffer size under **Options/Configuration/Input Device Settings/Buffer**. Smaller values for this **Buffer** parameter will increase the update rate of the real-time displays.

Sound-activated recording can be arranged by selecting the **Trigger** option *level of this channel*. For remote-controlled triggering via the trigger button on the device, the trigger option *joystick button1 / USG button* should be used. The joystick buttons 2, 3 and 4, which behave differently, may also be used. For triggering by a logic signal attached to **DIGITAL IN**, select *UltraSoundGate DI*.

In order to simplify the operation of the Avisoft-RECORDER software in the field, a link to **RECORDER USG** may be added to the Windows **Autostart** folder (*Start->Programs->Autostart*). Additionally, the Avisoft-RECORDER option *Monitoring/Autostart* should be activated. This arrangement will start the monitoring process automatically after booting the laptop (the UltraSoundGate device must be attached to the USB port prior to booting Windows).

### Avisoft-SASLab Pro

For recording from the main window recording command (**File/Record**) or from the real-time spectrograph window (menu **File/Real Time Spectrogram...**) first open the **Sound Card Settings** dialog box (menu **Parameters**). Select the **Avisoft-UltraSoundGate 416** (or **USB Audio Device** in Windows 2000, ME, 98) from the **active Sound Card** list box. Then select the desired sampling rate from the **Sampling Frequency** list box (see the table on the right for valid rates). Additionally, launch the **Buffer Size** dialog box from the **Parameters** menu. Activate the option *Enable Joystick button#1 / USG button*. The **Refreshing interval [%]** parameter can be reduced in order to get a smoother real-time display.

Depending on the computer power, the maximum FFT overlap for the real-time spectrogram may be limited at high sampling rates (>300 kHz). In such cases it may happen that the recording mode cannot be stopped. This problem can be solved by reducing the overlap parameter.

Please refer to the Avisoft-RECORDER and Avisoft-SASLab Pro manuals or the online help files for further details.

Avisoft Bioacoustics  
Breite Straße 20 A  
13187 Berlin  
Germany

Phone: +49 30 48476986  
Fax: +49 30 48476987  
www.avisoft.com  
www.ultrasoundgate.com  
sales@avisoft.com

## Specifications

### Available sampling rates, number of channels, resolutions & oversampling

Sampling rates [Hz]	8 Bit	16 Bit	32-fold
750000	+		
500000	++	+	
375000	++	+	+
300000	+++	++	
250000	++++	++	+
214285	++++	++	
187500	++++	++	+
166666	++++	+++	
150000	++++	+++	+
125000	++++	++++	
100000	++++	++++	+
75000	++++	++++	+
62500	++++	++++	+
50000	++++	++++	+

This table lists the available bit depths and oversampling ratios for each sampling rate. The number of crosses represents the number of available channels at each rate. The oversampling ratio will be 16-fold for those rates not marked in the 32-fold column. 32-fold oversampling will provide slightly better signal-to-noise ratios and better anti-aliasing performance.

Analog-to-digital converter type	sigma-delta with anti-aliasing filter
Number of channels	4
ADC resolutions	8 or 16 bit
Number of digital inputs	4
Analog input impedance	50kOhm
Frequency response (+-3dB)	0.05 ... 370 kHz
Maximum input sensitivity	+20mV
Supply current draw n from USB	450 mA
Physical dimensions (W/H/D)	103 * 56 * 145 mm
Weight	600 g

In the interest of product improvement, the specifications and/or appearance of this unit are subject to change without notice.

### System requirements

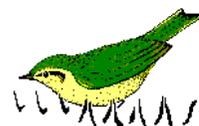
IBM-compatible PC, Pentium II, 230MHz or more with at least one USB port, running Windows2000/XP (Windows3.1 and Windows95 are not supported and Win 98/ME do not support 3 and 4 channel recording).



User's Guide Model 416-200



**Avisoft** ULTRASOUNDGATE



## End-user Agreement

**This a legal agreement between Avisoft Bioacoustics and the buyer. By operating this device and the accompanying software, the buyer accepts the terms of this agreement.**

- 1.The Device and the accompanying software is warranted to perform substantially in accordance with the operating manual for a period of six month from the date of shipment.
- 2.EXCEPT AS SET FORTH IN THE EXPRESS WARRANTY ABOVE, THE DEVICE IS PROVIDED WITH NO OTHER WARRANTIES, EXPRESS OR IMPLIED. THE VENDOR EXCLUDES ALL IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
- 3.The Vendor's entire liability and the Buyer's exclusive remedy shall be, at the Vendor's SOLE DISCRETION, either (1) return of the device and refund of purchase price or (2) repair or replacement of the device.
4. THE VENDOR WILL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES HEREUNDER, INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, LOSS OF USE, OR LOSS OF DATA OR INFORMATION OF ANY KIND, ARISING OUT OF THE USE OF OR INABILITY TO USE THE DEVICE IN NO EVENT SHALL THE VENDOR BE LIABLE FOR ANY AMOUNT IN EXCESS OF THE PURCHASE PRICE.
5. This agreement is the complete and exclusive agreement between the Vendor and the Buyer concerning the device.