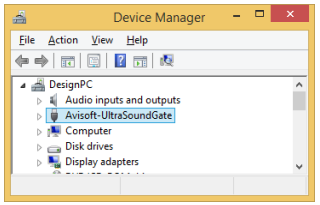
Introduction

Thank you for purchasing Avisoft UltraSoundGate 1216H. This bus-powered USB device supports 12 channel high-speed data acquisition at sampling rates of up to 750 kHz.
The accompanying recording software Avisoft-RECORDER USGH provides either continuous or triggered direct-to-disk recording with real-time spectrogram displays.

Installation procedure

First download and install the RECORDER USGH software from the Avisoft Bioacoustics website (www.avisoft.com/downloads or directly www.avisoft.com/RECORDER%20USGH.exe). This installation program will install both the RECORDER USGH application (rec_usgh.exe) and the required device drivers (usgh_xx16h.inf, usgh.sys) for the UltraSoundGate xx16H devices. When the installation procedure has completed, the UltraSoundGate unit can be connected to the computer. The device should then be detected as “Avisoft-UltraSoundGate 1216H” and the pre-installed driver should be finally activated.

Under some circumstances it might happen that the silent installation of the device driver fails. If that happens, navigate to the *Windows Control Panel* > *Hardware and Sound* > *Device Manager* and right-click at the entry *Other devices* > *Avisoft UltraSoundGate 1216H* and select the *Update Driver Software*... option. Then click at *Browse my computer for device driver software,* click at *Browse* and navigate to the folder *C:\Program Files (x86)\Avisoft Bioacoustics\RECORDER USGH\Drivers* and finally click at *Next*. The completed device driver installation will then look like this:

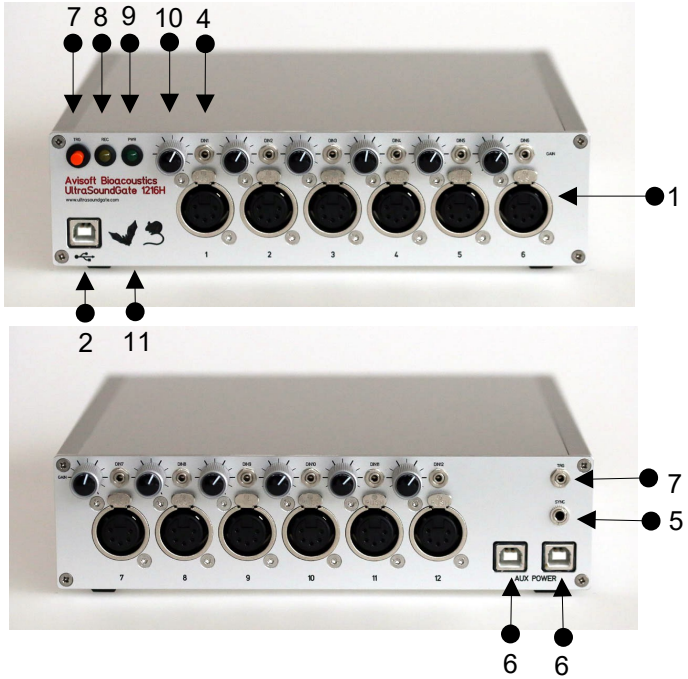


Getting started

The supplied RECORDER USGH software can be launched from **Start / All Programs / Avisoft Bioacoustics / RECORDER USGH**

On the first program start, the configuration dialog box will be launched automatically (otherwise it is available from **Options / Configuration).** Select the desired **Sampling rate** from the **Input Device Settings** section and click at **Ok.** Then click at the Pause button (**Monitoring/Pause**) and the Start button (**Monitoring/Start**). You will then see the real-time spectrogram displaying the incoming signals. To become familiar with the RECORDER USGH software use the online help system that can be accessed through the drop-down menu ***Help > Help...***, the ***Help...*** buttons on the individual dialog boxes or the website at http://www.avisoft.com/Help/RECORDER/content.htm and the section ***RECORDER USGH Software Settings*** in this guide.

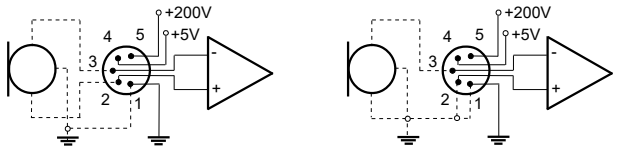
Components of the UltraSoundGate 1216H



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



2 USB 2.0 interface

Use this USB socket to connect the device to the computer. The additional USB socket (6) is an additional auxiliary power input that does not transmit any data over the USB.

3 TRG input

This 2-pole (mono) 2.5 mm mini-jack connector is electrically connected to the TRG button (7) and allows connecting an external trigger. This input is TTL-compatible (there is additionally an internal pull-up resistor of 10 kOhm to Vcc). Pulling this input to ground (for instance by closing a simple switch) will activate the logic ***USG TRG button***, which can be used as a ***Trigger*** source.

4 DIN 1...12

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 Vcc). The status of this signal is stored in the LSB (bit 0) of the 16-bit data words that are transmitted over the USB and can be used as a sample-precise trigger source in the RECORDER software. It can be extracted afterwards by the Avisoft-SASLab Pro sound analysis software (e.g. for creating labels). The digital inputs are not available in the 8-bit recording mode.

5 SYNC input/output

This socket allows to synchronize the sample clock signals of several UltraSoundGate units. To accomplish this, all devices must be connected to a single computer and one device must be configured as the master (see section *RECORDER USGH Settings* for details on this).

6 AUXILIARY POWER inputs

Due to constraints of the USB power supply specification (max 500mA) it is required to attach the USG 1216H device to 2 or 3 USB ports of the computer when more than 6 channels are activated or if the option “*Enable low power mode*” is not activated. Otherwise, the 5V supply voltage would drop below a critical level, which might prevent the proper operation of the A/D converters.

7 TRG button

This button can control the .wav file recording process in the RECORDER software. To enable this mode of operation, one of the following *Trigger* source options must be selected from the configuration dialog box:

USG TRG button auto hold : Pressing the button for more than 2 seconds will activate an auto hold mechanism (the recording continues after releasing the button and will stop once the button is pressed again). If the button is pressed for less than two seconds, it will only record as long as the button is being pressed.
USG TRG button : The software will record as long as the button is pressed.
USG TRG button inversed : The software will record as long as the button is not pressed (or as long as the external TRG signal is not active (logic high)).
USG TRG button toggled : The software will start recording once the button is pressed and continues until the button is pressed again.

8 REC indicator

This amber colored LED will flash once the device is connected to the PC. It will be switched off once the RECORDER USGH software is running the in the monitoring mode. In this mode, the REC LED indicates whether the RECORDER software is recording the incoming data onto disk.

9 POWER indicator

This green LED indicates that the unit is connected to the USB power supply.

10 GAIN control knobs

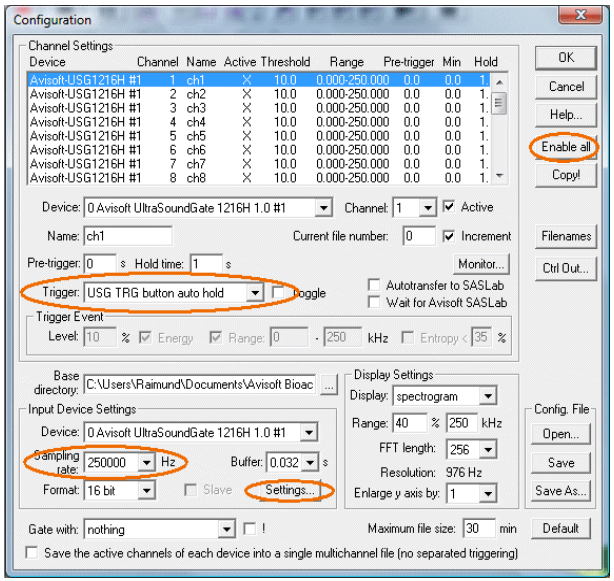
The control knobs adjust the analog input recording levels for each channel.

11 bus-powered / self-powered switch

This switch on the bottom allows selecting the powering mode of the unit. At the ***bus-powered*** setting, the unit will be powered through the main USB port connector (2) and optionally through the two additional auxiliary power connectors (6). At this setting, the power supply pins of all three USB connectors are used to power the unit, which is appropriate for bus-powered operation from a single computer (Do not connect other independent +5V power supplies in this mode!). At the ***self-powered*** setting, the main USB port connector (2) does not contribute to the power supply of the unit. Instead, one of the two auxiliary power connectors must be used to provide the required +5V supply voltage. This could be for instance a separate high-current (>500mA) AC power adapter or an USB power pack that provides a regulated 5VDC (+-0.2V) supply voltage.

RECORDER USGH Settings

The configuration dialog box can be launched from the menu Options/Configuration... or through the button



There is a list of 24 virtual channels at the top of the configuration panel. Each of these virtual channels can be assigned to a physical channel of the UltraSoundGate unit by selecting the desired ***Device*** and ***Channel*** number for each list entry. The button labeled “Enable all” will assign and activate all available channels automatically.

The sample rate can be selected from the ***Input Device Settings*** section and will always apply to all channels of the selected UltraSoundGate device. Available sample rates are 750, 500, 375, 300, 250, 214, 187.5, 166.6, 150, 125, 100, 75, 62.5 and 50 kHz.

The ***Buffer*** setting determines the USB transfer buffer size on the PC. Shorter durations will provide low real-time spectrogram display latencies but might lead to erroneous USB transfers under certain conditions.

The *Settings...* button in the *Input Device Settings* section launches the *Advanced USGH Device Settings* dialog box that provides several additional device options:

Enable master/slave mode for synchronizing several devices If you use more than one UltraSoundGate XX16H device, it is possible to synchronize their A/D converter sampling clock signals by connecting them through the SYNC sockets and activating this option (a 3 pole cable fitted with 3.5mm phone plugs not longer than 30 cm is required). In such a set-up, one device acts as the clock master and the other devices listen to the clock signal as slaves.

Activate slave mode for this device In the *master/slave mode*, one devices acts as the master and the others as slaves. So, this option must be disabled on the unit that should act as the master and must enabled on all other slave units (all USG XX16H devices can act either as slave or master).

Enable low power mode The A/D converter chips can optionally be operated in a power-saving mode that would increase the battery life in mobile laptop-based systems. The low-power mode slightly degrades the dynamic range performance. This option should also be activated if the USG 1216H is bus-powered from a single USB port only. Otherwise, the supply voltage might drop below a critical value, which can prevent the proper operation of the A/D converters.

Enable band-pass mode At a few sample rates (50, 62.5, 75, 150, 187.5, 250 and 375 kHz), the A/D converters can be configured for a special band-pass mode in which the analog input bandwidth ranges from fs/2 to fs instead of the normal mode from 0 to fs/2. This option can be advantageous for monitoring applications that require minimal .WAV files sizes. Note that the frequency scale of the resulting .WAV files will be reversed.

Turn on the polarization voltage This option activates the internal 200V polarization voltage generator of the UltraSoundGate XX16H devices and must be activated when using the CM16/CMPA microphones.

Ignore GetOverlappedResult error By default, the *GetOverlapped Result* error message will stop the monitoring/recording process. If this option is activated, the monitoring procedure will be immediately restarted, which is desired in long-term monitoring applications.

TRG out mode This option allows to change the I/O direction of the TRG socket. If activated, the TRG socket will be configured as a digital output that carries the state of the internal trigger or file saving state as selected from the *Control Output settings* dialog box *(Ctrl Out...* button*)*. In this case, the *USG TRG button* trigger source options will not work.

Enable safe multichannel data transfer mode Under some circumstances it might happen that the PC is unable to reliably transfer multichannel data streams through the USB interface without gaps. This can become a serious problem when the sample rates and the number of channels are high and if the latency of the Windows operating system is poor (due to insufficient processing power or misbehaving device drivers). So, if you encounter any problems while recording more than one channel (sporadically mixed-up channels), this option should be activated. The RECORDER software will then immediately correct such false channel associations. Due to certain system constraints, this option is not available at the sample rate of 750 kHz

Avisoft ULTRASOUNDGATE

UltraSoundgate 1216H

User's Guide

Sound-activated recording can be arranged by selecting the **Trigger** source option ***level of this channel***. For remote-controlled triggering via the trigger button on the device or via the external TRG input, one of the trigger options ***USG TRG button...*** can be used. For triggering by a TTL signal attached to **DIN**, select ***UltraSoundGate DI***.

The Pre-trigger duration should be kept as short as possible. Long pre-trigger settings can lead to data transmission errors if the sample rate and the number of channels is high.

In order to simplify the operation of the Avisoft-RECORDER software in the field, a link to **RECORDER USGH** may be added to the Windows ***Startup folder*** (*Start->All Programs->Startup*). 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).

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 fora period of 24 months 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 MERCHANTIBILITY 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.

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Specifications

Number of channels	12 (12 separate A/D converters)
ADC type	Delta-Sigma architecture with integrated adaptive anti-aliasing filter
Resolution	16 bit or 8 bit
Maximum aggregate sample rate	12 x 750 kHz / 16 bit
Sample rates [kHz]	750, 500, 375, 300, 250, 214, 187.5, 166.6, 150, 125, 100, 75, 62.5, 50
Frequency response (-3dB)	20 Hz - 370 kHz
Input sensitivity (max trim)	-43.2dBV = -41 dBu = 6.9 mVrms
Input sensitivity (min trim)	-3.2dBV = -1 dBu = 0.69 Vrms
Gain adjustment potentiometer	40 dB continuous range
Input impedance	50 kOhm
Analog input connectors	female XLR-5 sockets
Other inputs	external trigger (TTL-compatible), 4 digital inputs (TTL-compatible), SYNC in/out
Computer interface	USB 2.0, isochronous high-speed mode
Supply current (drawn from the USB)	1 x 500 mA or 3 x 300 mA
Physical dimensions (W/H/D)	222 x 56 x 238 mm
Weight	1.6 kg

Computer requirements

Windows PC with at least three USB 2.0 ports,
Intel Core i5 processor or higher,
running Windows Vista / 7 / 8 / 10 / 11

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

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Sample rates [kHz]	750, 500, 375, 300, 250, 214, 187.5, 166.6, 150, 125, 100, 75, 62.5, 50
Frequency response (-3dB)	20 Hz - 370 kHz
Input sensitivity (max trim)	-28.4 dBV = -26.2 dBu = 38.0 mVrms
Input sensitivity (min trim)	1.6 dBV = 3.8 dBu = 1.2 Vrms
Gain adjustment potentiometer	30 dB range with 3 dB increments
Input impedance	50 kOhm
Analog input connectors	female XLR-5 sockets
Other inputs	external trigger (TTL-compatible), 4 digital inputs (TTL-compatible), SYNC in/out
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