ZYLIA Studio PRO
Reference manual

Based on ZYLIA Studio PRO plugin version 2.1.0

Instruction revision B

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Overview

ZYLIA Studio PRO is a VST/AU/AAX plugin which enables spatial filtering and signal separation directly within a Digital Audio Workstation (DAW). ZYLIA Studio PRO, enables powerful new features for 3D audio production, sound source separation and surround recording when using the ZM1 output directly in a DAW.

<u>FREE Edition:</u> ZYLIA Studio PRO transforms a raw 19-channel **ZYLIA ZM-1** recording into a number of Virtual Microphones which are easy to steer in any direction from the point of capture. It is possible to set and monitor Virtual Microphones of multiple polar patterns or characteristics – live or during postproduction.

ZYLIA Studio PRO comes with multichannel presets that can be used in surround or ambient recordings (2.0, 3.0, 5.1, 7.1 and more), thereby making it possible to record the entire sound scene directly in 5.1 or 7.1 surround sound or derive beds for immersive audio formats such as Dolby Atmos!

<u>PREMIUM</u> Edition: **NEW since version 2.0.0:** In the ZYLIA Studio PRO PREMIUM version, the same features are additionally available for 3rd order Ambisonics b-format input signals. Amongst other benefits, this feature makes workflows available to leverage the full spatial resolution for AAX plugins. This also means that the same advanced spatial filtering and source separation techniques can also be applied to other microphone arrays.

Workflow Summary

In order to process audio previously recorded by ZYLIA ZM-1 do the following:

1. Import 19 channel recording into your DAW as a single track,
2. Add ZYLIA Studio PRO to the plugin chain of the track with your multichannel file,
3. Arrange Virtual Microphones within ZYLIA Studio PRO,
4. Route the outputs from the Virtual Microphones to new tracks in the DAW.

In order to process audio which comes directly from ZYLIA ZM-1 do the following:

1. Select ZM-1 as an input device for a new track in DAW,
2. Add ZYLIA Studio PRO to the plugin chain of the same track,
3. Arrange Virtual Microphones within ZYLIA Studio PRO,
4. Route the outputs from Virtual Microphones to new tracks in the DAW.

You can download a sample REAPER project at http://www.zylia.co/downloads.html

Important: ZYLIA Studio PRO requires 48000 Hz sample rate.

Installation

To install ZYLIA Studio PRO:

- Download the installer for your operating system from http://www.zylia.co/zylia-studio-pro-download.html

- Run the installer

- Follow the instructions in the installer

ZYLIA Studio PRO by default will be installed in:

- C:\Program Files\Common Files\VST (Windows)

- Library/Audio/Plug-ins/VST (macOS).

Before the first launch make sure that the folder with ZYLIA plugin is included in the VST scanning path of your DAW (you can usually set this path in your DAW Preferences).

Product Keys

ZYLIA Studio PRO is free plugin (new from version 2.0.0), you need a product keys for the Premium Edition only!

Product keys for ZYLIA Studio PRO Premium Edition are provided via email to customers who registered on the company website (http://www.zylia.co/register.html). If you cannot find the message with your product keys, please check the SPAM folder in your mailbox first. If it is still missing send an email to support@zylia.pl.

Activation

ZYLIA Studio PRO Premium Edition works in two modes:

- **Trial** – all Premium features are available for 7 days. The trial mode can be used once on a single computer.

- **Activated** – unlimited access to all application features.

To activate the features of the Premium Edition successfully an Internet connection is required.

To activate:

- Click on the cog icon and select Premium version.

- Enter the product key

Zylia Sp. z o. o.	support@zylia.pl	KRS: 0000270693
Mostowa 27	phone: +48612794044	REGON: 140778047
61-854 Poznań, Poland	www.zylia.co	NIP: 5252380826

- Click ACTIVATE
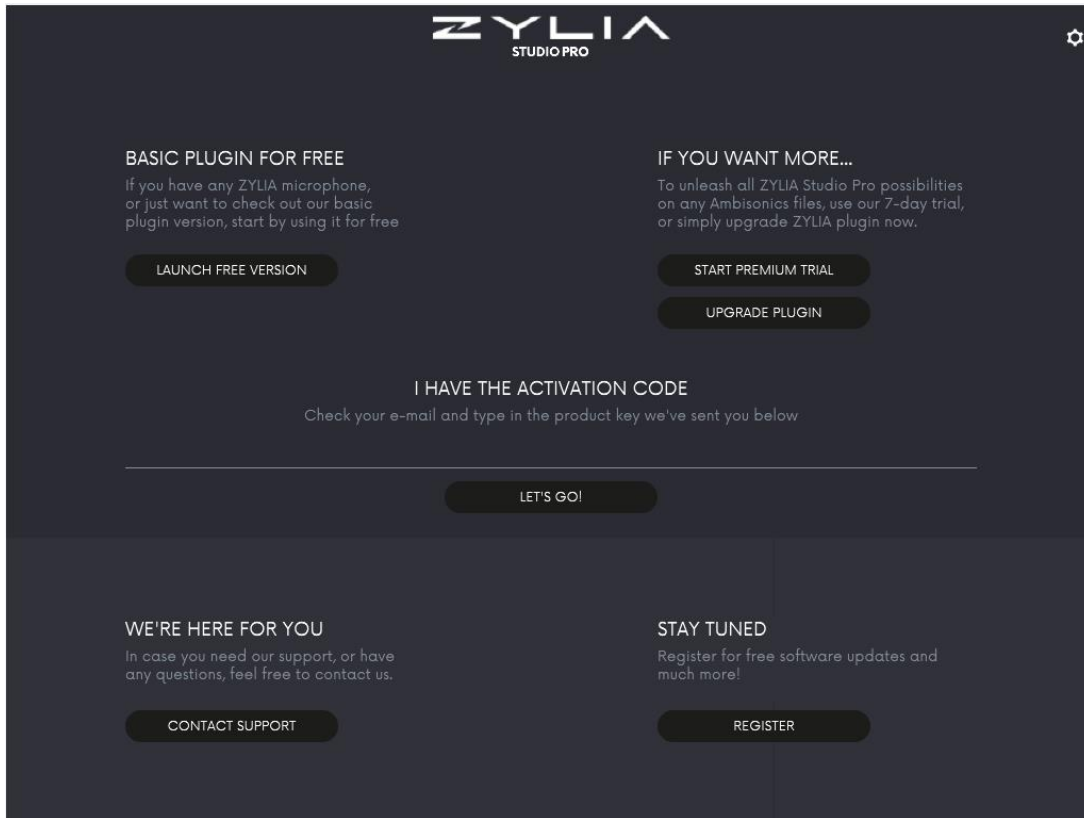
The maximum number of computers on which the Premium version can be activated is **3 times**, this is also specified in the End User License Agreement.

Deactivation

If you want to transfer ZYLIA Studio PRO PREMIUM from one computer to another you can deactivate the Premium version.

To deactivate:

- Click on the cog icon

- Choose DEACTIVATE

After deactivating you will be no longer able to use ZYLIA Studio PRO PREMIUM features on this computer. The number of deactivations is unlimited.

Plugin setup

ZYLIA ZM-1 model or Ambisonics B-format input

Due to differences between ZYLIA ZM-1 microphone models, it is important to select a proper model in the ZYLIA Studio PRO plugin. To do so, use the menu located in the top right area of the plugin window. Setting an incorrect microphone model will result in inferior sound quality. If you have the PREMIUM version, this is where you can select the Ambisonics B-format input instead.

If you are not sure which microphone model you have, please refer to your OS hardware managing facilities.

- On Windows, you can use **Device Manager** application. When connected, your microphone model should appear in *Universal Serial Bus devices* list.

- On macOS use the **Audio MIDI Setup** application. Your microphone model should appear in the **Audio Devices** window.

Virtual microphones

A virtual microphone is a software-defined microphone which combines spatial filtering and sound source separation.

Adding a virtual microphone

To create a new virtual microphone, use the **Add microphone** button near the upper right corner of the plugin window. You can add up to 24 microphones. To rename or delete the microphone click the **More options** button (indicated by three vertical dots) on the right side.

You can also use the **+** button in the middle of the radar or add the virtual microphone in the position proposed by the **SOURCE LOCALIZATION** function.

Virtual microphone positioning

To control the orientation and pattern of a virtual microphone you can use the *azimuth*, *elevation* and *width* sliders. They represent the position of the currently selected virtual microphone. The azimuth angle defines the horizontal direction of the virtual microphone, while the elevation angle corresponds to its vertical direction. The width setting determines the directivity of the microphone (see *Polar pattern* for details).

In addition, you can use the radar display to change the azimuth angle of any virtual microphone. To do so, click on the note icon and – while holding left mouse button – drag the icon around the radar display.

Source localization

Source localization is the ZYLIA Studio PRO feature which helps the user to find sound sources and position virtual microphones. The estimated position of the source is marked by the blue icon with a *+ sign*. To enable the localization function click on the **SOURCE LOCALIZATION** button in the upper left corner. Current Source localization results are sent to plugin parameters. In case of single source, its position will be sent to *Z1 DoaAzimuth* and *Z1 DoaElevation*, when second source is detected, its position will be passed to *Z2 DoaAzimuth* and *Z2 DoaElevation* etc.

Important: Source localization may not work correctly for overdriven signals. Output channel

ZYLIA Studio PRO provides multiple audio output channels. The names of these channels correspond to the plugin outputs as seen by the DAW, i.e., **Z1** is the first output. Each virtual microphone can be assigned to a single output channel. To connect the virtual microphone to output channel:

1. Select the virtual microphone from the list on the right side of the plugin window.

2. Click on output channel name (e.g., **Z2**) in the *Parameters* section below the virtual microphone list. Select a new output channel from the menu.

If you want to disable the virtual microphone, you can select the empty output channel (labeled as with a dash **-**).
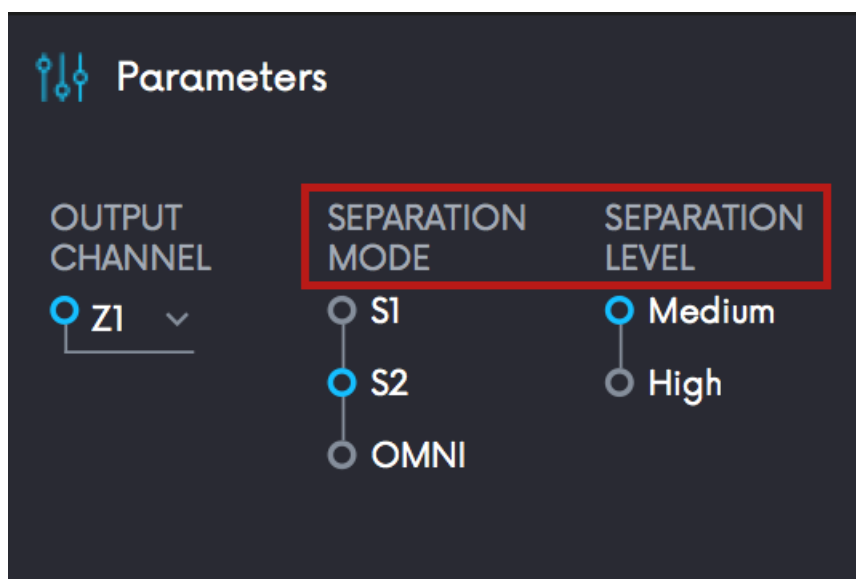
Important: Output channel setting has an effect on automation envelopes (see *Automation* for more details).

Separation parameters

The character of the sound produced by the virtual microphone is affected by the separation mode and level settings, which can be adjusted in the *Parameters* section near the bottom right corner of the plugin window.

The separation mode allows you to choose how the sound separation algorithm operates when more than one virtual microphone is set up in the ZYLIA Studio PRO.

The **S1 separation mode** is designed to cancel out sounds arriving from the directions selected by other virtual microphones than the current one. It results in better cancellation of spill from the rest of the recorded sound sources but it may be not optimal to reduce noise or reverberation. Please note, that when two sources are positioned too close to each other (less than 15°) the mode is automatically changed from S1 to S2. We recommend the S1 separation mode for recordings made in spaces with low reverberation time.

Important: Due to complex calculations, the **S1 separation mode** is designed to work with a moderate number of virtual microphones.

The **S2 separation mode** focuses on reducing all sounds arriving from directions other than the current microphone. This mode is well suited for removal of unwanted diffuse sound but might not cancel out the spill as effectively as S1. We recommend mode S2 for recordings made in more reverberant spaces, and for those situations where you work with many virtual microphones and if you plan on automating virtual microphone parameters.

OMNI mode has equal sensitivity in every angle thus azimuth, elevation and angle settings are ignored.

When the *separation level* is set to *high* additional processing is applied simulating close microphone behavior. The ambient sounds and background noises are reduced and the

separation between the sound sources is even higher.

NOTE: the separation level **high** applies a blind source separation algorithm. This is a nonlinear signal processing techniques that may alter the timbre of the sound captured by the virtual microphone.

Polar pattern

This function allows you to see approximate microphone sensitivity to sounds in relation to the angle. To enable polar pattern:

1. Select the virtual microphone from the list on the right side of the plugin window.

2. Click the **Polar pattern** button near the lower left corner of the plugin window.

Width and the separation mode have an effect on the shape of the polar pattern.

Important: since the **OMNI** profile has equal sensitivity for all angles, it's not displayed.

Polar pattern for S2 mode.   *Polar pattern for S1 mode.*

Energy map

The energy map displays acoustic energy distribution around the ZYLIA ZM-1 (it may be helpful in virtual microphone positioning). To enable it, simply click on the button near the lower left corner of the plugin window.

Important: The Energy map may not work correctly for overdriven signals.

Automation

For each virtual microphone you can automate the following parameters:

- Azimuth angle,

- Elevation angle,

- Width (directivity).

Automation envelopes are mapped to output channels. For instance, to draw the azimuth automation for a virtual microphone connected to the *Z2* channel, you need to find the *Z2 azimuth* parameter in your DAW. Bear in mind that changing the output channel won't transfer the automation settings to the new output channel.

Presets

ZYLIA Studio PRO is equipped in a set of presets. Those are pre-defined virtual microphones positions and polar patterns for music bands and surround sound applies.

Band presets

Virtual microphones in Band presets are evenly distributed around ZYLIA ZM-1 and have 20° width. The name of each preset refers to the number of microphones (e.g. **Solo** – 1 virtual microphone, **Quintet** - 5 virtual microphones).

Surround sound

Those presets are prepared for surround playback. Channel positions are defined based on the NHK 22.2 and the MPEG-H 3D Audio documentation.

Important: Surround presets don't include LFE channels, but it is possible to create an LFE channel with an OMNI polar pattern virtual microphone and a low pass filter.

Stereo Narrow			
Channel name	Azimuth	Elevation	Width
Front Left Center	30	0	60
Front Right Center	-30	0	60

Stereo Wide			
Channel name	Azimuth	Elevation	Width
Front Left	45	0	60
Front Right	-45	0	60

Stereo Binaural			
Channel name	Azimuth	Elevation	Width
Side Left	90	0	120
Side Right	-90	0	120

3.0 Surround			
Channel name	Azimuth	Elevation	Width
Front Center	0	0	120
Left Surround	110	0	120
Right Surround	-110	0	120

4.0 Quadrophonic			
Channel name	Azimuth	Elevation	Width
Front Left	45	0	90
Front Right	-45	0	90
Back Left	135	0	90
Back Right	-135	0	90

5.1 Surround			
Channel name	Azimuth	Elevation	Width
Front Center	0	0	20
Front Left Center	30	0	60
Front Right Center	-30	0	60
Back Left	110	0	60
Back Right	-110	0	60

7.1 Surround			
Channel name	Azimuth	Elevation	Width
Front Center	0	0	20
Back Left	135	0	60
Back Right	-135	0	60
Front Left Center	30	0	60
Front Right Center	-30	0	60
Side Left	90	0	60
Side Right	-90	0	60

10.2 Surround			
Channel name	Azimuth	Elevation	Width
Front Center	0	0	20
Front Left Center	30	0	30
Front Right Center	-30	0	30
Back Center	180	0	60
Top Front Left	45	45	30
Top Front Right	-45	45	30
Front Left	60	0	30
Front Right	-60	0	30
Back Left	110	0	60
Back Right	-110	0	60

5.1.4 3D Audio			
Channel name	Azimuth	Elevation	Width
Front Center	0	0	20
Front Left Center	30	0	60
Front Right Center	-30	0	60
Top Front Left	45	45	30
Top Front Right	-45	45	30
Back Left	110	0	60
Bakc Right	-110	0	60
Top Left Surround	110	45	60
Top Right Surround	-110	45	60

22.2 3D Audio			
Channel name	Azimuth	Elevation	Width
Front Left	60	0	30
Front Right	-60	0	30
Front Center	0	0	20
Back Left	135	0	30
Back Right	-135	0	30
Front Left Center	30	0	30
Front Right Center	-30	0	30
Back Center	180	0	30
Side Left	90	0	30
Side Right	-90	0	30
Top Front Left	45	45	30
Top Front Right	-45	45	30
Top Front Center	0	45	30
Top Center	0	90	60
Top Back Left	135	45	30
Top Back Right	-135	45	30
Top Side Left	90	45	30
Top Side Right	-90	45	30
Top Back Center	180	45	30
Bottom Front Center	0	-20	20
Bottom Front Left	45	-20	20
Bottom Front Right	-45	-20	20

AAX limitations

Due to the fact that Pro Tools (Pro Tools HD Only) supports a maximum of 16 channels per track since version 12.8.2, ZYLIA Studio PRO works slightly different in the AAX version than the VST/AU version. It processes the first 16 channels from a ZYLIA ZM-1 recording – the bottom three microphones are omitted. As a consequence, the plugin has limited capabilities in terms of the maximum number of virtual microphones (16 outputs), therefore the surround preset 22.2 is not available in this version.

Note: since the Premium version can take 3rd order Ambisonics b-format signals as an input, i.e. 16 channels. We suggest for the Pro Tools workflow to make the A-format (19 channels) to B-format (16 channels) conversion offline with the ZYLIA Ambisonics converter. Then the full spatial resolution will be accessible to Pro Tools users as a 16 channel B-format signal.
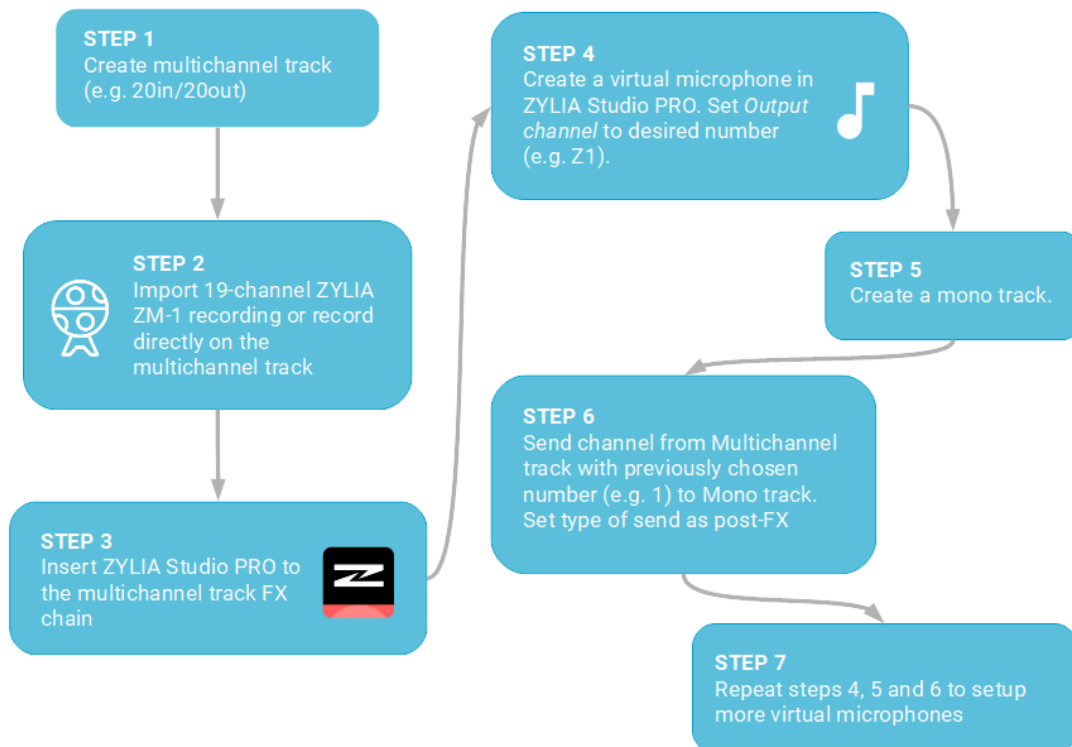
DAW session setup

ZYLIA Studio PRO is a multichannel plugin, it has 32 input channels and 24 output channels. It, therefore, requires an additional step during setup regarding the signal flow in a DAW session to work correctly.

Firstly, you need to work with a DAW that has multichannel support – at least 19 channels per track. The more virtual microphones you plan to use, the more channels per track your DAW needs to support). The minimum number of 19 channels is due to the ZYLIA ZM-1 recording format (Pro Tools specific limitations are discussed in the *AAX limitations*).

Note: when working with the PREMIUM Edition, your DAW only needs to accommodate 16 channels per track.

General DAW workflow

STEP 1
Create multichannel track (e.g. 20in/20out)

STEP 2
Import 19-channel ZYLIA ZM-1 recording or record directly on the multichannel track

STEP 3
Insert ZYLIA Studio PRO to the multichannel track FX chain

STEP 4
Create a virtual microphone in ZYLIA Studio PRO. Set *Output channel* to desired number (e.g. Z1).

STEP 5
Create a mono track.

STEP 6
Send channel from Multichannel track with previously chosen number (e.g. 1) to Mono track. Set type of send as post-FX

STEP 7
Repeat steps 4, 5 and 6 to setup more virtual microphones

More information regarding the configuration of sessions for particular DAWs is available on http://www.zylia.co/tutorials.html.

OSC Control

Overview

ZYLIA Studio Pro can send and receive OSC (Open Sound Control) messages. Parameters and plugin features that can be controlled via OSC:

- Virtual microphones parameters:

    o Azimuth

    o Elevation

    o Beam width

    o Separation mode

    o Separation level

- Microphone model

- Adding new virtual microphones

- Deleting virtual microphones

ZYLIA Studio Pro can also send OSC messages. After enabling SOURCE LOCALIZATION, the positions of localized sources will be transmitted over OSC.
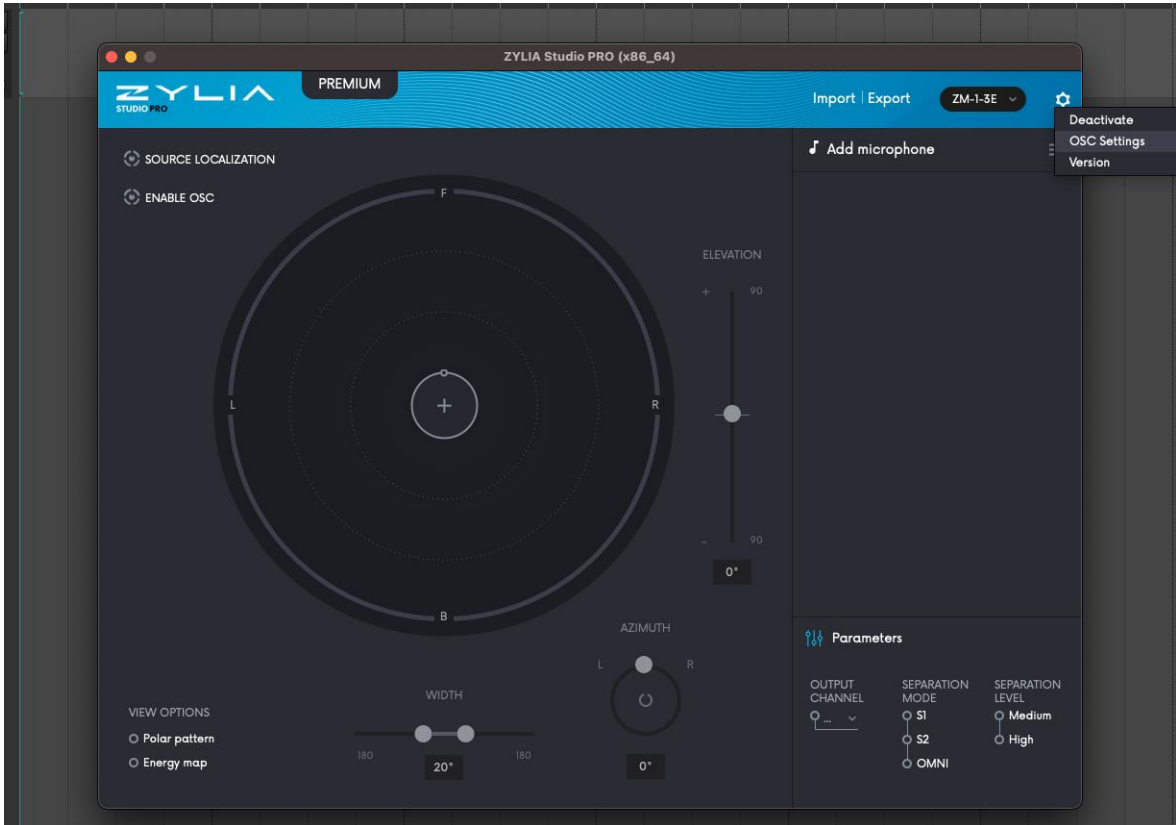
Settings

Before usage, the user needs to setup OSC parameters:

- Sender IP address

- Sender port

- Sending interval

- Receiver port

Those parameters can be set from the OSC Settings menu:
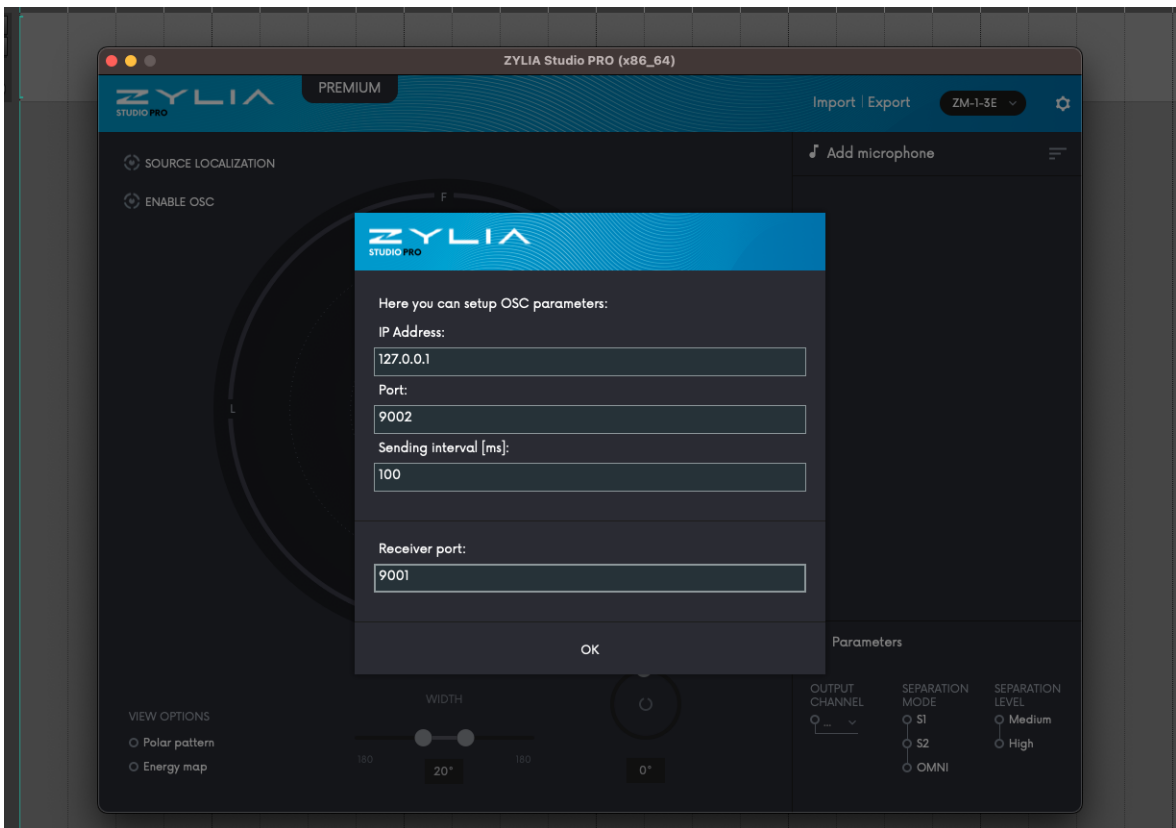
Message formats

Receiver:

- Virtual microphones parameters - /zspro/vmic

    o Azimuth - /zspro/vmic/azimuth MIC_NUMBER AZIMUTH (0-359)

    o Elevation - /zspro/vmic/elevation MIC_NUMBER ELEVATION (-90-90)

    o Beam width - /zspro/vmic/beamWidth MIC_NUMBER WIDTH (20-360)

    o Separation mode - /zspro/vmic/separationMode MIC_NUMBER S1|S2|OMNI

    o Separation level - /zspro/vmic/separationLevel MIC_NUMBER Medium|High

- Microphone model - /zspro/setModel ZM-1-1C|ZM-1-1D|ZM-1-3E|Ambisonics

- Adding new virtual microphones - /zspro/addSource NAME AZIMUTH ELEVATION

- Deleting virtual microphones - /zspro/removeSource MIC_NUMBER

Sender:

    o /zspro/numSources CURRENT_NUMBER_OF_SOURCES

    o /zspro/sourcePosition SOURCE_NUMBER AZIMUTH ELEVATION

System requirements

- 64-bit Intel system
- Operating system:
    - macOS X 10.9 to the latest
    - Windows 7, 8.1, 10
- Minimum 2 GB RAM
- 2 GB of free space for ZYLIA Studio PRO installation
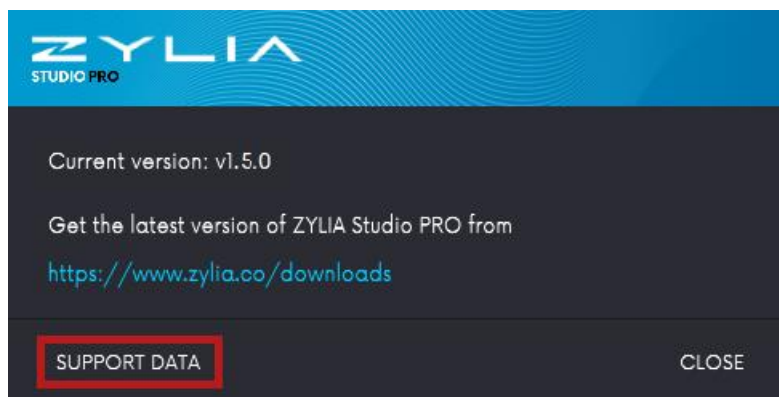
Additional information

ZYLIA Studio PRO end-user license agreement (EULA) is available on the company website (http://www.zylia.co/zylia-studio-pro-download.html)

If you require any additional information or if you encounter any technical issues, feel free to contact support@zylia.pl.

Support data export

To export a file with the ZYLIA Studio PRO support data:

- click on the cog icon in the upper right corner of the plugin
- choose *Version and updates*
- click on *SUPPORT DATA* button and save the file.