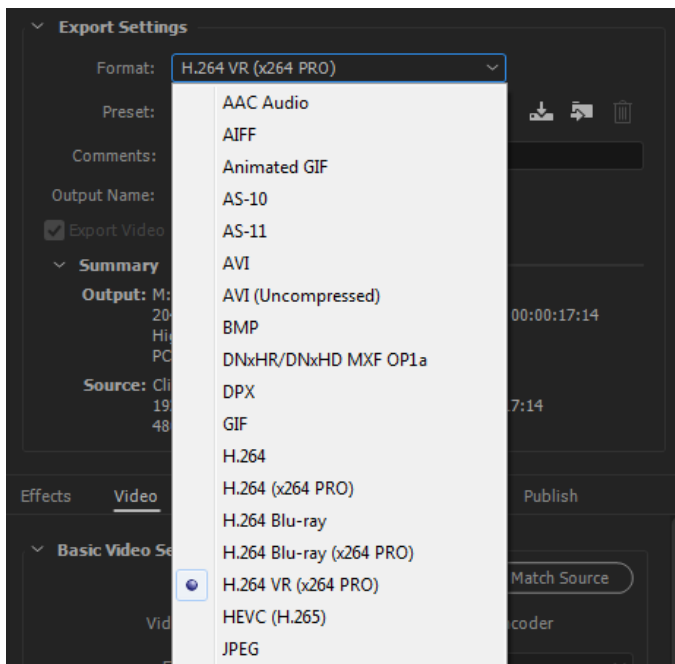


x264 PRO

x264 PRO^{BD}

x264 PRO^{VR}

User Guide



x264 PRO and x264 PRO^{BD} are in the Format drop-down box next to their respective Adobe default plug-ins that they replace.

x264 PRO is a very flexible H.264 and audio encoder. It is labeled “H.264 (x264 PRO)”.

x264 PRO^{BD} is an H.264 encoder that enforces the Blu-ray specification. It is labeled “H.264 Blu-ray (x264 PRO)”.

CC 2015 and above:

x264 PRO^{VR} is an H.264 encoder that extends the H.264 standard to allow greater than 4K resolution as well as the necessary information for players to understand that the video is VR. Both 2D and 3D are supported. Ambisonic 1st order (4ch) spatial audio is also supported. It is labeled “H.264 VR (x264 PRO)”.

TIP: Stereo 8k is the equivalent of eight 1080p videos all at the same time. It needs a lot of very fast RAM in the system.

Due to the settings required to make H.264 8K work the encoder does not run across a lot of CPU cores very well. Thus a 4core overclocked Intel Core i7 will encode faster than a Xeon with 6,8,10,12 or more cores running at lower clock speed even though overall core * clock is faster than a 4 core i7.

Intel Skylake Core i7 6700K is recommended.
DRAM 2133MHz or above is recommended.

Recommend RAM

8K x 8K	32GB
8K x 4K	16GB
4K x 4K	16GB
4K x 2K and below	16GB

Preset Name	Format	Frame Size	Frame Rate
User Presets & Groups			
System Presets			
Broadcast			
H.264			
Match Source - Draft Output	H.264 (x264 PRO)	Based on ...	Based on ...
Match Source - High Constant Quality	H.264 (x264 PRO)	Based on ...	Based on ...
Match Source - Low Constant Quality	H.264 (x264 PRO)	Based on ...	Based on ...
Match Source - Medium Constant Quality	H.264 (x264 PRO)	Based on ...	Based on ...

x264PRO Presets:

Presets for each of the three plugins are provided that help you get sensible settings for the plug-in’s purposes.

Preset Name	Format	Frame Size	Frame Rate
User Presets & Groups			
System Presets			
DVD & Blu-ray			
Blu-ray			
HD 720p 23.976	H.264 Blu-ray (x264 PRO)	1280x720	23.976 fps
HD 720p 50	H.264 Blu-ray (x264 PRO)	1280x720	50 fps
HD 720p 59.94	H.264 Blu-ray (x264 PRO)	1280x720	59.94 fps
HD 1080i 25 (1.33 PAR)	H.264 Blu-ray (x264 PRO)	1440x1080	25 fps
HD 1080i 25	H.264 Blu-ray (x264 PRO)	1920x1080	25 fps
HD 1080i 29.97 (1.33 PAR)	H.264 Blu-ray (x264 PRO)	1440x1080	29.97 fps
HD 1080i 29.97	H.264 Blu-ray (x264 PRO)	1920x1080	29.97 fps
HD 1080p 23.976 (1.33 PAR)	H.264 Blu-ray (x264 PRO)	1440x1080	23.976 fps
HD 1080p 23.976	H.264 Blu-ray (x264 PRO)	1920x1080	23.976 fps
Match Source - Draft Mode	H.264 Blu-ray (x264 PRO)	Based on ...	Based on ...
Match Source - High Quality VBR	H.264 Blu-ray (x264 PRO)	Based on ...	Based on ...
Match Source - Low Quality VBR	H.264 Blu-ray (x264 PRO)	Based on ...	Based on ...
Match Source - Medium Quality VBR	H.264 Blu-ray (x264 PRO)	Based on ...	Based on ...
Match Source - Studio Quality VBR 2-pass	H.264 Blu-ray (x264 PRO)	Based on ...	Based on ...

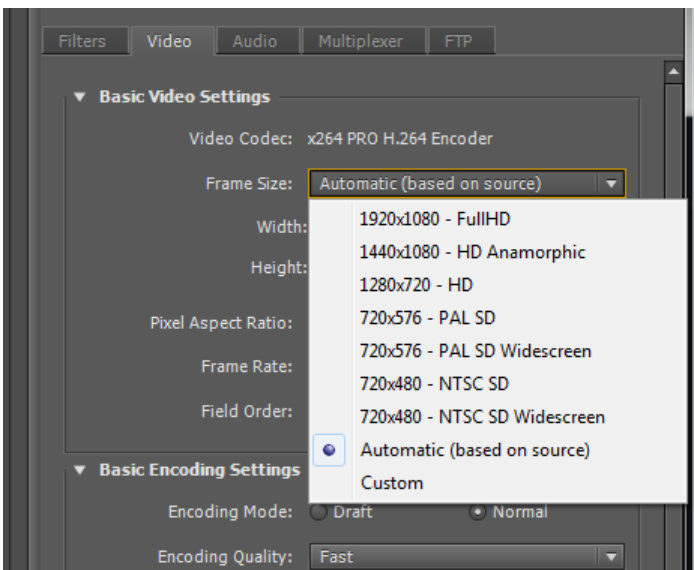
The x264 PRO^{BD} Blu-Ray presets cover all the formats defined in the Blu-Ray standard. They will not permit you to make a non-compliant stream.

Preset Name	Format	Frame Size	Frame Rate
User Presets & Groups			
System Presets			
Broadcast			
H.264			
VR - 2.8K Mono	H.264 VR (x264 PRO)	2880x1440	29.97 fps
VR - 2.8K Stereo	H.264 VR (x264 PRO)	2880x2880	29.97 fps
VR - 2K Mono	H.264 VR (x264 PRO)	2048x1152	29.97 fps
VR - 2K Stereo	H.264 VR (x264 PRO)	2048x2048	29.97 fps
VR - 4K Mono	H.264 VR (x264 PRO)	4096x2048	29.97 fps
VR - 4K Stereo	H.264 VR (x264 PRO)	4096x4096	29.97 fps
VR - 5K Mono	H.264 VR (x264 PRO)	5760x2880	29.97 fps
VR - 5K Stereo	H.264 VR (x264 PRO)	5760x5760	29.97 fps
VR - 8K Mono	H.264 VR (x264 PRO)	8192x4096	29.97 fps
VR - 8K Stereo	H.264 VR (x264 PRO)	8192x8192	29.97 fps
VR - Source Resolution	H.264 VR (x264 PRO)	Based on ...	Based on ...
Web Video			
YouTube			
YouTube VR - 2.8K Mono	H.264 VR (x264 PRO)	2880x1440	29.97 fps
YouTube VR - 2.8K Stereo	H.264 VR (x264 PRO)	2880x2880	29.97 fps
YouTube VR - 2K Mono	H.264 VR (x264 PRO)	2048x1152	29.97 fps
YouTube VR - 2K Stereo	H.264 VR (x264 PRO)	2048x2048	29.97 fps
YouTube VR - 4K Mono	H.264 VR (x264 PRO)	4096x2048	29.97 fps
YouTube VR - 4K Stereo	H.264 VR (x264 PRO)	4096x4096	29.97 fps
YouTube VR - 5K Mono	H.264 VR (x264 PRO)	5760x2880	29.97 fps
YouTube VR - 5K Stereo	H.264 VR (x264 PRO)	5760x5760	29.97 fps
YouTube VR - 8K Mono	H.264 VR (x264 PRO)	8192x4096	29.97 fps
YouTube VR - 8K Stereo	H.264 VR (x264 PRO)	8192x8192	29.97 fps
YouTube VR - Source Resolution	H.264 VR (x264 PRO)	Based on ...	Based on ...

The x264 PRO^{VR} plugins are the same for “VR” vs “YouTube VR” except the following.

The “VR” version is configured for player support.

The “YouTube VR” version is configured for optimized encoding. Very few players can decode this video but YouTube and other web services can. It will make a smaller file at the same quality. It is recommended for final upload to a streaming service, like YouTube.

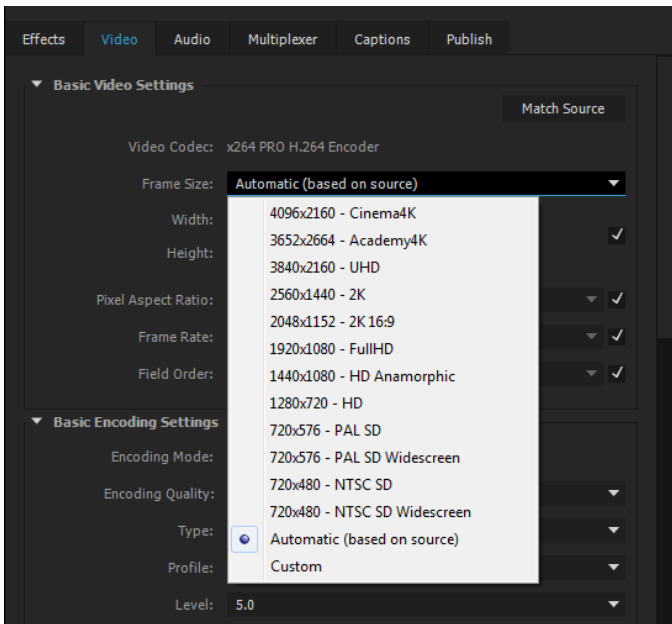


The parameters in the configuration settings have been designed to be filled in from the top down. For example, the Frame Size affects the Pixel Aspect Ratio, Frame Rate and Field Order.

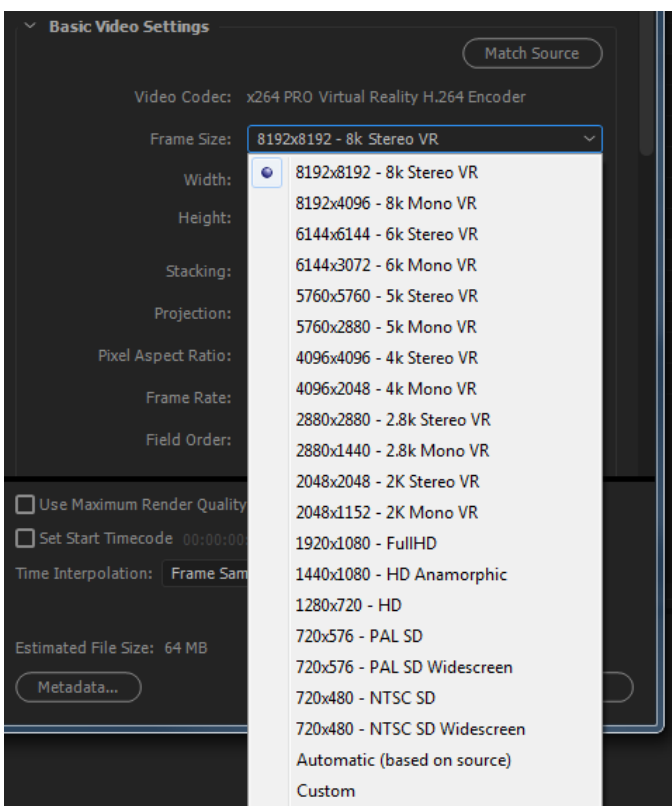
Basic Video Settings:

Frame Size:

Common preset frame sizes are given. For all resolutions not in the list the Custom field can be used in conjunction with the Width and Height parameters. Choosing a preset resolution will automatically adjust the Pixel Aspect Ratio, Frame Rate, Field Order, Color Space and Broadcast Standard.

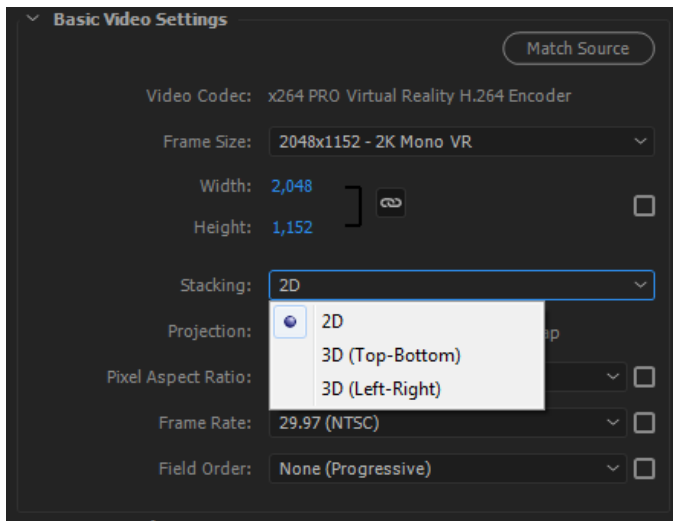


Adobe CC 2015 and above extends the common preset frames sizes up to Cinema4k. Prior versions can be manually set to these resolutions using the Width and Height controls.



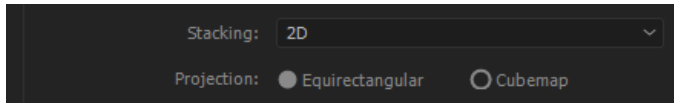
Adobe CC 2015 and above with x264 PRO^{VR} allows up to 8k x 8k resolution.

Note that resolutions above 4096x2160 violate the H.264 standard macroblock per frame limit. Software decoders can handle this violation and is how you can upload to YouTube and edit in Premiere beyond 4K.



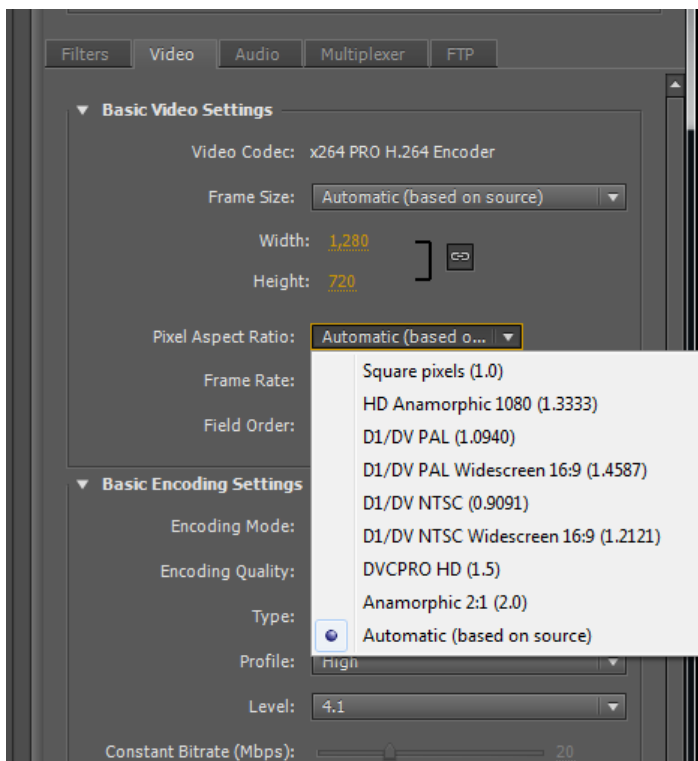
VR only - Stacking:

The stacking indicates if the video is Mono or Stereo and, if Stereo, whether the Left and Right eyes are stacked on each other (Top-Bottom) or side-by-side (Left-Right).



VR only – Projection:

The Projection indicates whether the video is laid out in Equirectangular (typical for YouTube) or CubeMap (typical of Facebook). Note at this time Premiere only understands Equirectangular editing. To export as CubeMap you will need an Equirectangular to CubeMap Effect to transform the layout as your last filter.



Pixel Aspect Ratio:

Common presets are given for the pixel aspect ratios (PAR). When combined with the Frame Size the result is the Display Aspect Ratio (DAR).

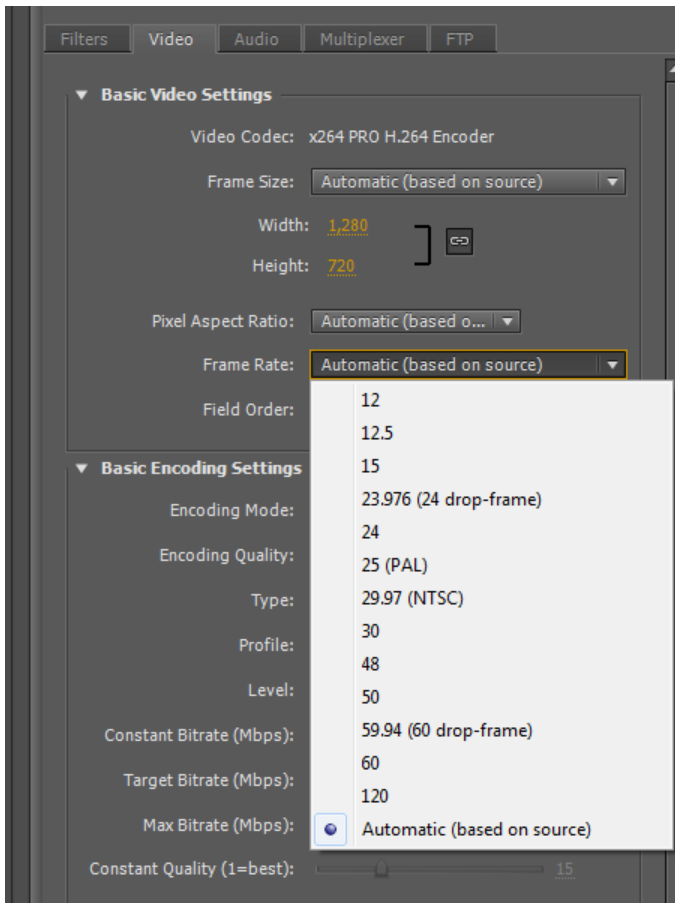
For example,

$$1920 \times 1080 \times 1:1 \text{ PAR} = 16:9 \text{ DAR}$$

$$1440 \times 1080 \times 1.3333 \text{ PAR} = 16:9 \text{ DAR}$$

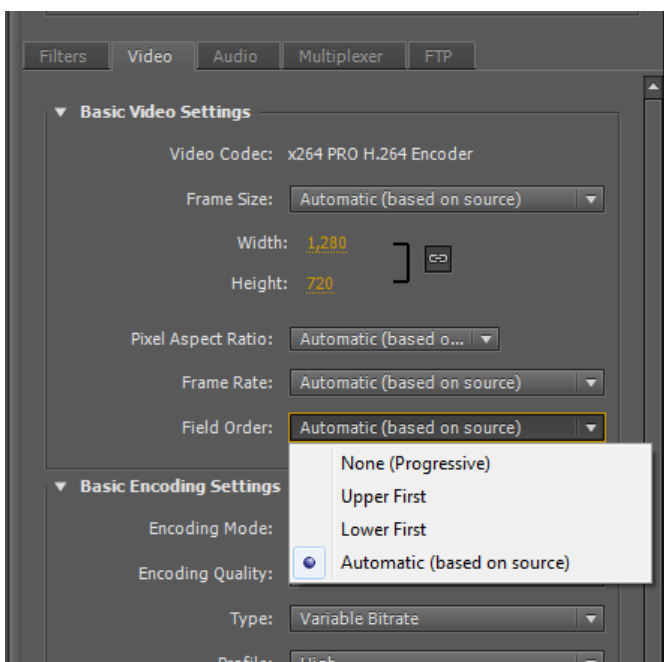
$$720 \times 480 \times 1.2121 \text{ PAR} = 16:9 \text{ DAR}$$

$$720 \times 480 \times 0.9091 \text{ PAR} = 4:3 \text{ DAR}$$



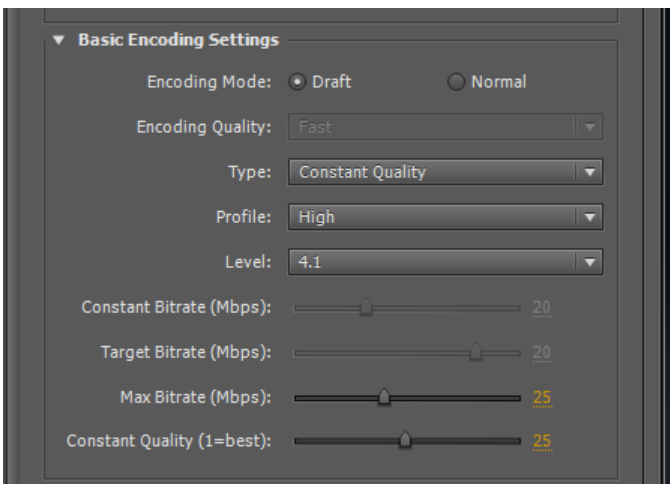
Frame Rate:

Common frame rates are given at presets. They include the standard frames rates as well as ½ standard frame rates.



Field Order:

Progressive and Interlaced field orders are available in the presets.

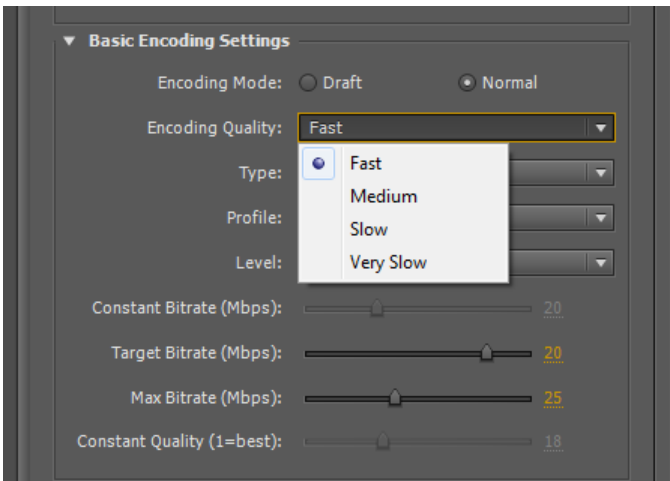


Basic Encoding Settings:

Encoding Mode:

Draft is a quick preset to make a fast proof output that has low quality. It can be further tuned with the Constant Quality slider.

Normal enables the Encoding Quality presets.



Encoding Quality:

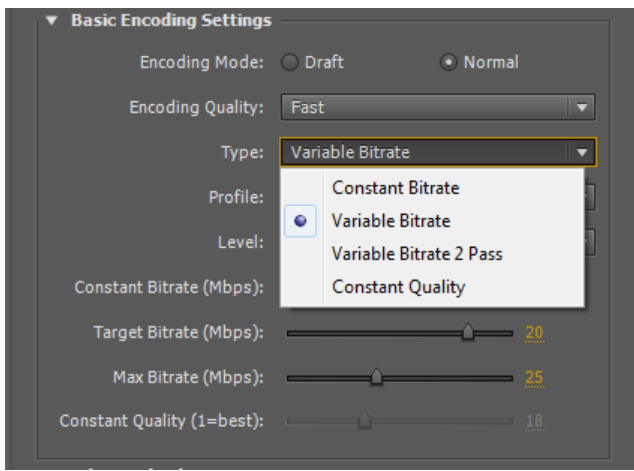
Four presets are provided to quickly adjust the encoding quality of the video. The slower the encode the better the compression quality will be.

For encodes targeting a bitrate this means less visible artifacts.

For encodes targeting a quality this means a smaller overall file size.

Medium is recommended for most jobs where speed of completion weighs equally against overall image quality.

Slower and Very Slow are recommended if your target bitrate is low or you want the best quality image possible and are not concerned about the time to encode.

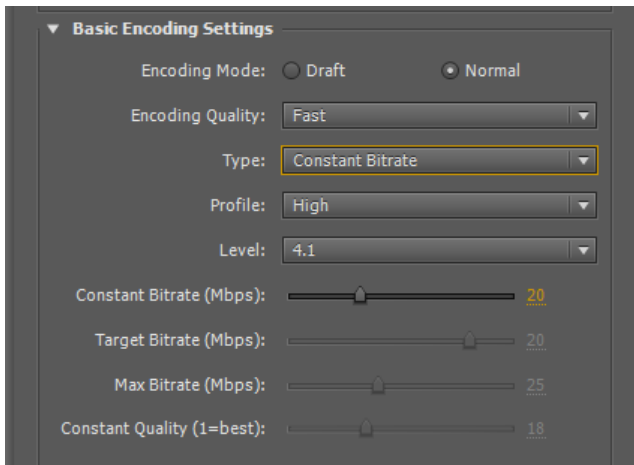


Encoding Mode:

Four modes are provided in the presets.

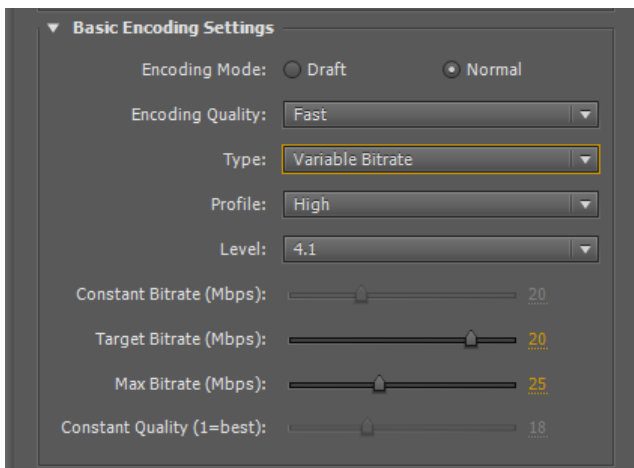
Constant Bitrate:

In this mode the bit rate will be kept constant. Frames that have less detail will have wasted bits and frames that have more detail will be visually less correct.



Variable Bitrate:

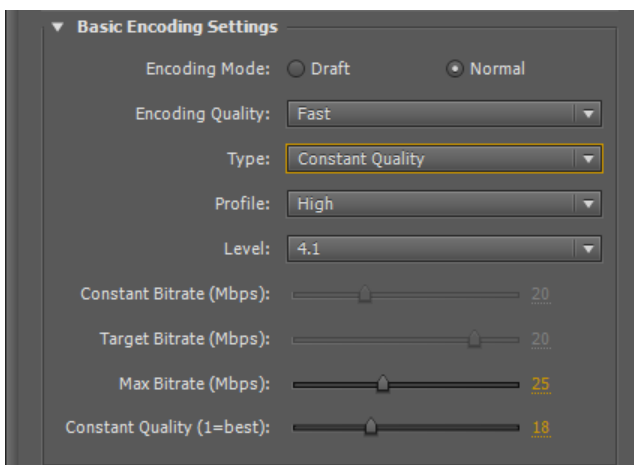
In this mode the average bit rate will aim to hit the Target Bitrate. It will not exceed the Maximum [Video Buffer Fill] Bitrate.



In 2 pass mode the video will be encoded twice. On the first pass a statistics file will be generated. With this peak-ahead information the second pass can take bits from future frames if needed yielding an overall better quality encode.

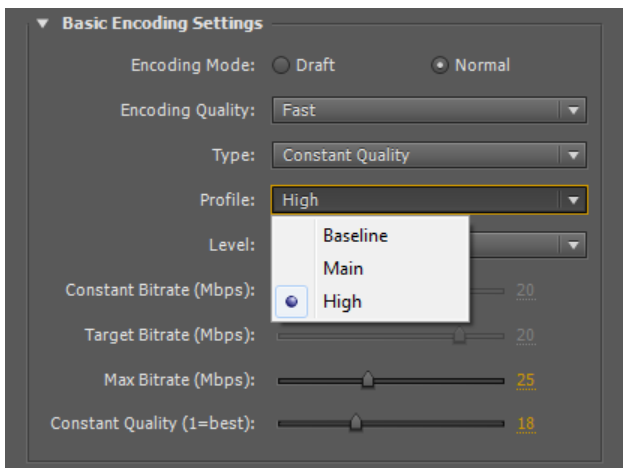
Constant Quality:

In this mode the quality of each frame is the goal. The bit rate will not exceed the Maximum [Video Buffer Fill] Bitrate.



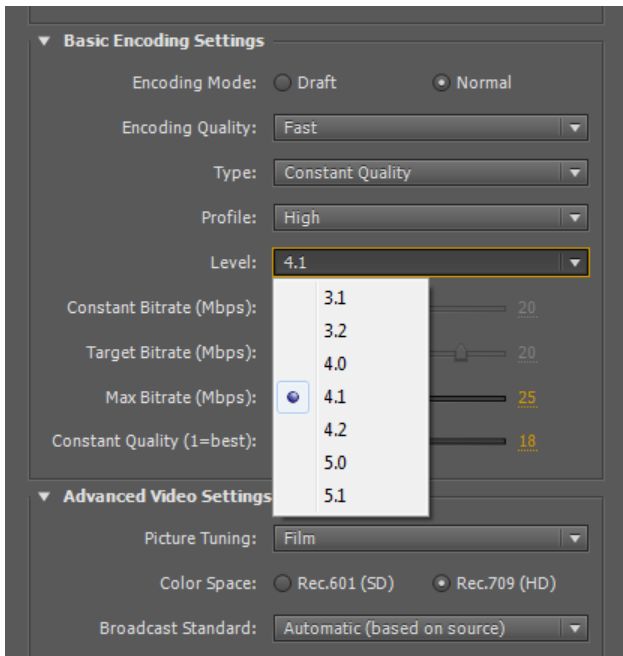
23 is the default value. Many authoring professionals like a values between 15 and 21 for an acceptable amount of visual compression artifacts. Jobs requiring the best quality possible regardless of the bitrate use 1.

TIP: If you don't know what bitrate your footage will need to give you a quality you desire - render a test at a given constant quality. With the resulting file work out the overall bitrate and then re-encode at that bitrate using Variable Bitrate 2-pass or simply keep the file as is if the overall file size is not a problem.



Profile:

The H.264/AVC encoding profile presets are provided. Most consumer devices are capable of decoding High profile today. Generally speaking the higher the profile the better the encoding options there are for the encoder.

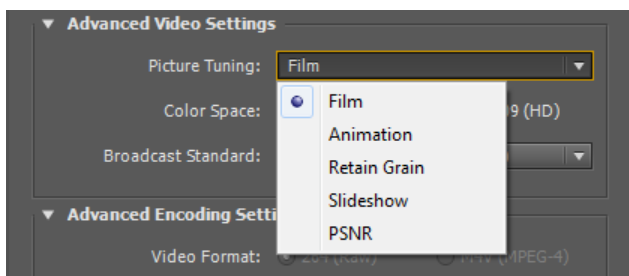


Level:

The H.264/AVC encoding level presets configure the features of encoding that are permissible. At level 4.1 and above encoding “slices” are set to 4 as per the specifications.

NOTE: Most H.264 encoders don’t have slice support as required for Blu-ray authoring!

The Level affects the Maximum Bitrate as well as the maximum Height x Width and Frame Rate.



Picture Tuning:

The five provided presets allow you to tune the encoding engine for the sort of footage you are rendering.

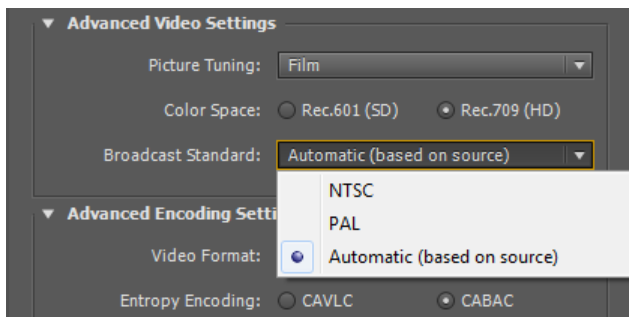
PSNR is the Peak Signal to Noise Ratio. It is a mathematical comparison of how closely the encoded image matches the source. It is not the psycho-visual difference – ie the human eye perceived difference. Film is the default.

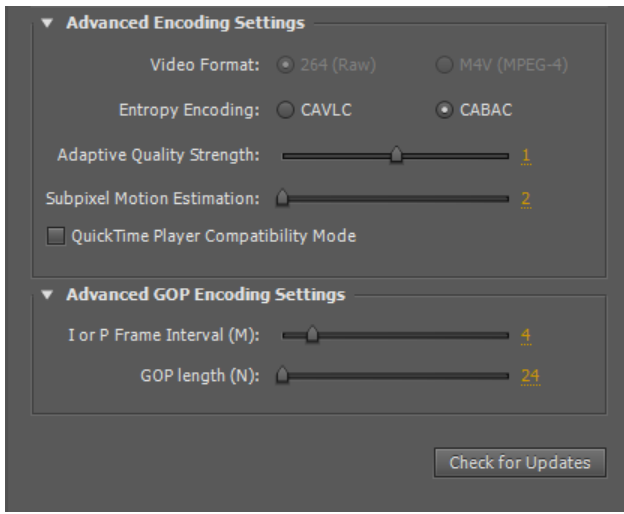
Color Space:

Rec.601 is the color space for Standard Definition TV. Rec.709 is the color space for High Definition TV. In somewhat rare cases this rule can be broken.

Broadcast Standard:

Combined with the Color Space (above), the presets of NTSC & PAL set the H.264 Annex M color primitive flags set in the encoded stream.





Advanced Encoding Settings:

Video Format:

When Multiplexing is disabled in the Multiplexing Tab these two options are active.

The options choose whether the encoded stream is saved as a RAW file (.264) or put into a MPEG-4 container (.m4v).

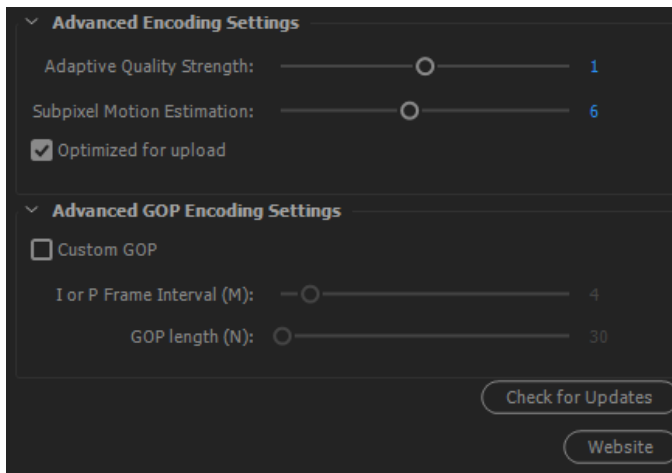
TIP: Most Professional Blu-ray authoring software will only accept raw .264 video streams. For this reason x264 PRO^{BD} is shipped without a Multiplexer.

Entropy Encoding:

The lossless data compression has presets of CALVC and CABAC. Some older decoders cannot decode CABAC encoding so the option to change to CALVC is provided.

Subpixel Motion Estimation:

This slider is provided to finely tune the motion estimation of the encoder. The higher the value the greater the encode time but the better the resulting quality of the bitstream. It is affected by the Encoding Speed vs Quality preset. '2' is the Draft default. Values 5-7 are common for high quality encodes.



Adaptive Quality Strength:

Large areas are prone to losing quality to save bits. By moving this slider to a value between 1.0 and 2.0 you can bias the bit decision to encode these areas with more bits. The resulting video in these areas can be quite amazing vs the default behavior. Experiment with values to find a value that works to minimize artifacts in your footage.

x264 PRO & x264 PRO^{BD} Only - QuickTime Player Compatibility Mode:

This checkbox disables features of the encoder to make a video stream that will play in this problematic player. It is at the expense of overall quality.

It also configures the encoder to make a video stream that it isn't affect by the notorious "gamma" problem in the QuickTime Player!

x264 PRO^{VR} Only – Optimized for upload:

This checkbox enables features of the encoder to make a video stream that will be optimized for upload (smaller and higher quality). It will not play well on most video players.

Check for Updates (Windows version only):

This button launches the Update Agent on the Windows Toolbar. If a new version is available it will prompt you to download it. You can download while using the plugin. You must exit before installing a new version. In general there is no need to un-install first. If there is a need you will be prompted. Your presets will persist across updates.

Advanced GOP Encoding Settings:

I or P Frame Interval (M):

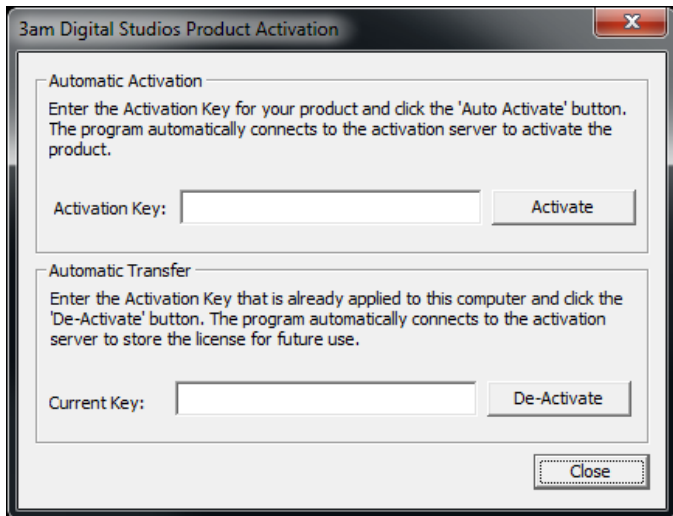
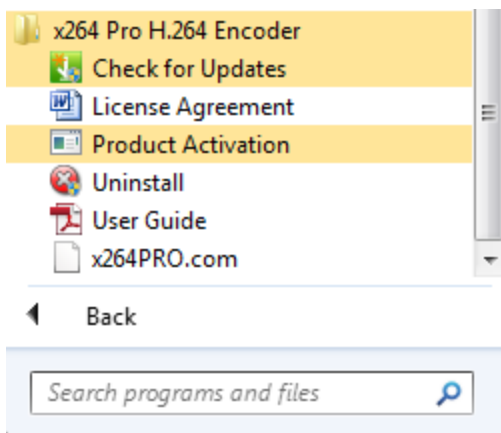
This is the number of frames between I or P frames. For example, M=3 would yield a GOP structure like so:

IBBPBBPBBP...BBI

GOP length (N):

The distance between GOP I frames. The default is the source footage frame rate.

Start Menu (Windows version only)



Check for Updates:

This button launches the Update Agent on the Windows Toolbar. If a new version is available it will prompt you to download it. You can download while using the plugin. You must exit before installing a new version. In general there is no need to un-install first. If there is a need you will be prompted. Your presets will persist across updates.

License Agreement

The End-User-License Agreement (EULA).

Product Activation

On first run you will be presented with the Product Registration and Activation window.

From the Start Menu you can also select “Product Activation”.

Use this dialog box to Activate or De-Activate your license.

If you are going to do a hardware change to your PC such as changing any of these items:

- BIOS
- Hard Disk(s)
- Network Card(s)

then first de-activate your key sending it back to the Activation Server. After the hardware upgrade (or complete PC change) you may then re-activate your installation.

You are licensed to transfer your key to another PC two (2) times only.

If you are doing hardware changes on the same PC please email support@3amDigitalStudios.com and we will accommodate your hardware upgrade since it's the same workstation.

Uninstall

Use this to delete the plugin from your system. Remember to de-activate your license first – see above.

User Guide

This document.

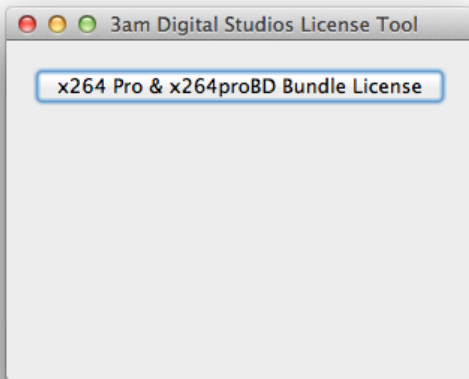
x264PRO.com

A link to the x264PRO web site.

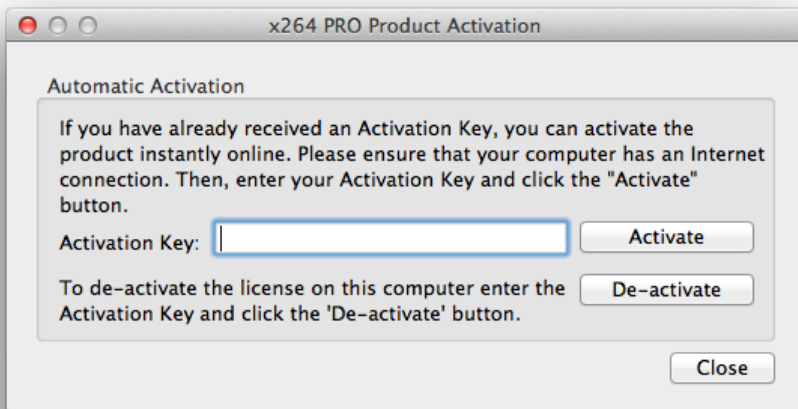
Applications – x264 PRO Utilities (Mac version only)

3am Digital Studios License Tool:

To convert from a Trial License to a Permanent License (no red X watermark) launch this tool.

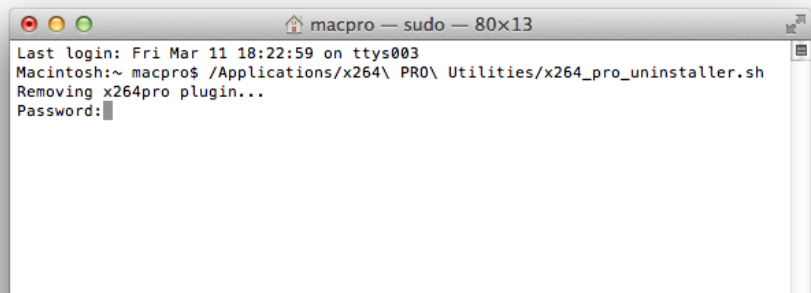


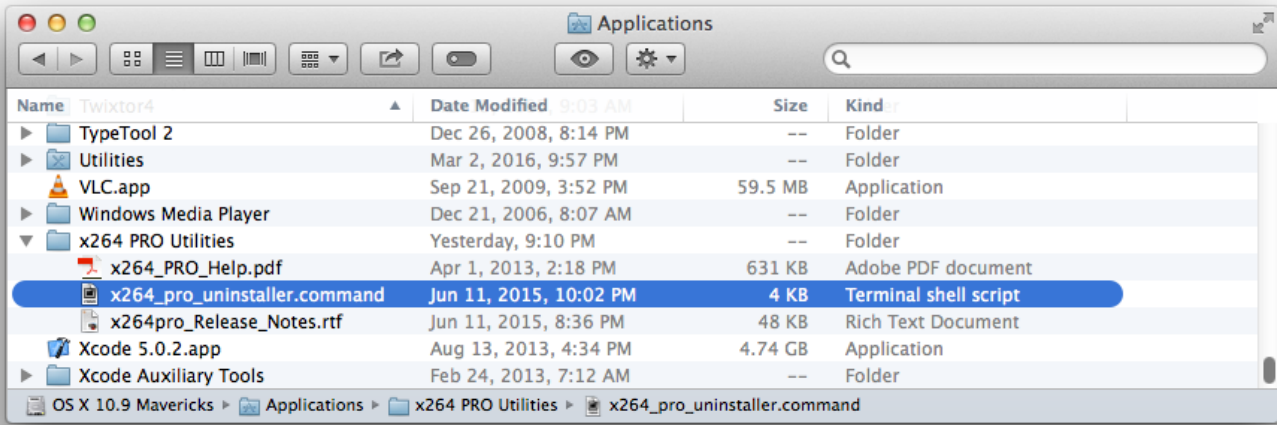
Click on the x264 Pro & x264proBD Bundle License and enter your permanent key. You can also get to this dialog from the bottom of the plugin via the "Licensing" button.



Uninstalling:

Double click on "x264_pro_uninstaller.command". You will be prompted for your password.





Technical Specifications:

Output	x264 PRO ^{BD}	x264PRO ^{VR}	x264PRO
Video	H.264 AVC Elementary Stream (.264)	H.264 AVC Elementary Stream (.264)	H.264 AVC Elementary Stream (.264)
Audio	Linear PCM (.wav)	Linear PCM Advanced Audio Codec	Linear PCM (.wav) Advanced Audio Codec (.aac)
Multiplexer	N/A	MPEG-4 Video and Audio (.mp4) (AAC only) Quicktime (.mov)	MPEG-4 Video (.m4v) MPEG-4 Video and Audio (.mp4) (AAC only) Quicktime (.mov)
Supported standard	Blu-ray	H.264 ignoring Macroblock limits to permit 8k	H.264
Video codec	H.264 AVC	H.264 AVC	H.264 AVC
AVC Profile	Main, High	Baseline, Main, High	Baseline, Main, High
Supported level	High Profile 4.0, 4.1 Main Profile 3.0, 3.1, 3.2, 4.0, 4.1	3.0, 3.1, 3.2, 4.0, 4.1, 5.0, 5.1, 5.2, 5.2+	3.0, 3.1, 3.2, 4.0, 4.1, 5.0, 5.1, 5.2
Resolution Frame Rate	1920x1080x29.97i, 25i (16:9) 1920x1080x24p, 23.976p (16:9) 1440x1080x59.94i, 50i (16:9) 1440x1080x24p, 23.976p (16:9) 1280x720x59.94p, 50p (16:9) 1280x720x24p, 23.976p (16:9) 720x480x59.94i (4:3/16:9) 720x576x50i (4:3/16:9)	Variable (16x16 - 8192x8192) Frame rate : 12, 12.5, 15, 23.976, 24, 25, 29.97, 30, 48, 50, 59.94, 60, 120	Variable (16x16 - 4096x4096) Frame rate : 12, 12.5, 15, 23.976, 24, 25, 29.97, 30, 48, 50, 59.94, 60, 120
VR information	N/A	Spatial Video v1 (UUID) Spatial Video v2 (ST3D, SV3D) 2D and 3D (Top-Bottom & Left-Right) EQUIRECTANGLAR and CUBEMAP projections Spatial Audio v1 (SA3D) 4ch 1 st order Ambisonic	N/A
Bit rate	1Kbps - 40Mbps	1Kbps - 500Mbps	1Kbps - 300Mbps
Encoding Method	CBR/VBR 1 pass encoding/VBR 2 pass encoding/Constant Quality		
Audio codec	Linear PCM	Linear PCM Advanced Audio Codec	Linear PCM Advanced Audio Codec
Audio channels	Mono, Stereo, 5.1	Mono, Stereo, 5.1, 4ch 1 st order Ambisonic spatial audio	Mono, Stereo, 5.1
Audio bit depth	8, 16, 24, 32bit (LPCM)	8, 16, 24, 32bit (LPCM)	8, 16, 24, 32bit (LPCM)
Audio bit rate	n/a	56 - 320kbps (AAC)	56 - 320kbps (AAC)
Sampling rate	8, 16, 32, 44.1, 48, 96KHz	8, 16, 32, 44.1, 48, 96KHz	8, 16, 32, 44.1, 48, 96KHz