

MA VPU

USER MANUAL

of MA Lighting



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1. Introduction

MA Lighting's MA VPU – Video Processing Unit – is a dynamic range of solutions for the control, live access and alteration of videos, still images and 3D objects in real time.

All videos, still images and 3D objects can be scaled, positioned, tiled, colored and managed directly from any grandMA2 console. It is as simple as controlling any other fixture – just add the MA VPU to the network session. The entire operation relies on the highly intuitive well- established MA philosophy. In other words, if you know grandMA2, you will most definitely know the MA VPU.

Thanks to the efficacy of the MA VPU all videos can be displayed in a resolution higher than Full HD. Furthermore, the internal output synchronization of the MA-Net2 ensures the highest frame and DMX synchronicity.

Horizontal and vertical softedge blending as well as keystone correction help to scale videos to any size. And there is more to it than that! The MA VPU offers a convenient functionality of 3D keystone and enables the user to fit content to any 3D objects, regardless of size and shape. Furthermore, playback speed can be adjusted with the help of smooth speed control and the improvement of frame interpolation.

In addition, there is also a plethora of functions, features and effects such as frame blending, color boost, dynamic color key, contrast, brightness, hue, saturation as well as blur, sepia, black / white, ocean and many more.

The MA VPU can be programmed via the grandMA2 console in blind and preview modes. This simplifies programming considerably. Also, the VPU has a Single-Layer-Crossfade mode which allows the user to program all content within the same layer.

The MA VPU has a pre-installed content library comprising more than 17 GB of professional content.

1.1. Help From MA Technical Support

If the VPU is not working as described in the manual, you can take the following steps:

- **Error message:** You cannot proceed with the next step of the description and you receive an error message:
Refer to [Error Messages](#) and repeat the procedure.
If the problem is still there, contact the technical support.
- **System is not working:** If you cannot proceed with the next step of the description and you do not receive an error message:
Contact the technical support and describe the last steps you took.

Technical Service and Support

MA Lighting and its extensive distributor network offer an unparalleled technical service.

Call on our expertise for help with any problem, no matter if it is regarding operation, software features, software installations or trouble shooting.

Please send an email (in English or German) to the tech support with your contact details and the technical question. See the email address of the technical support in the footer of this website.

This email service is monitored during MA Lighting's regular business hours in Germany from 8.30 a.m. until 5 p.m., Monday through Friday.

For emergency services please contact your local MA distributor or the MA Lighting Service Hotline.

Call: +49 5251 688865-99. Please note that this is a 24/7 hotline which is used for emergency cases only. Use this hotline only if troubles occur shortly before an upcoming event.

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1.2. System Requirements

If you want to run MA VPU on your PC, here's what it takes.

	Minimum	Recommended
Operation system	Windows® 7	
	Windows® 8	
	Windows® 8.1	
	all with admin rights	
Decoder Package	Main Concept Decoder Pack MPEG2 8.2.0	
Processor	CPU Dual Core 2.4 GHz or faster	Intel i7
	with SSE2 support	
RAM	2 GB	12 GB
Hard disk	32 GB available space	type SSD
Graphic card	3D with hardware acceleration and 512 MB	
	Vertex Shader Version 3.0 or greater	3 GB graphic RAM
	Pixel Shader Version 3.0 or greater	
Resolution	1024 x 768 or higher	1920 x 1080
Network card	100BASE-TX, 1000BASE-T	1000BASE-T

IBM® compatible PC or notebook is necessary.

Additional requirements for the use of certain features:

- To use the online help and to download the latest version of MA VPU, you need internet access.
- To save to a USB stick, you need a USB 2.0 or 3.0 port.

We recommend that you visit your PC manufacturer's website for information about updated drivers and hardware compatibility.

2. For Your Safety

This device is conform to the following harmonized standards:

- EN 60065 (Safety Requirements) ,
- EN 60950-1 (Information Technology Equipment Safety)
- EN 55103-1:2009 (Electromagnetic Compatibility)
- EN 55103-2:2009 (Electromagnetic Compatibility)
- 2014/30/EG (Electromagnetic Compatibility)
- 2011/65/EU (RoHS II)
- 2014/35/EU (Low Voltage Directive)

This device is a state-of-the-art technology.

However, residual risks cannot be ruled out.

To avoid risks, follow the safety instructions.

MA Lighting does not cover damages which can be result of an inobservance of the safety instructions.

3. Functions and Features

At its most basic level, MA VPU allows for the control of several moving images and high-resolution images simultaneously. Videos and still images can be combined, mixed and controlled using any grandMA console like a regular multi-parameter fixture. For this, several 3D video layers are available plus one master fixture (master layer) for PC remote controlling, shaper, iris and scaling settings, camera fixtures (output layers) for Shaper, Iris, Effects, Scaling, Camera Positions, Keystone and Softedge

In addition, MA VPU offers the possibility of choosing any three dimensional object as a surface for video or still images. Cubes, cylinders, spheres, extruded logos or any other three-dimensional shape can be “textured” with complimentary images or videos. The position and orientation of these three dimensional objects are fully controllable from the grandMA console. You could start with a cube rotating and progress to a three-dimensional logo flying around, but from then on, you are only limited by your imagination.

Each image or video that is used at the same time requires a layer. Since the opacity of each layer is controllable, it is possible to cross fade from one video image to another by cross fading from one layer to another. By controlling and mixing the output of the MA VPU, your grandMA2 console has become a video mixer.

3.1. Transition from grandMA video to MA VPU



Hint:

This information conforms to grandMA video users changing to MA VPU.

As a user of a grandMA video dongle version (either on MA mediaPC or self designed media server) you will encounter most likely the following situation: grandMA video software is installed on a computer (self designed or mediaPC) with some content likely the MA original content plus additional custom-made content. Mainly this will be any QuickTime coded content. The grandMA video software might be also installed on additional computers like laptops to use it as pre-visualization or control suite stations without any dongles in use.

Now, you can choose from one of the following options:

1. Leave everything as it is. You can stay with the grandMA video software and your known content. Please be aware that the grandMA video software as known today will not be further developed nor be implemented in future grandMA software releases. The grandMA video software will only work with grandMA 'series 1' software 6.121 or lower.

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2. Update your MA mediaPC or media server to MA VPU software and benefit from the features of MA VPU plus
 - Performance increased tremendously - at least 4+ layer of 1080p are possible with 60fps.
 - The VPU is more integrated into the network than grandMA video ever was
 - Effects are added per layer and per output - each of them can handle 4 effects at the same time.
 - Colorkeying is built in now - even with a tolerance value for smooth transitions.
 - 3D keystone is possible by adding a 3D model on the output layer
 - Much easier Fixture handling by only 3 fixture types - the output fixture includes keystone, master, softedge and so on...

The VPU is able to run either with grandMA 'series 1' or grandMA2 - safe investment. The VPU software comes with a new decoder to ensure best content results. That means - however - that new content is needed and the new one is based on MPEG-2! Attention: All custom-made content needs to be rendered into MPEG-2. All old show-files are obsolete due to the fact that the new fixture types are not equal to the grandMA video fixture types!

Launching the MA Video Processing Units (VPU) there is no more split between software and hardware. The dongles are discontinued - only the full package including dedicated hardware is available, the dongle is "built-in". For sure, everybody who invested into dongles will benefit of the new VPU functionality by installing the latest VPU release software.

With the MA VPUs there is no "open" operating system with any kind of default driver - they are all improved to serve the best result for the VPU. Also the decoder has changed for best performance results. That means - however - that new content is needed and the new one is based on MPEG-2. With any MA VPU there is some Gigabyte of content pre-installed.

With the MA-Content-Package you'll get a discount compared to buying the clips individually. When ordering, you will receive a voucher code that enables you to download your selection of Showfootage's clips and pics from their website www.showfootage.com

From grandMA video to VPU. How to update your system:

After downloading the software from our webpage you just need to install it. The look & feel will be like the grandMA2 software. Then you need to download a new MPEG-2 decoder from Main Concept and actually pay for it.

Should not be about 50\$€. Attention: Keep the key number!! From now on the software is fully functional. Please be aware of the fact that old shows from grandMA video cannot be loaded anymore. Therefore the new showfile is absolutely compatible to grandMA2. All custom-made content might need to be re-rendered into MPEG-2.

As a former user of grandMA video you will easily discover the new functionality of the MA VPU software. Some functionality has changed as well as some naming. Please refer to the documentation like the online manual to learn about it. If you use the VPU software with an external dongle (old grandMA video) you will have the same performance like a MA VPU plus - in other words: there are no restrictions!

Major changes in a rough overview:

- Decoder and codec has changed! From QuickTime to MPEG-2! You need to buy it (with the VPU it is included)
- Old shows are obsolete
- Old content needs to be re-rendered
- New fixture types for VPU

We hope that this document provides what you need to know about the transition from grandMA video to the VPU software. The grandMA video software ends with the first release of the MA VPU Software. For any further information please get in contact with us - we are glad to assist you!

About MPEG-2:

MPEG is the name of the “Moving Pictures Expert Group” who created a couple of international standards. One important one is the MPEG-1/2 (ISO/IEC 13818-part x) standard which will be used for the MA VPU. As MA uses Microsoft’s DirectShow to render the textures (pictures) it will need a Codec1 to be able to read in these pictures. This codec is the MPEG2 one from MainConcept. There are several formats that can contain MPEG2 videos, below are some well known ones:

- .mpg (MPEG-1 or MPEG-4 possible)
- .mpeg (MPEG-1 or MPEG-4 possible)
- .m2v (MPEG-2 Elementary Video Stream)
- .m2a (MPEG-2 Elementary Audio Stream)
- .m2s (MPEG-2 Elementary Data Stream)
- .vob (DVD Video Object)

The MPEG2 standard allows a couple of variation which are not so important to know but which will influence the quality of the picture. They are defined to be able to run several resolutions like full HD for example. That influences also the bitrate which can vary from approx. 3 to over 80 Mbit/s. As higher the bitrate as more workload for the CPU, RAM & so on.

Codec is short for 'compressor-decompressor', a piece of software that is able to decode and encode a certain format. By this definition, a DirectShow filter is not a codec.

3.2. Teaser Mode

To try out the functionality of MA VPU on a PC without purchasing a VPU, use the Teaser Mode. With the Teaser Mode, you can use the MA VPU software without a dongle for small applications without a water mark.

Limitations:

- Maximum 2 patched VPU Layers
- Maximum 1 VPU station in a session
- Maximum 1 DVI output (assigned in Display Settings)
- Maximum video content below 800x600 pixels (there is no limitation for pictures or sound files)



Restriction:

Since V3.1 the MA VPU Pixel Mapper works independent from VPU hardware. The Pixel Mapper then only works within MA-Net (not with Art-Net or sACN) and can be mapped on the parameters of the selected session.

If one of the above limitations is not met, a water mark is displayed. Teaser Mode status messages are displayed in a docking frame dialog named "Teaser Status" that is displayed by default.

If the user disabled the docking frame or the Teaser Status window, this dialog appears automatically if a violation of the teaser rules occurs. This will only happen once in a showfile.



Important:

You have to install the full Mainconcept MPEG2 Decoder to be able to playback videos without a water mark. The VPU Teaser changes the water mark of the VPU software. For testing purposes, it is possible to use the MPEG2 Demo Decoder.

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3.3. Comparison VPU plus / VPU basic / VPU light

	MA VPU plus MK2	MA VPU basic MK2	MA VPU light
DVI-Output with switchable EDID Manager (back panel)	3(1 x DVI-D dual link, 1 x DVI-D single link, 1 x DVI-I dual link)	3(1 x DVI-D dual link, 1 x DVI-D single link, 1 x DVI-I dual link)	3(1 x DVI-D dual link, 1 x DVI-D single link, 1 x VGA)
Full-HD resolution MPEG-2 (1080p/60Hz)	6*	4*	2*
Internal 7" Touch Screen(800 x 480 Pixel)	x		
2"-Color-TFT-Display providing status information			x
Power Up switch (front panel)	x	x	x
SDI IN	2**	2**	
powerCON IN (back panel)	x	x	x
powerCON OUT (back panel)	x	x	
Menu button (front panel)			x
RJ45 etherCON Gigabit network connector (back panel)	2	2	2
XLR-male balanced transformer isolated audio outputs at studio level (back panel)	2	2	2
S/PDIF-Cinch Connector -Digital Audio OUT			1
USB-Ports (front panel)	2 x USB 2.0	2 x USB 2.0	2 x USB 2.0
USB-Ports (back panel)	2 x USB 3.0 1 x USB 2.0	2 x USB 3.0 1 x USB 2.0	2 x USB 3.0
Connection for external harddrives,etc. (back panel)	1 x eSATA 6G	1 x eSATA 6G	1 x eSATA V3.0
Processor		I5-Quad-Core-Processor	Quad-Core-Processor
Dual Channel RAM	8GB@2,4GHz	8GB@1,65GHz	8GB@2,1GHz
Fast SATA - Solid State Drive	240GB	120GB	120GB

*layers simultaneously **Option

4. Main Features

MA VPU is the Video Processing Unit for the grandMA range of lighting control consoles. It uses a Windows® operating system to facilitate the control of video and still images directly from any grandMA console and runs on readily available PC hardware. As fully integrated part of the grandMA network system, MA VPU is not just triggered via DMX. This has many advantages. On the one hand a minimum of setup and configuration is required due to bi-directional communication between the console and the MA VPU. On the other hand the grandMA console allows for direct access to the server and previews the content as thumbnails in the preset.

The MA VPU enables a console operator to control and alter videos, still images and three-dimensional objects in real-time from a grandMA lighting console. Three-dimensional objects can be textured with video clips or animated images. Videos, still images and three-dimensional objects can be manipulated in multiple ways and in the same intuitive manner as a lighting fixture is manipulated from the grandMA console.

4.1. Installation and Maintenance

The actual version of the video application can be downloaded from the MA Lighting support site:
www.malighting.de



You should have administration rights to install the program.

To work with grandMA VPU without administration rights you have to arrange the administration rights by the administrator on the installation path e.g.:

C:\Program Files\MA Lighting Technologies\grandMA VPU Software

For Dongle Users only:

Please extract the downloaded file into a temporary folder and run the Setup (MAVPU_vn.n.n.n.exe) program.

4.1.1. Startup

This chapter describes the startup of the MA VPU application.



For Dongle Users only: To realize an auto start of the MA VPU application a startup software 'VPULoader.exe' is installed on the target machine at:
C:\Program Files\MA Lighting Technologies\grandMA VPU Loader

This program is called by the operating system (e.g. Windows 7 or Windows 8.1) in startup of the MA VPU.

At the initial start after the installation or the update of the MA VPU application, the end user license agreement is shown.

The MA VPU application will not start, until the end user license agreement is confirmed.

If you are using a MA VPU plus, the end user license agreement is shown at the internal touch display.



Important:

If you are using a MA VPU basic or MA VPU light, the end user license agreement is shown at the first external DVI-output - so connect a display and a mouse to the MA VPU basic or MA VPU light.

At the end user license agreement the user has the choice to install additional third party codecs, which can be used at the new Hap-Converter.

4.1.2. Software update

To update the VPU software choose: File / Update Software or Setup / Update software in the touchscreen to open a dialog to select the wanted update file.

Navigate to the wanted folder and select the file. Click OK to proceed.

After the installation is finished, the VPU software will restart and the new version is automatically starting afterwards.

Check the version number in the VPU itself to make sure that the installation was successful.

4.1.2.1. Service Packs

Images can be stored on Drive D of the internal hard disk or on any external USB storage device that holds enough space to store your data. You should start Acronis from the Acronis Startup Recovery Manager. This means that you should restart the machine and press F11 during boot.



4.1.3. Update of Fixture Types

If you want to use the new functionality of the fixture types in existing VPU shows this new fixture types have to be imported into the existing VPU show. Therefore you must perform the following steps:



Attention: Take care to select the right Layer types (VPU Camera, VPU Layer etc.). If the type doesn't fit, the show will be damaged!

- Connect the VPU to the desk and start the session.
- Do a backup of the Function Blocks on the VPU:



Select the 'Content Editor' and 'Export Function Blocks' for the 'VPU Layer' and the 'Camera Layer'

•

• ----- Desk -----

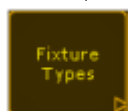
Import the new Fixture Types:

On the desk (or onPC):

Select 'Setup' - 'Patch and Fixture Schedule':

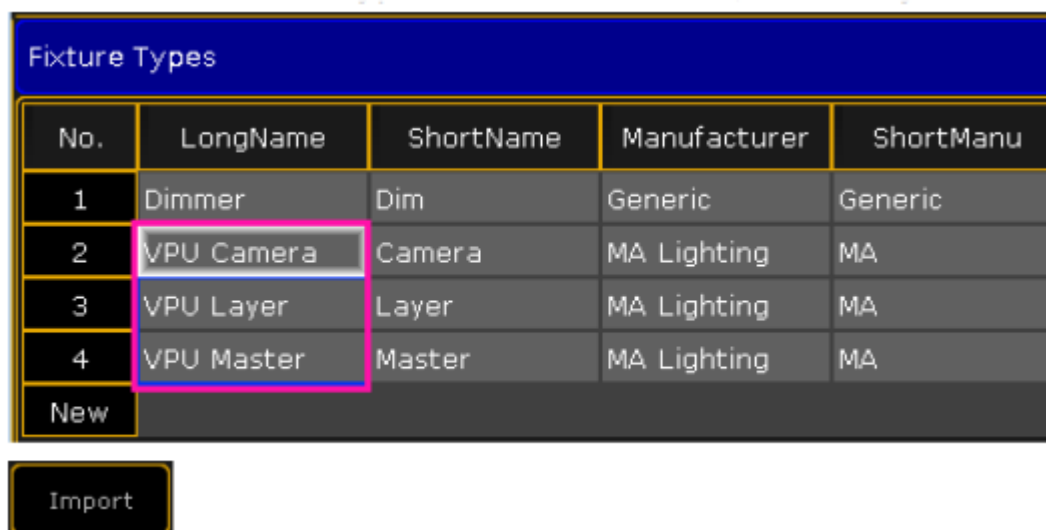


• Select 'Fixture Types':



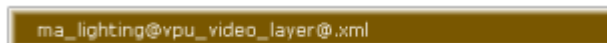
and click on 'Import'

• Select the Fixture Type for VPU Camera, VPU Layer or VPU Master:



and click on 'Import'.

• In the upcoming window select the layer to import:



Leave the dialog with 'Ok'.

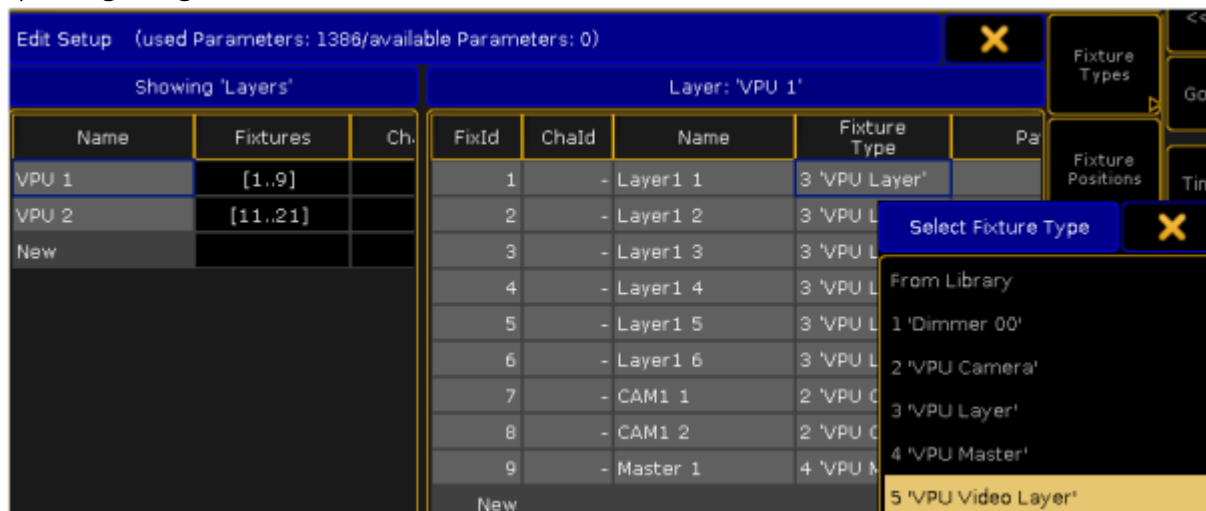
• The new Fixture Type appears in the overview with a 'used' entry of '0' and can be used now:

Fixture Types								
No.	LongName	ShortNam	Manufacturer	Shor	Mode	ModelSca	ModelKey	Used
2	VPU Camera	Camera	MA Lighting	MA		0.00		6
3	VPU Layer	Layer	MA Lighting	MA		0.00		12
4	VPU Master	Master	MA Lighting	MA		0.00		2
5	VPU Video Layer	Layer	MA Lighting	MA		0.00		0
New								

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- Select the Fixture in the Layer window with the right mouse button and select the new fixture type from the upcoming dialog:



Attention: Take care to select the right Layer type. If the type doesn't fit the show will be damaged!

- Now the unused ('Used' entry is '0') Layers can be deleted

Fixture Types								
No.	LongName	ShortName	Manufacturer	ShortMa	Mode	ModelSca	ModelKey	Used
1	Dimmer	Dim	Generic	Generic	00	1.00		0
2	VPU Camera	Camera	MA Lighting	MA		0.00		6
3	VPU Layer	Layer	MA Lighting	MA		0.00		0
4	VPU Master	Master	MA Lighting	MA		0.00		2
5	VPU Video Layer	Layer	MA Lighting	MA		0.00		12

Now you can use new functionalities of the imported layers in your VPU.'

- Do the same exchange steps for VPU Master and VPU Camera Layers.

----- V P U -----

- On the VPU import your Function Block backups: Select the 'Content Editor' and 'Import Function Blocks' for the 'VPU Layer' and the 'Camera Layer':



Now you can use new functionalities of the imported layers in your VPU.

4.1.4. Backup

grandMA VPU is equipped with Acronis ® backup software (Not for dongle users of former grandMA video).



This manual describes Acronis 2010. VPUs basic with serial numbers < 2 and VPU plus with serial numbers < 45 are equipped with Acronis 2009. Basically the use of Acronis 2009 is the same as Acronis 2010.

Machines from Serial Number #87 on operate Windows 7. They are equipped with an USB stick at the VPU backplane to start Acronis.

- Attach this USB stick to an USB Port.
- restart the VPU and press F12 during startup. Password is '12345'
- Select your USB stick as boot device
- Acronis will now be started.

4.1.4.1. Handling backups with the VPU

MA Lighting keeps the factory settings of the Windows operating system with all factory default settings on a hidden part of the hard disk of the VPU. This is useful for you to recall this data whenever you encounter problems in the VPU software that cannot be solved by a software update. You can use Acronis as well to store and recover your own backups.

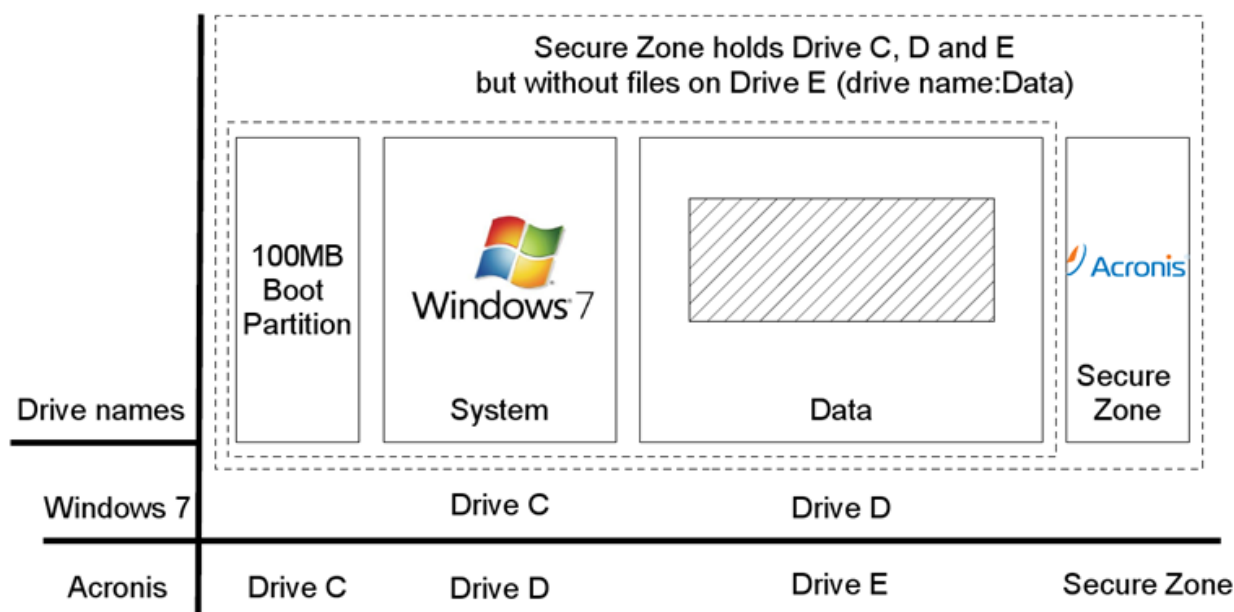


Do not store or delete any files in the Acronis Secure Zone! This is your lifesaver whenever it gets serious! The Secure Zone shall only be used to store 1 factory default file!

Your images can be stored on Drive D of the internal hard disk or on any external USB storage device that holds enough space to store your data. You should start Acronis from the Acronis Startup Recovery Manager. This means that you should restart the machine and press F11 (or F12 on VPUs > #87) during boot.

In Windows 7 (VPUs with serial numbers from #87) the partitioning of the haddisk changed. This is shown in the following image:

Windows 7 based VPU



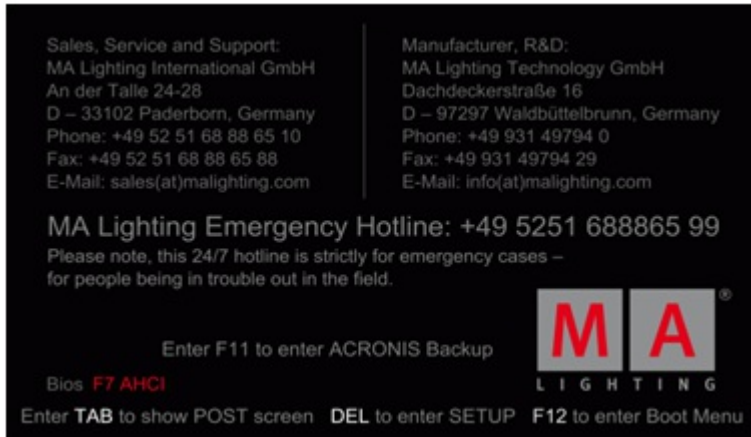
4.1.4.2. Start Acronis on VPUs with serial Numbers up to # 86 on

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VPUs with serial numbers below # 86 are based on Windows Vista. Restart the machine and press F11 during Boot. This will lead you to the Acronis Start Menu. Press F11 again to open up a “Boot Menu” window to enter parameters:



Stood in January 2010, you have to force the graphic card to do 800x600 to work correct with the internal screen on a VPU Plus. Otherwise you will see graphical artefacts and not readable fonts!

On a VPU Basic it is not intended to put any Boot menu parameters into this line. If you pressed F11 and the Boot menu window comes up:



Enter this complete line (also written identical!!) (only in Acronis 2010):

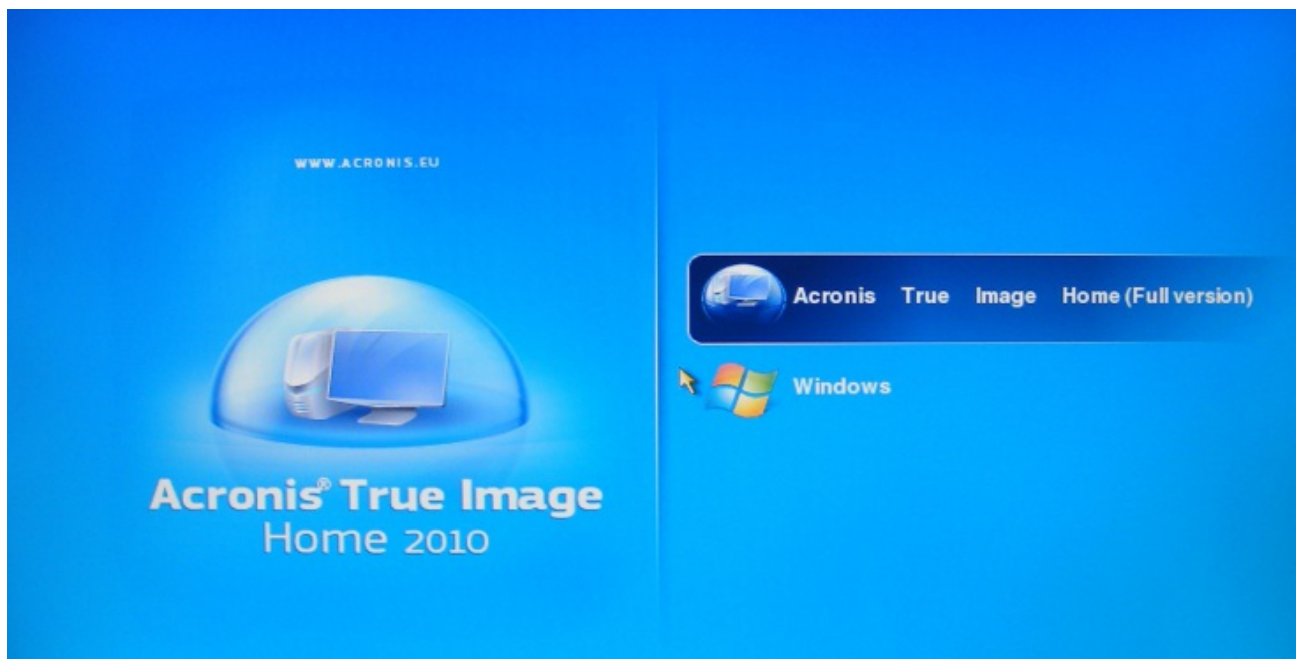
vga=0x315 quiet and press OK.

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You will then be at the start screen of Acronis. Choose “Acronis True Image home” to proceed: Enter this complete line (also written identical!) (only in Acronis 2010): vga=0x315 quiet and press OK. You will then be at the start screen of Acronis. Choose “Acronis True Image home” to proceed:



4.1.4.3. Start Acronis on VPUs with serial Numbers from # 87

VPUs with serial numbers from # 87 on are based on Windows 7. They are equipped with an external USB stick that you will find at the backplane of the VPU.

To boot from USB media press F12 during startup. This leads to the boot menu.

The password to enter the boot menu is '12345'.

Select the boot device 'Hard Disk' and then the USB flash drive as shown:



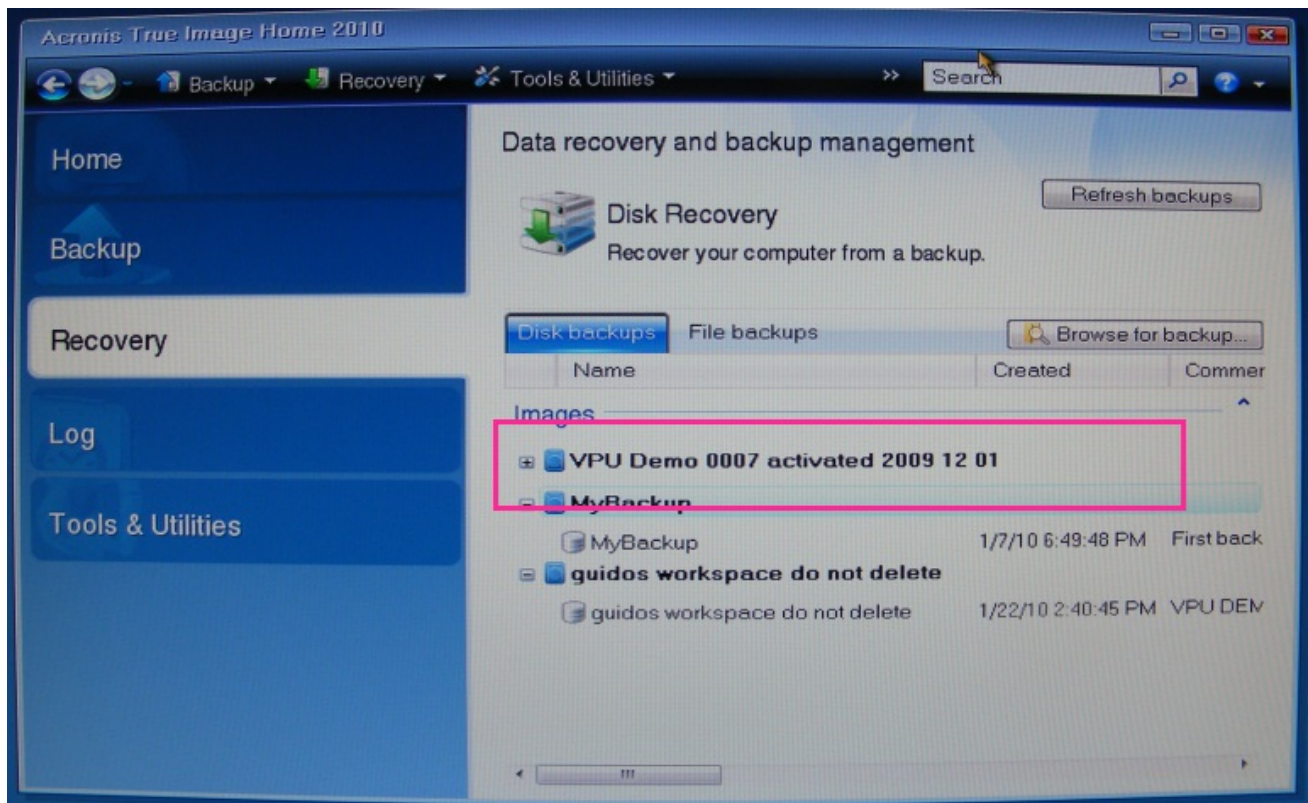
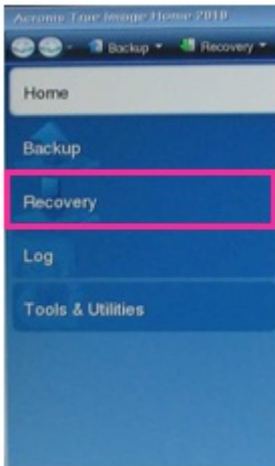
You will then be at the start screen of Acronis.

4.1.4.4. Restoring an image with Acronis

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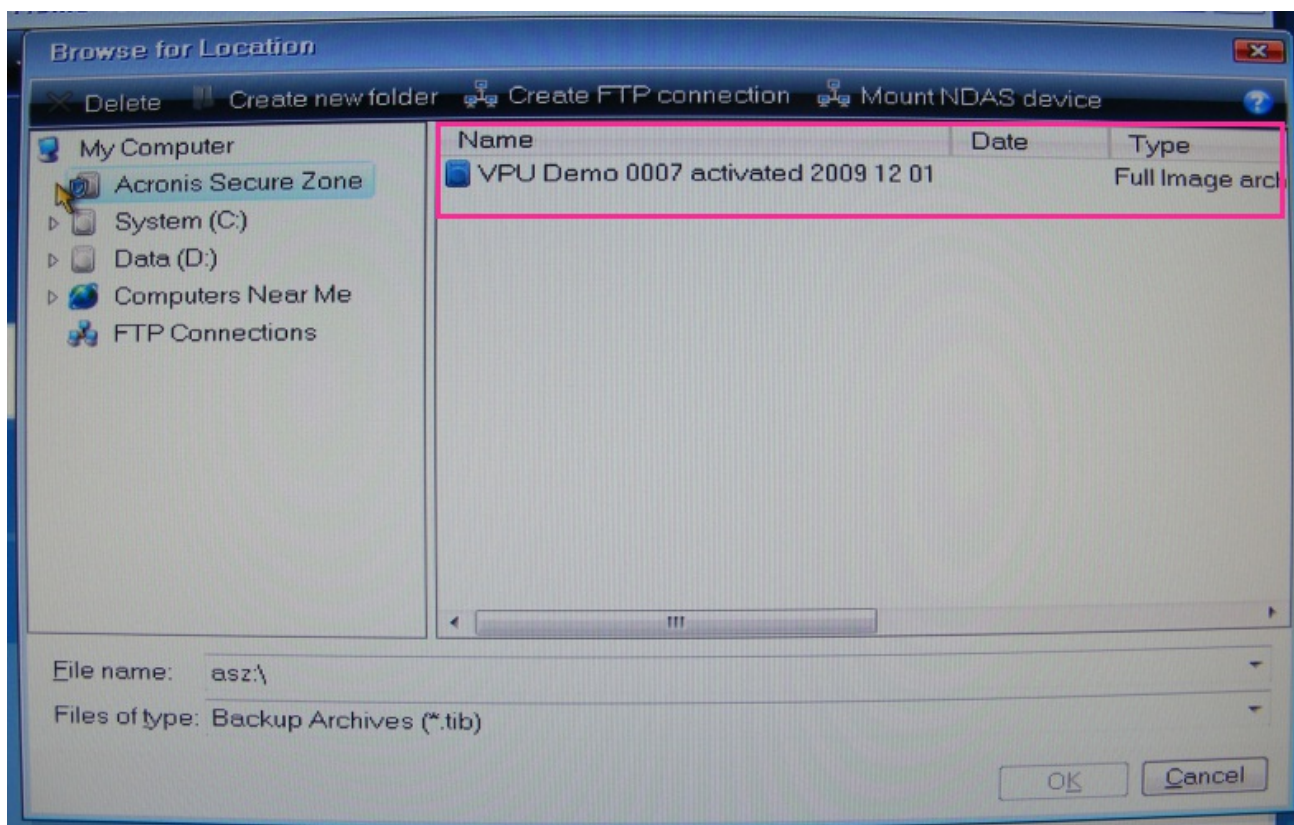
In Acronis click on “Manage and Restore”. This will list you all available backups:



Backup overview

If you are restoring an image from an external memory, click browse for backup to select the image from your memory. In some cases the Secure Zone image is not listed here automatically. You can rather click the „Refresh Backups“ button or recall the image out of the Secure Zone again if necessary.

Select your drive and image and click OK:



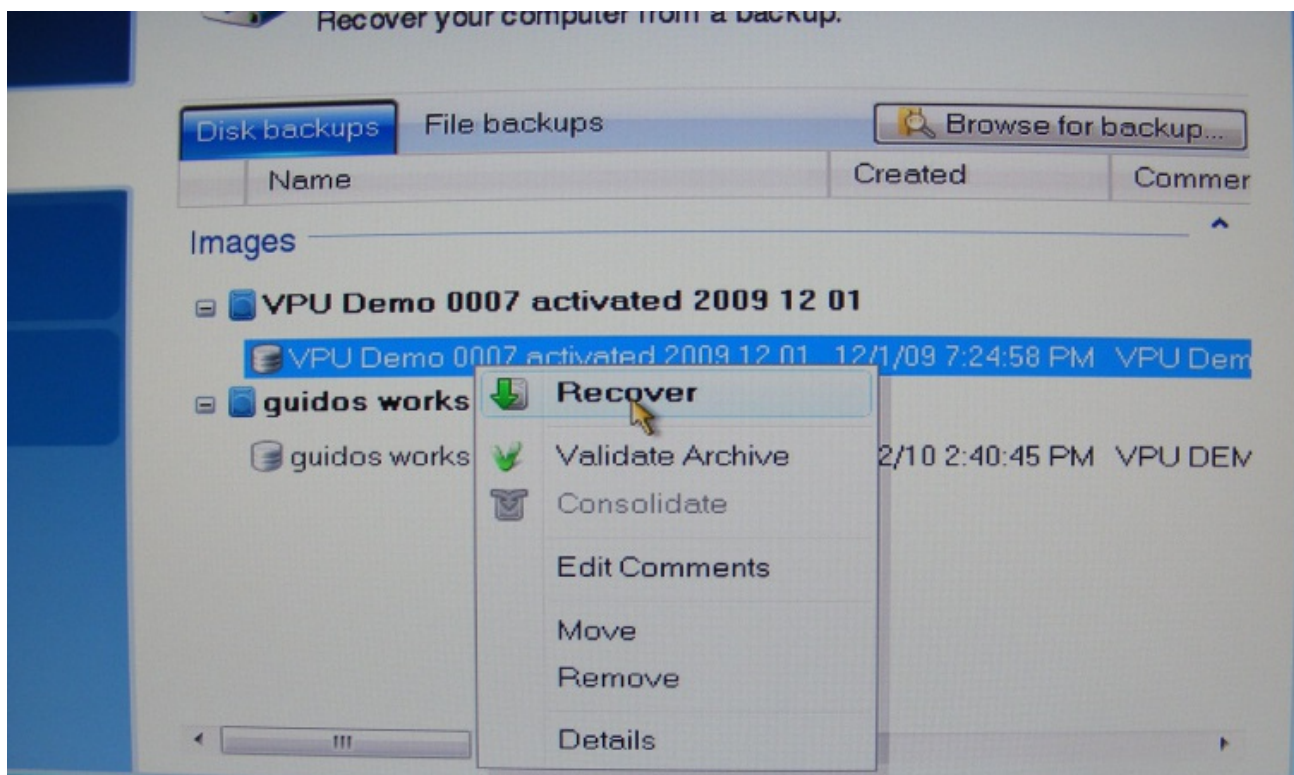
Backup browser

If you are restoring from Acronis Secure Zone do the same as described above, your Secure Zone is listed in the location tree as well. Select the file and click OK.

Now you see the wanted image listed.

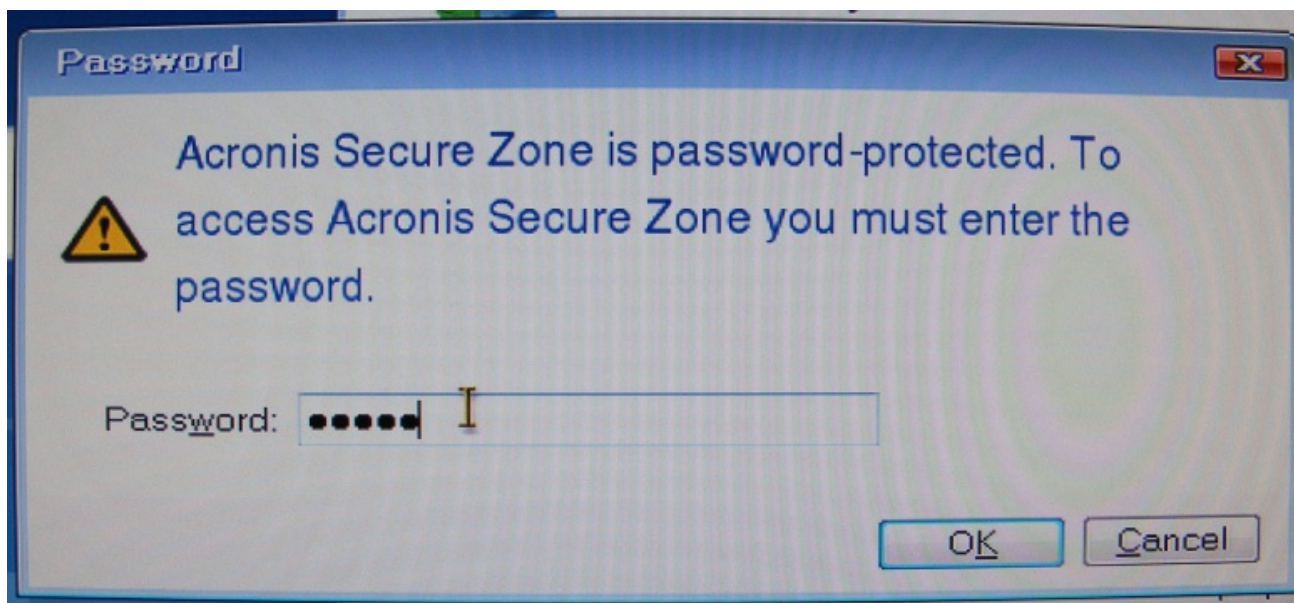
A right click with the mouse on the image will give you several options.

Choose recover to proceed:



Recover options

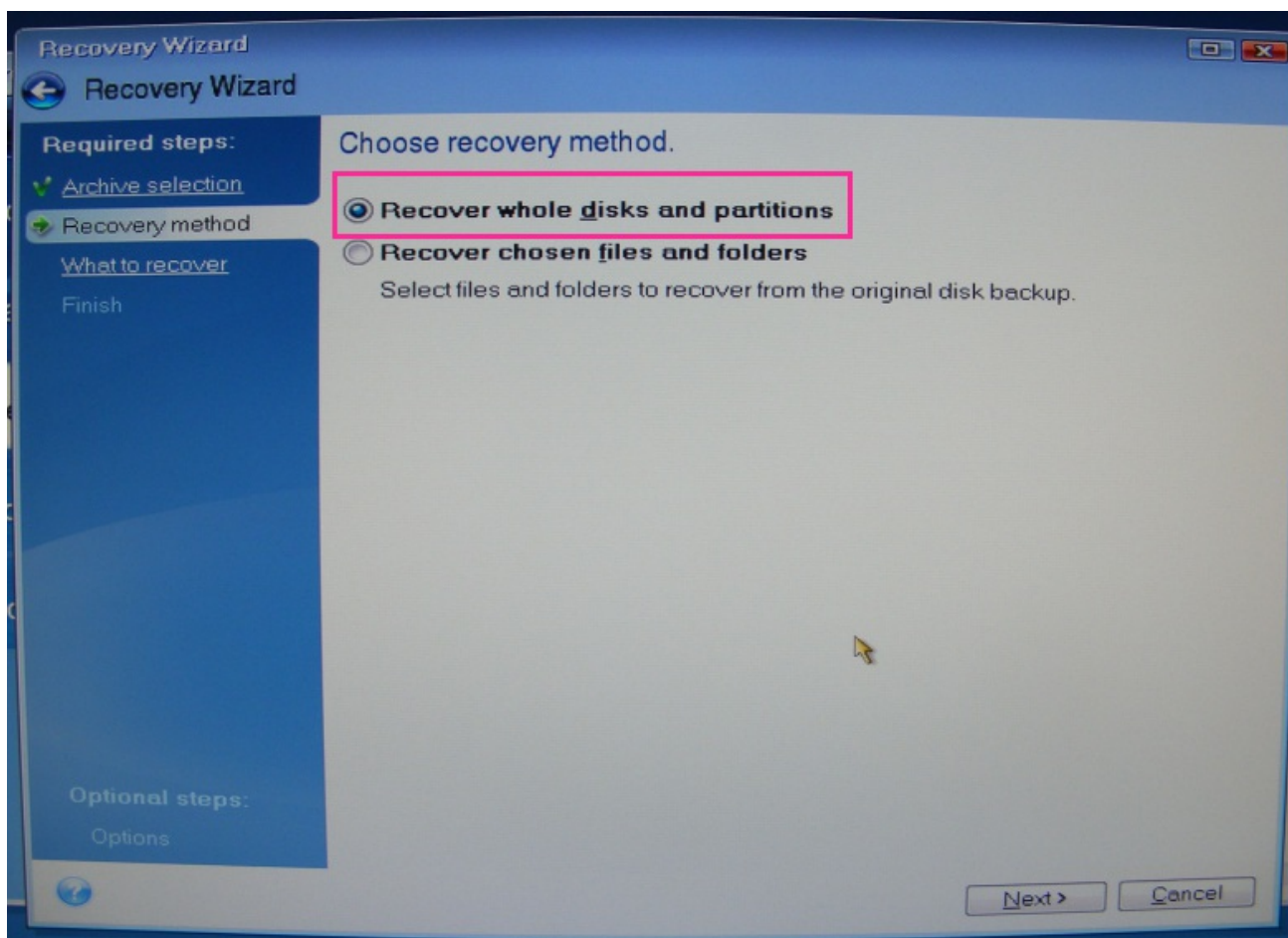
If you are recovering from a secure zone file, then you will be prompted with a new window:



Password request

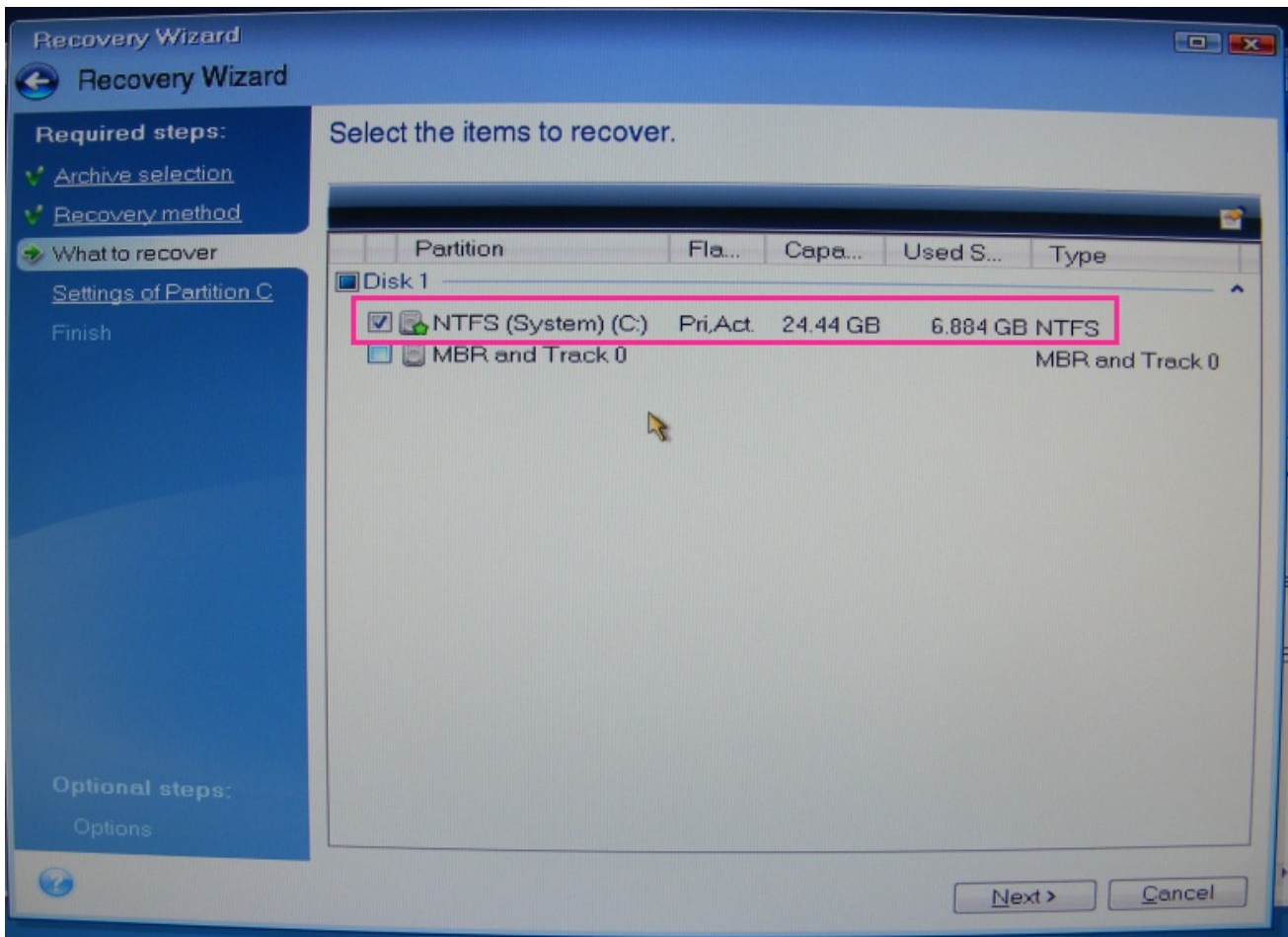
Enter: "12345" as the password and proceed by clicking on Ok.

The next option is to choose whether to restore the whole partition / drive that may be stored in the file or only some files of it. In our case you may only want to restore the whole disk / partitions:



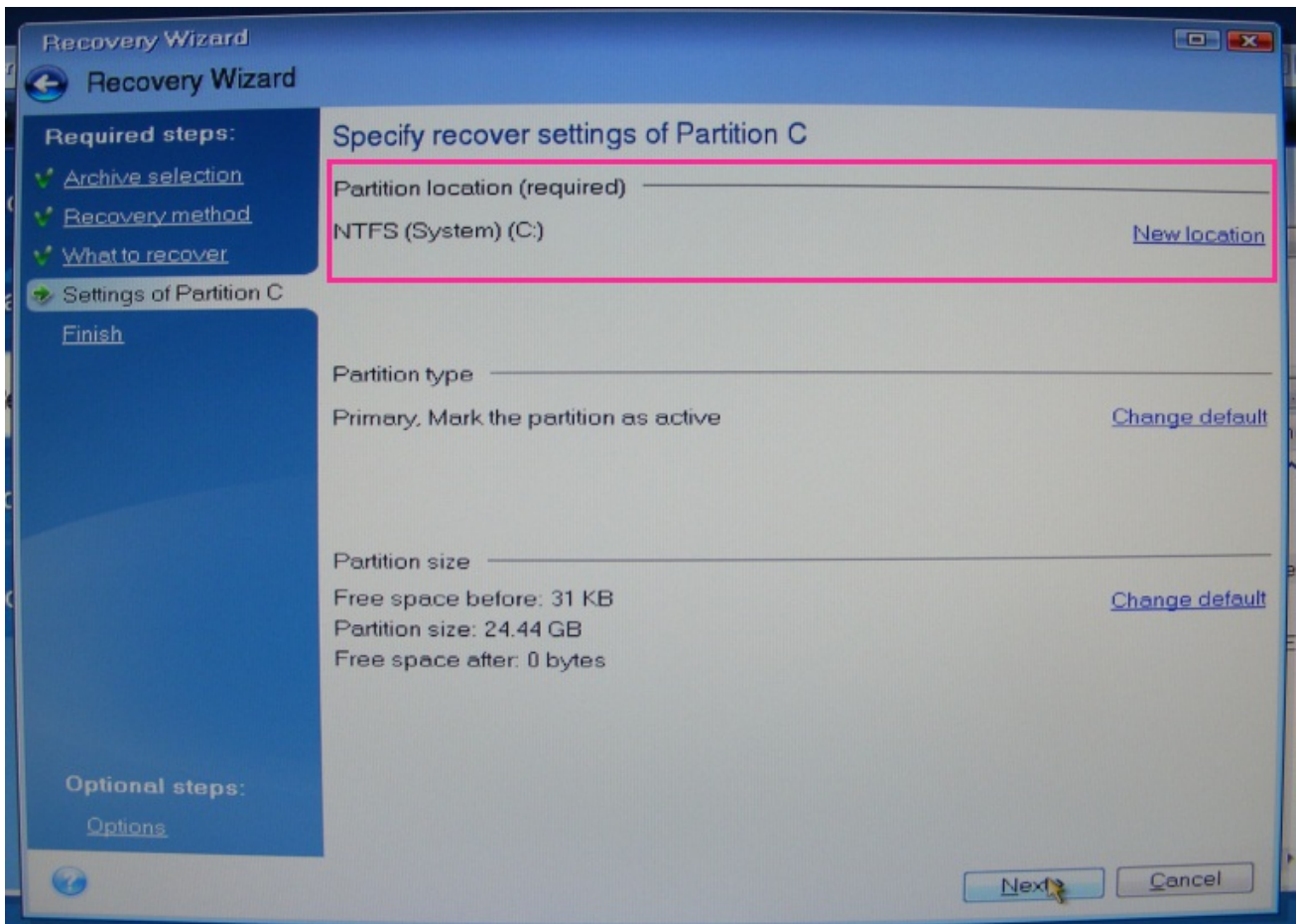
Recovery method

If your image does only contain one partition, you may see a picture like this in the next step. You should only choose to restore the partition, not the master boot record:



Partition selection

If you restore a complete hard disk, make sure that you select the whole disk including the Acronis Secure Zone:

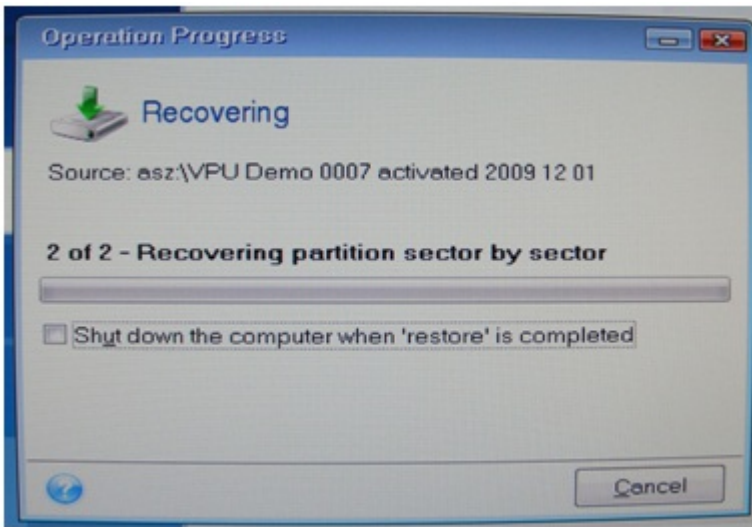


Recover settings

Make sure to choose the right location (e.g. a secure zone file has always be recovered to System drive C:). If it is not the wanted one click on new location and choose the right place.

If you want to restore a complete disk, make sure to choose the right hard disk if your VPU does have more than one hard disk drives. Also check the right connection and naming of any external connected hard drive. If you are unsure, please contact MA Lighting to avoid any damage of your system.

In the next step you will see an overview of what you will restore. Click on proceed and start the recovery of the image:



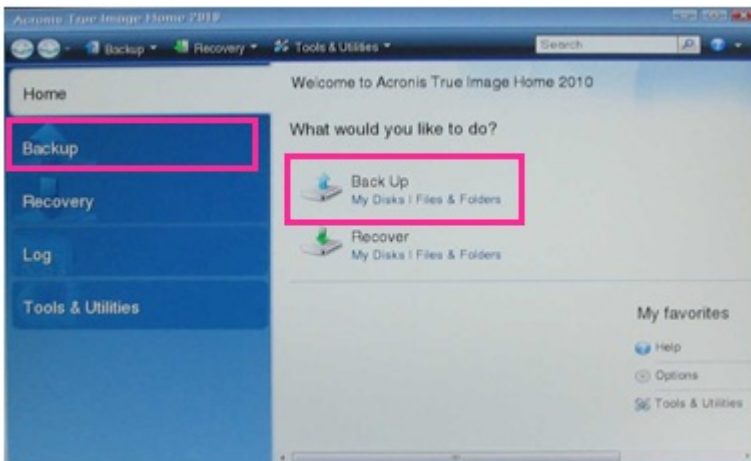
Operation process

4.1.4.5. Storing an image with Acronis

Since MA Lighting wants to give you the factory settings for trouble shooting, never delete, change or store files in the Acronis Secure Zone.

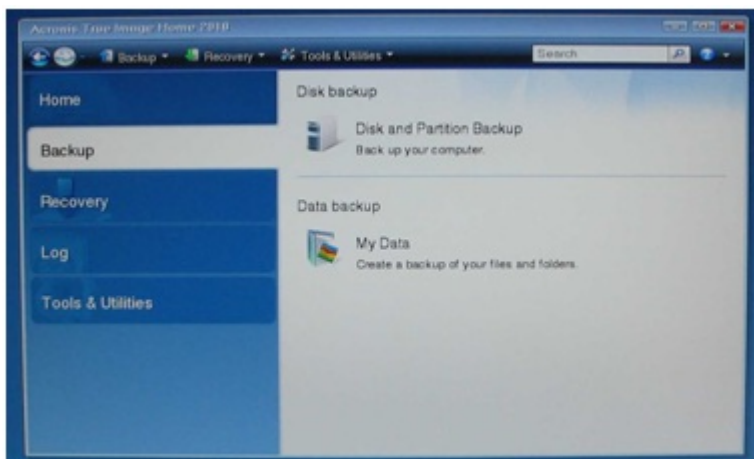
Keep in mind that a FAT32 formatted USB stick or hard disk can only handle files up to 4Gbyte. Otherwise you will have to reformat that device with the NTFS file system.

In Acronis choose the Backup option:

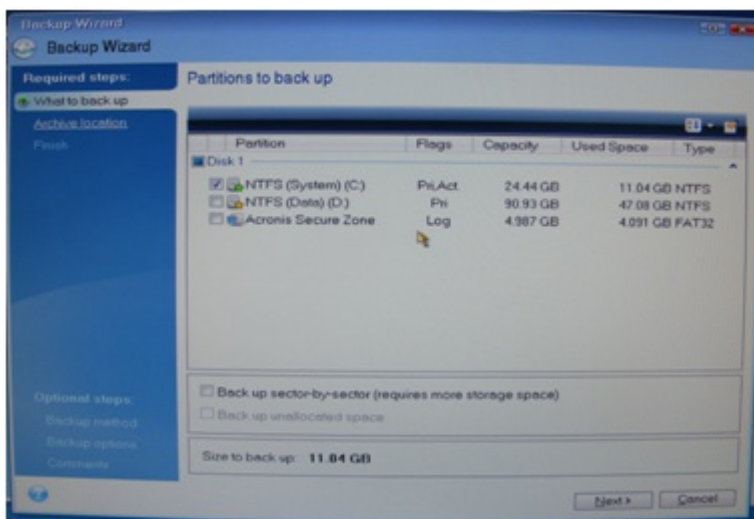


Backup option

Normally you want to backup a complete partition so the next selection shall be 'Disk and Partition' Backup:



Type of backup

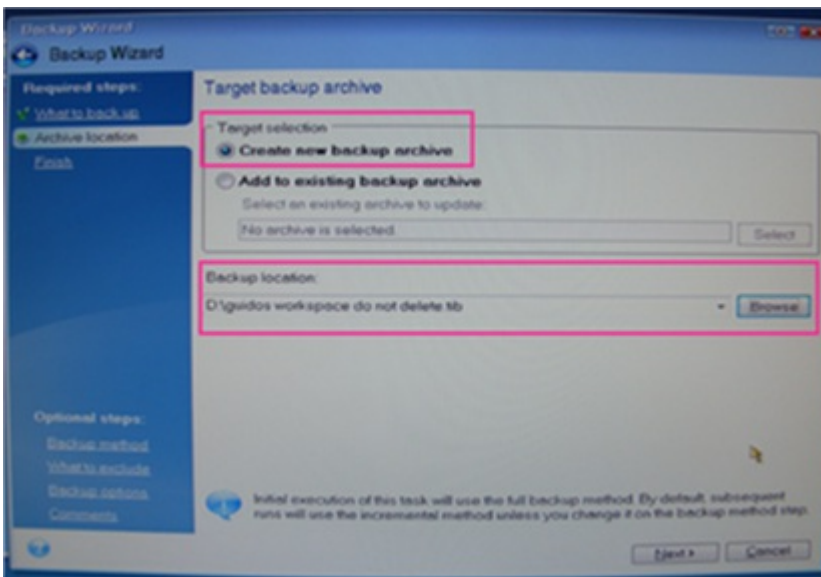


Partition selection

The next step is to define which partition or part of the disk you want to backup.

If you want to write a backup of a single partition, then select the corresponding partition without the Secure Zone.

If you want to do a complete System Backup, also include the Acronis Secure Zone. When everything has been set right, choose next to proceed:



Backup location

To write your image onto any memory you can choose the place to store.

Click on Browse to do so.

The file name should be conform with these definitions:

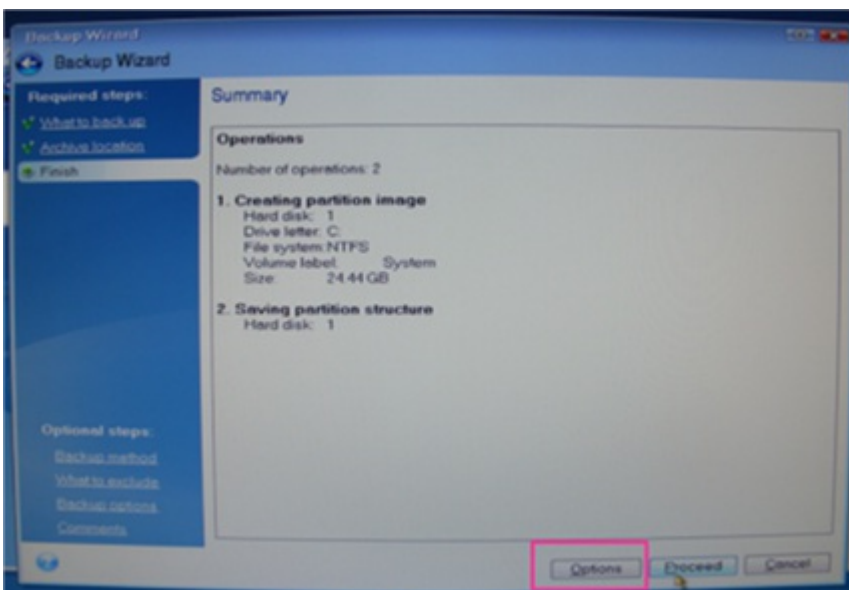
Name: "VPU XXX SN activated DD MM YYYY"

where XXX is the Type (BASIC / PLUS / PRO) | SN is the Serial Number e.g. 0004 for number 4.

Click on next to proceed.

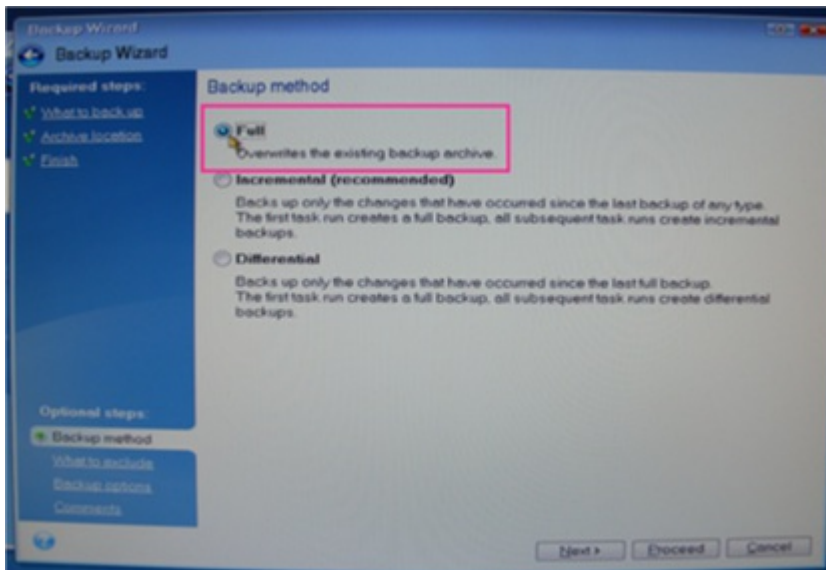
In Acronis 2010 you could now directly proceed to write the image.

However, it is necessary to choose "Options" to do further settings before writing the image:



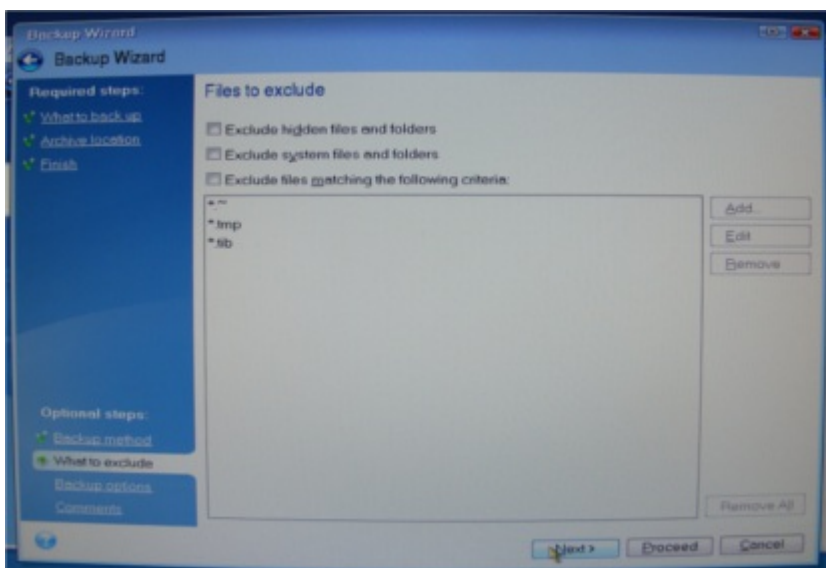
Backup summary

You have to choose “Full” as backup method:



Backup method

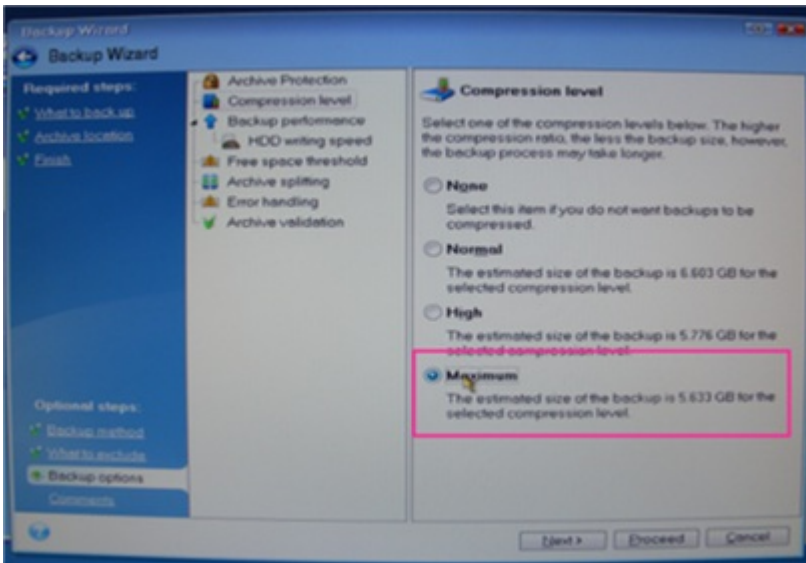
No files shall be excluded in the image so do not click any of these options in the next step:



Excluded files

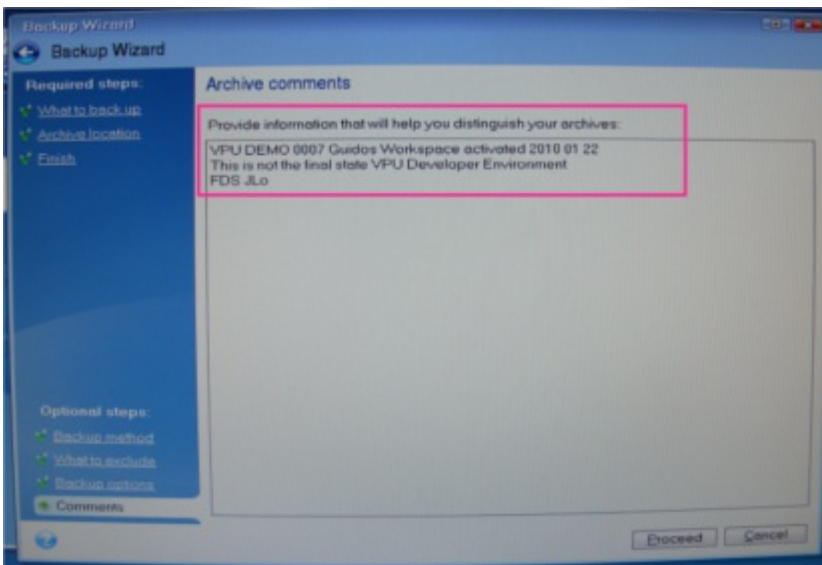
Choose the maximum compression level.

When storing images for your own purpose or in a normal backup situation you can lower the compression level to normal to speed up the process:



Compression level

In the last step before actually writing the image make sure to add some comments:



Archive comments

VPU XXX SN activated DD MM YYYY

where XXX is the Type (BASIC / PLUS / PRO) | SN is the Serial Number e.g. 0004 for number 4.

This is identical with the file name for the created backup.

After inserting all these information click on proceed to start the backup.

You should always get a positive message at the end of the process.

If not you should definitely check what went wrong.

4.1.4.6. Backup the VPU content after shipment

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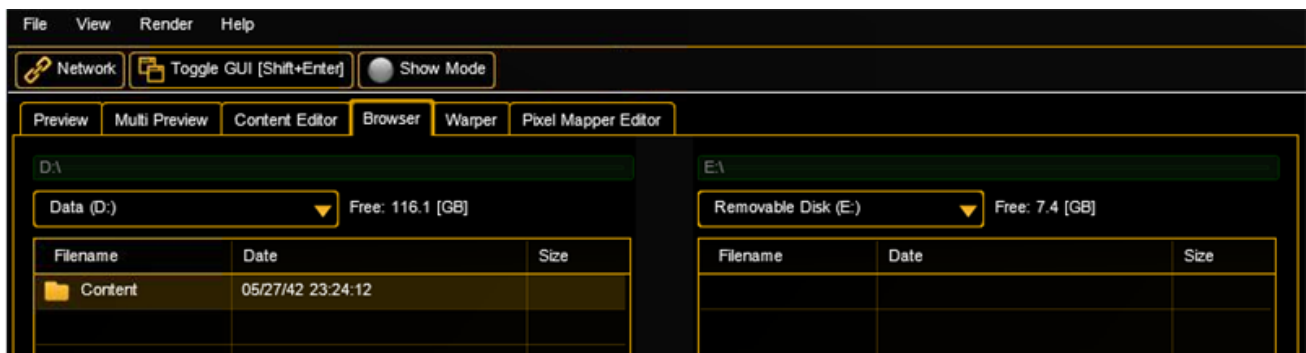
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After unpacking the VPU Unit, the first thing you should do is to make a copy of the delivered content onto any type of USB storage device. This can be a USB stick or a USB hard disk with minimum ~21 GByte free space (the current content has got 20.6 GB !).

This should be done by opening the file browser in the VPU software and by copying the complete content folder of drive D to your USB device. Just make sure that you connect your storage device before you switch to the internal file browser of the VPU because otherwise it may not be listed as a possible option. In the application click on the 'Browser' tab.



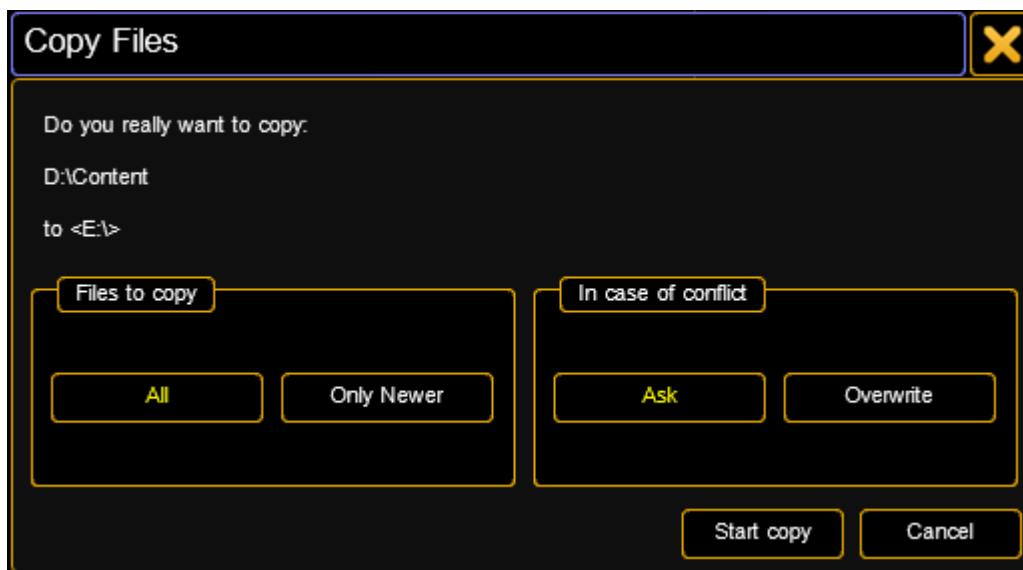
In the browser window you can choose between two storage locations and drives. You can choose your storage device / hard disk partition by clicking on the dropdown menu to get a list of all available drives.



In our case we want to copy the folder “Content” from drive D to your USB storage device. So on the left side you choose drive D and on the right side you choose your USB device, in this case drive E with the name “RemoveableDisk”.

To do so, click on the folder on the left side and Drag&Drop it with a mouse to your drive on the right.

You can choose if you want to copy only the newer files. In case of conflicts you can be asked to overwrite or overwrite without any feedback:



After the copy process is finished the copy process window will close and you will be returned to the browser window.



To verify the copy process, you can check the size of the folder on the USB device and compare this with the folder on drive D.

You can now disconnect the external storage device by unplugging the USB cable.

4.1.5. Access VPU via Network

To access the VPU over the Network, make sure your computer is in the same range as the IP address that is assigned to the Ether 1 device in the VPU.

In your computer open a windows explorer window and type the IP address of your VPU as shown below:

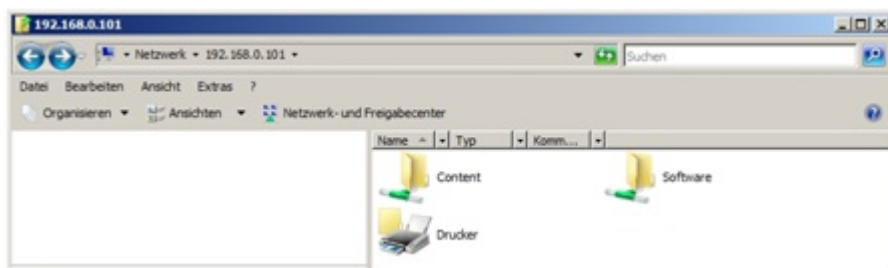


A popup will show up and ask you to enter the user and password necessary to access the VPU.

User / Benutzername: "MA"

Password / Kennwort: "12345"

Then you can transfer data to the content or the software folder.



You have access to the complete partition d:\.

The default folder for content is d:\content.

The software folder is used to transfer software updates to the unit via Ethernet connections

4.1.6. Version of grandMA desk or grandMA onPC (off-line)

You can determine by means of the version number of grandMA VPU if the software version fits to the software version of the desk or grandMA2 onPC.

grandMA VPU version number can be determined via:

- Filename of the setup:
MAVPU_v{VPU-Version}
- Splash screen (appears while startup)
- Info box (Menu - Help - Info)
- VPU status bar

Example:

MAVPU_v3.0.0.n

3.0.0. GMA2-Streaming Version This number should correspond to the grandMA 2 streaming version
n This number is for internal purpose

4.1.7. IP Addresses

IP addresses are what allow the internet and most modern networks to work. It's a way of identifying a computer by a unique set of numbers (an IP address). An IP address is made up of a set of four numbers. Each number can have a value between 0 and 255. IP addresses can be set via the network settings of the MA VPU (File / Settings / Network). MA VPU has to be restarted if the settings are changed. New addresses are read with the restart of MA VPU.

Your VPU and the console must have their respective IP addresses set up correctly.

Example for class-C network:

grandMA console IP address: **192.168.0.5**

The **first three sets of numbers** must be the same and the last set must be different.

MA VPU IP address: **192.168.0.10**

To setup the IP address of the desk, refer to the desk user's manual.



The default IP address of MA VPU is 127.0.0.1 (the local host address of the PC). In this case MA VPU application can be connected only with the onPC application running on the same PC. To work within the external network choose the network address e.g. 192.168.0.x.

The actual IP address is shown within the Status Bar:



You can change the IP address via the menu entry: 'File - Settings - Network'.

4.1.7.1. IP Address of the PC

Please note if you are already part of a network please check with your network administrator before changing your IP settings.

IP settings can be found at:

START - CONTROL PANEL - NETWORK AND SHARING CENTER

4.1.7.2. Art-Net IP Address

The Art-Net Standard needs a class A IP address beginning with 2. for example 2.2.2.2 and a subnet mask 255.0.0.0.

This address can be added via the Windows® control panel dialog Advanced TCP/IP Settings.

Further information about the Art-Net protocol under:

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4.1.8. EDID Manager

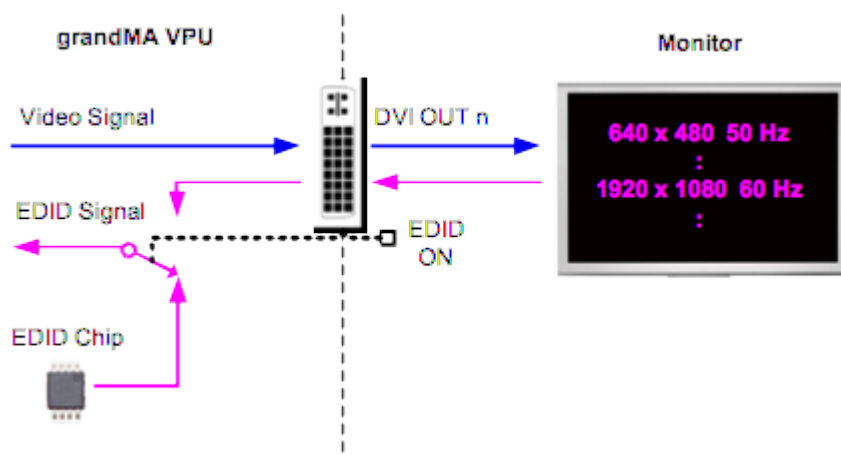
Extended Display Identification Data exchange is a standardized means for a display to communicate its capabilities to a source device. It enables the VPU to know what kind of monitor is connected. The EDID includes manufacturer name and serial number, product type, phosphor or filter type, timings supported by the display, display size, luminance data and (for digital displays only) pixel mapping data.

Unfortunately some LED walls offer no EDID data, so the VPU software cannot offer the correct resolution and refresh rates. Or if a monitor is reconnected the right resolution and refresh rate has to be set again.

To avoid these troubles the DVI outputs of the VPU have been equipped with additional hardware. An EDID Chip offers the common resolutions and refresh rates to the VPU hardware.



The switch near the DVI OUT connector lights blue if EDID is simulated.





If VPU is turned on and only output 2 is connected (EDID signal found) this output gets the logical output 1. If now a second monitor is connected to output 1 (or EDID 1 is switched on) this will be assigned to logical output 2. This situation can be undone if VPU is restarted with only one monitor (or EDID signal on) on output 1.

The EDID chip offers the following DVI resolutions and refresh rates. Other values are invalid:

H	V	Refreshrate / Hz	H	V	Refreshrate / Hz
640	480	50			
			1280	800	60
640	480	59			
			1280	1024	50
640	480	60			
			1280	1024	60
720	480	59			
			1400	1050	50
720	480	60			
			1400	1050	60
720	576	50			
			1440	900	60
800	600	50			
			1600	1200	50
800	600	60			
			1600	1200	60
1024	768	50			
			1680	1050	59
1024	768	60			
			1680	1050	60
1280	720	24			
			1920	1080	24
1280	720	25			
			1920	1080	25
1280	720	29			
			1920	1080	29
1280	720	30			
			1920	1080	30
1280	720	50			
			1920	1080	50
1280	720	59			
			1920	1080	59
1280	720	60			
			1920	1080	60

4.1.9. CITP / MSEX Protocol

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CONTROLLER INTERFACE TRANSPORT PROTOCOL / MEDIA SERVER EXTENSION, is an open network protocol used between visualizers, lighting consoles and media servers to transport non-show critical information during pre-production.

The VPU can be used as a Video Streaming Server to a console or a visualiser e.g. MA 3D. Each output and each layer can be streamed independently.

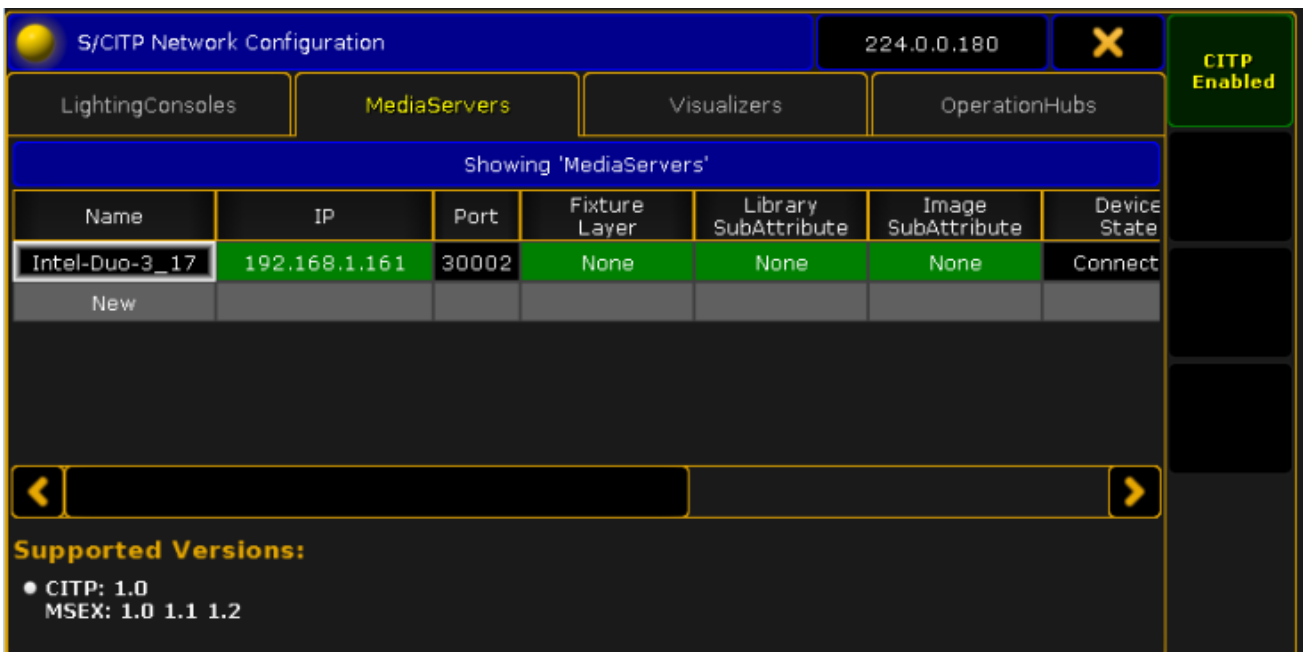
The resolution of each stream is limited to max 64 kbyte per frame and depends on the ratio of the rendered output. From this follows that resolutions are below 200x200 pixels depending on the ratio of the rendered source.

The frame-rate is set by the displaying visualizer and is limited by the VPU software: Currently 30 fps are shared for all outputs (1 output = 30 fps, 2 outputs = 15 fps each, 3 outputs = 10 fps each) and all layers share 15 fps (1 layer = 15 fps each, 10 layers = 1.5 fps each, 20 layers = 0.7 fps each).

If the complete traffic on the network adapter reaches 30MBit, then the VPU will start to limit its output of CITP even more.

CITP connection is not possible when running CITP sender and CITP receiver at the same computer. Setup CITP menu title bar shows current CITP multicast address. This address can be changed. Changing this address changes CITP multicast address for all MA stations (consoles, MA 3D, MA VPU) in current session. Be aware, when changing this address connection to third party CITP stations may not be possible anymore.

CITP can only be enabled in the grandMA2 software if connected to the VPU. To enable CITP on the desk go to **Setup** | **CITP Network Configuration** and set CITP to Enabled:



CITP Settings

At the VPU the CITP properties can be monitored. Each headline in the Multi Preview indicates if CITP is requested for that output and displays the outgoing fps:

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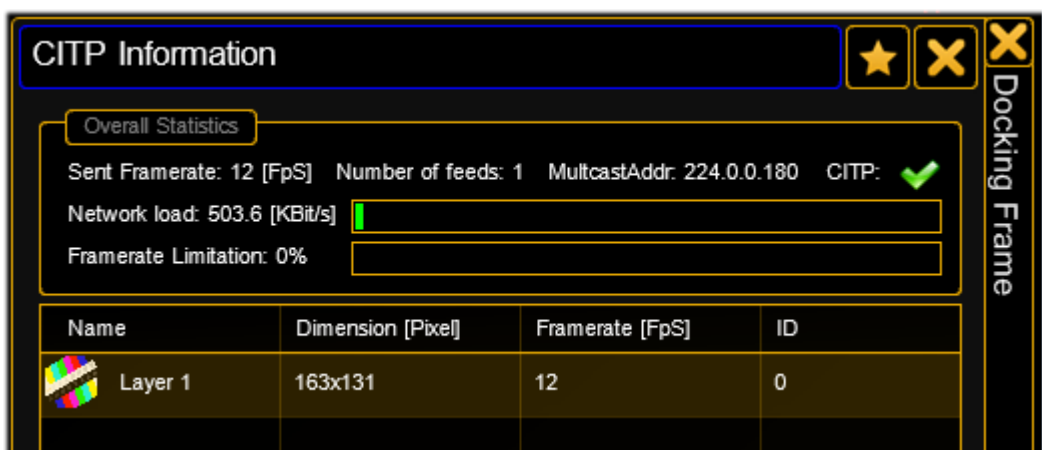
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CITP Preview

Additionally the status bar in the bottom of the GUI reflects the CITP status.

In the docking frame a CITP Status window can be opened to monitor the CITP local and global setting and to see the outgoing streams information:



CITP Information

At the desk a CITP Video window can be created via: Create Basic Window - Other - CITP Video Viewer. The Window looks like this:



CITP Video Viewer

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If the Show Mode is enabled, CITP is automatically disabled.

5. Communication with the grandMA Desk Series

You can connect the VPU to:

- The grandMA desk, see: [Connection with the grandMA desk](#)
- The grandMA onPC, see: [Connection with the grandMA onPC](#)



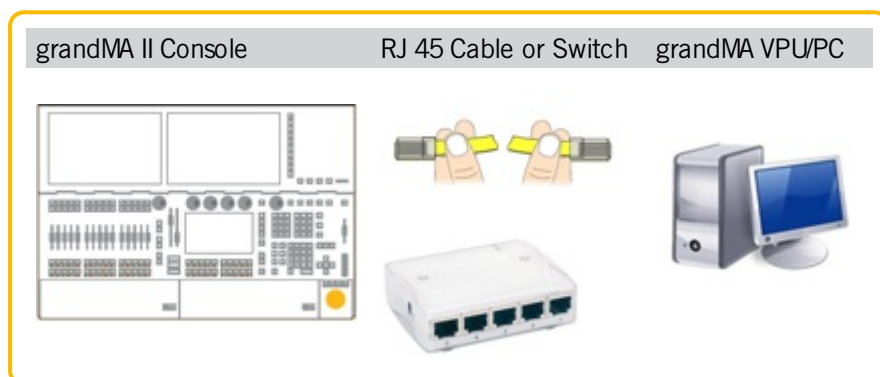
Notice that MA VPU fixtures (Layer, Camera, Master) need a valid DMX-patch in order to communicate with MA VPU

5.1. Connection with the grandMA desk

Please make sure, that the program version of the grandMA desk meets the specifications described in: [Version of grandMA desk or grandMA onPC \(off-line\)](#).

For communication you have to connect the VPU with the grandMA console or another PC running the grandMA2 onPC.

You can do this directly with a patch cable with two RJ-45 connectors or via a network switch.



If you use a network with a switch, connect the PC with a regular patch network cable to the switch.

- Connect the cable to the desk.
- Start the desk and load a video show
- Start the grandMA application and join the session or invite the video application from the desk

The application connects to the desk and receives the data of the current show. If you do not get a connection to the desk, make sure that grandMA VPU has the right IP address as described in ['IP Addresses'](#).



A detailed example can be found at: [Quickstart with grandMA2](#)

5.2. Connection with the grandMA onPC (off-line) software

Make sure, that the program version of the grandMA onPC software meets the specifications described in: [Version of grandMA desk or grandMA onPC \(off-line\)](#).

- Start the grandMA2 onPC and load a show (Backup / Load Show)
- Start a new session at the grandMA2 onPC (Setup / MA Network Control / Create Session)
- Start the MA VPU application

Invite the VPU to your session (Setup / MA Network Configuration). Press "Add" and choose your MA VPU. Right click on the cell "Session Member" to invite the MA VPU. Choose a Fixture Layer.



A detailed example can be found at: [Quickstart with grandMA2](#)

5.3. Connection States

When you launch MA VPU (Video Processing Unit) it tries to connect to a session where its state is set to "Session Member".

The two states of the connection are indicated by the heart in the status bar. The blinking of the heart indicates the communication between the desk and MA VPU.



Heart is broken and red: No connection to a session established.



Heart is blinking green: MA VPU is connected to a session.

ATTENTION: With the start of a new session (Create) the session founder overwrites all data of the other members. I.e. if a new session is founded by the MA VPU **all** data in the desk will be overwritten!

If more than one console, visualizer or onPC editor is connected to the network the connections to the equipment will have to be properly assigned.

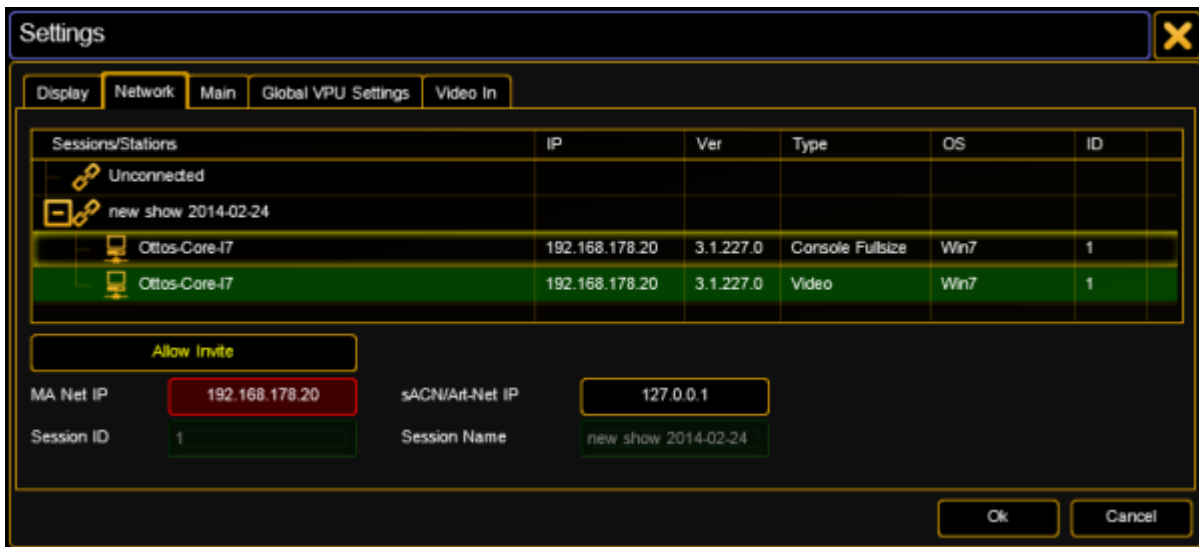
- The communication between consoles, visualizer, VPU applications and onPC editors takes place in sessions.
- A session has only one founder. This is e.g. the master. On connection the founder transfers its data (fixture types) to the connected stations.
- From then on, all session members are synchronized and have equal rights.
If a fixture is edited at a connected station the change is reflected to the master and vice versa.

A Session always has one master and several stations.

The network configuration can be managed by the 'Settings - Network' dialog.

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Network settings



Hint:

If the session entry appears in red, the streaming version is wrong. You have to update the software.

The upper part of the dialog shows the active sessions and their members in a tree view. MA VPU is marked green.

Allow Invite:

If this button is active, the VPU can be invited to a session.

Settings:

MA Net IP:

Use this listbox to choose an IP address for network communication. If there is more than one IP available (e.g. multiple network cards installed) select the IP address which is linked to the grandMA desk.

sACN/Art-Net IP:

Use this listbox to select an IP address for the Art-Net communication of the Pixel Mapper (receive data only).

Session ID:

Every session in the grandMA network has a unique ID.

Session Name:

Displays the name of a session.

6. Data Management

This section describes how data is managed by the desk and MA VPU. If they are connected in a MA network session the desk gets the master and the video application becomes the slave of a session. Data changed within the video application is transferred to the desk and vice versa.

6.1. Master slave

The MA console or onPC is always the master of a session. If the MA VPU is started as standalone it is not in a session. If a desk is connected and a session is started within the desk the VPU becomes the slave. So the synchronization of desk and video data is guaranteed.

6.2. Principle function diagram

The following pattern demonstrates how data is processed.

If you connect the grandMA VPU to a grandMA2 desk you can compare the result with some slide projectors remote controlled by an MA desk.

In contrast to a slide projector the slides are not projected on the screen.

The screens or 3D objects are active light emitters like monitors and can take the shape of any geometric form. This takes place on so called “layers”. Each layer output feeds a virtual camera.

- The virtual camera outputs can be mixed up to a resulting video output.
- Each layer has its own magazine containing emitting 3D objects.
- Each layer has its own magazine containing videos, images and masks.
- The number of 3D video layers can vary in dependence of the complexity of your show.
- You can patch up to 32 layers

If the grandMA VPU is invited in a session by the desk, layers behave similar to a fixture. All layers have access to the same content pool.

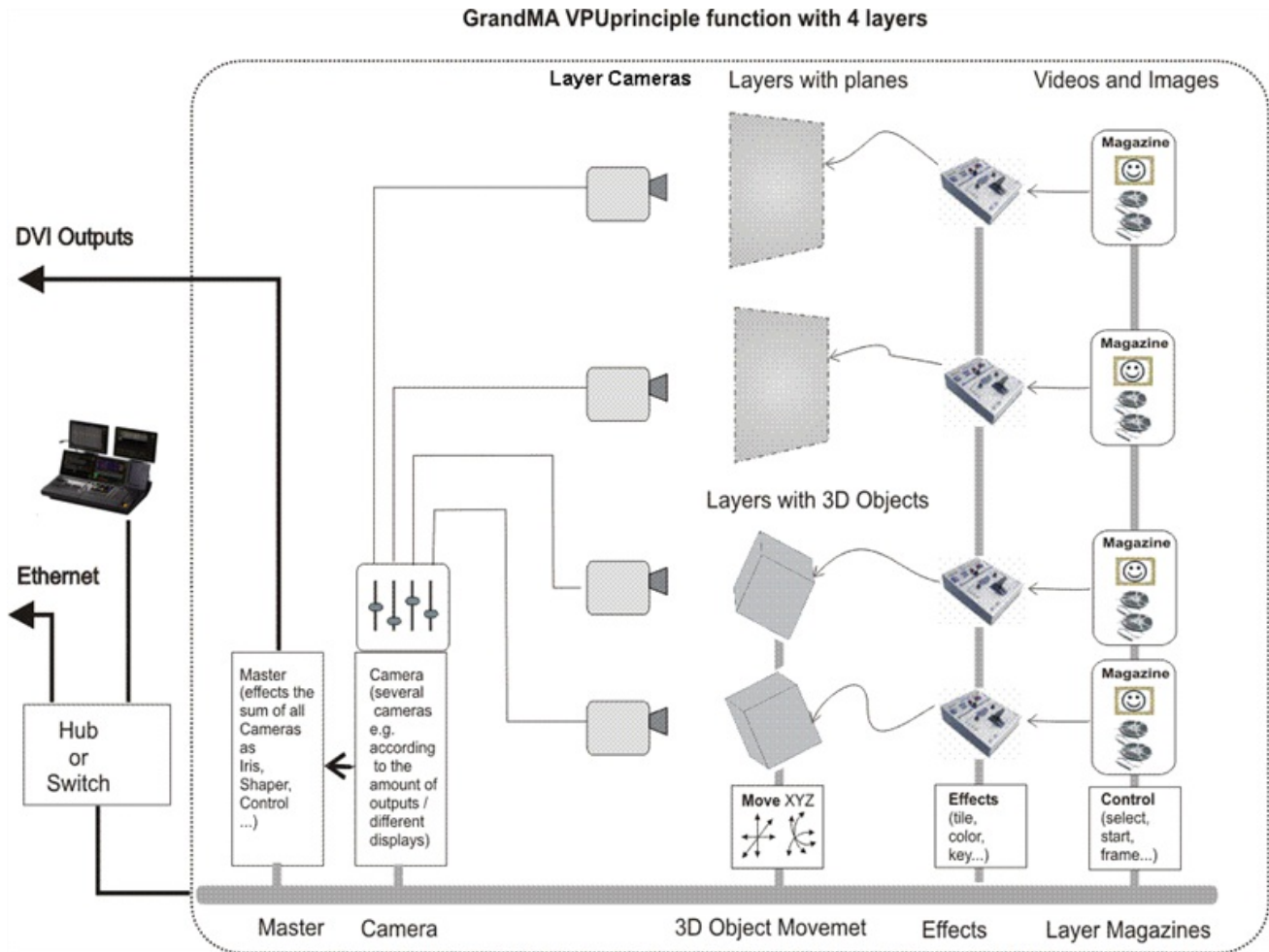
The application receives the amount of layers and each layer magazine is assembled with several images and videos.

These are indicated by their relative paths and names.

If a layer 3D object or the content of a magazine is changed within grandMA VPU, the changed properties are immediately taken up by the desk.

Several grandMA VPU applications are shown in several 'fixture layers' on the MA-desk.

The following diagram shows a principle structure with 4 layers.



MA VPU: Principle function diagram

6.3. Layer Properties

For a better overview the patch of a show can be arranged in Fixture Layers on the grandMA2 desks. E.g. the conventional lights can be separated from the multi functional fixtures and video engines.

For each MA VPU station an own Fixture Layer is created. This Layer accepts several Video Layers. These Video Layers can be combined to meet your requirements. In the following example the Fixture Layer with the name ,VPU' contains 1 Master Fixture, 6 Video Layers and 2 Camera Fixtures (known as former VPU Output fixture):

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Layers for a show can be arranged for your requirements on the desk. You can find them in the fixture library at the entry: 'MA LIGHTING'

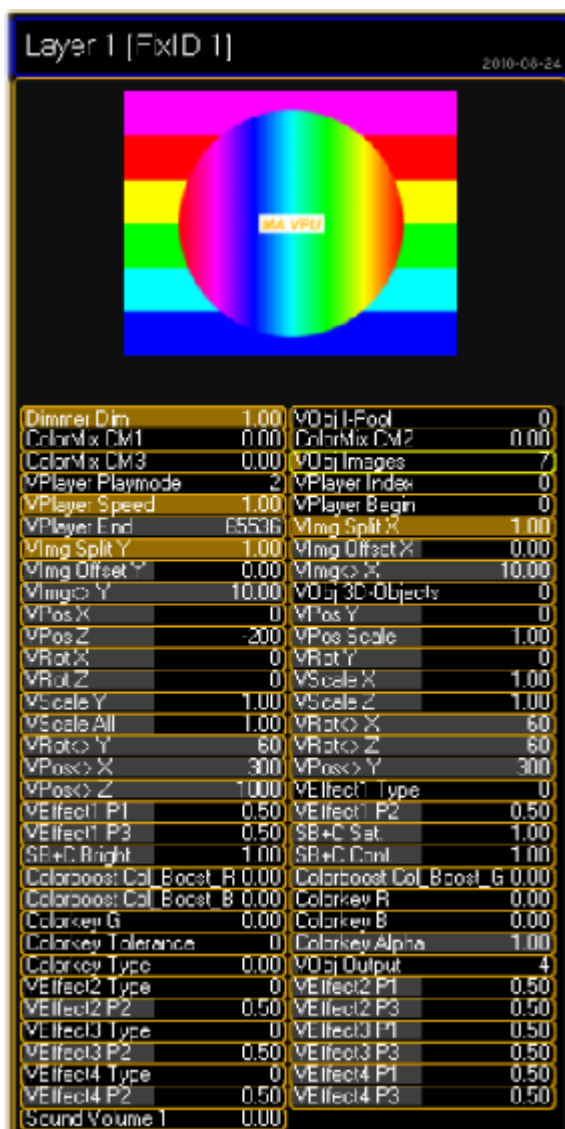
The different Layer Types have the following meanings:

Video Layer:

Master:

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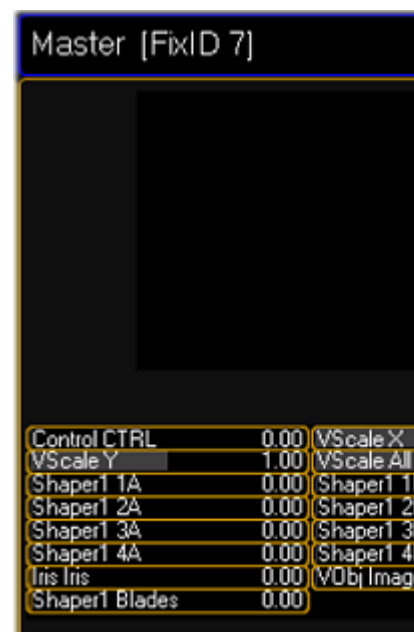
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This Layer can use several 3D Objects from the library to represent images and videos. The content can be shown on several outputs of the graphics card or the pixel mapper. A MA VPU application can contain several 3D Video Layers for images and videos. You can patch up to 32 layers to be more flexible in programming.



Please note that you can not run video clips on all these layers at the same time due to performance reasons.



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6.4. Layer Reference

If you choose a 'Layer Reference' as input source for a layer the layer shows the input from the source layer. This saves performance because the video must not be decoded twice. For example if layer 1 shows a video and layer 2 takes layer 1 as reference the video has only to be decoded for layer 1. Layer 2 can be used to set effects. To use the 'Layer Reference' use the layer fixture and select Layer Reference as content. The related channel sets are located at the I-pool standard folder. If you want to add them to another folder, look for a free channel set and select 'Insert for Layer References' via right mouse button.



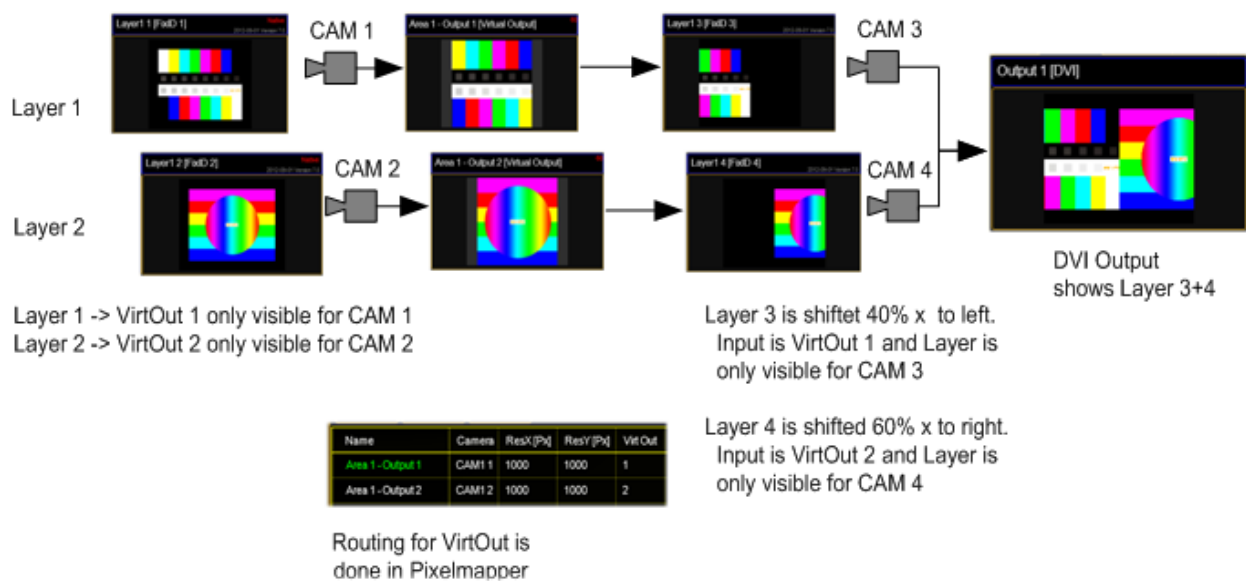
Important

Only the video itself is feed into the other layer, not the changes in color or effects etc.

6.5. Virtual Outputs

The Pixel Mapper Output can be configured with a "Virtual Output ID". You should not place any Pixel Mapper Fixtures onto that Pixel Mapper Output. If a Virtual Output ID is set, then any "Render IP" settings are ignored, the field is greyed out. The idea behind that: since a Virtual Output can be assigned with a dedicated, single Camera, you can route certain Layers to this dedicated Camera. So these Layers are only displayed on that Camera and thus only rendered on the Pixel Mapper Output. You can route as many Layers to that Virtual Output as you like. The next step is to route this Virtual Output as Virtual Input onto another Layer. This Layer is only displayed on a Camera that is only visible on a DVI Output.

Example for 2 Virtual Outputs:



What is it good for?

The user can create output display arrangements where each single arrangement is controlled by a Camera. So each single arrangement layer can be modified via the softedge, keystone and splitscreen parameters of each Camera. This comes in handy if an LED controller grabs certain areas out of the displayed picture and the VPU user wants to control these areas with a dedicated VPU Camera Fixture. This can be used to drive a "Matrox Triple Head to Go" setup and control each DVI Output with a dedicated VPU Camera Fixture. The "Triple Head to Go Device" is recognized by the VPU Software as one big output. What you basically do is to assign 3 Layers that display Virtual Output 1; 2 and 3 next to each other.



Don't use the Virtual Output signal as input for the same layer (e.g. VirtOut 1 as input for CAM 1 on the same layer). That will lead an optical feedback!

6.5.1. Virtual Output: Configuration of a TripleHead2Go Digital Port

The following example shows the configuration of a **TripleHead2Go Digital** DisplayPort in 3xHD:



To use the right product consider that the card has DVI-In- and Outputs!

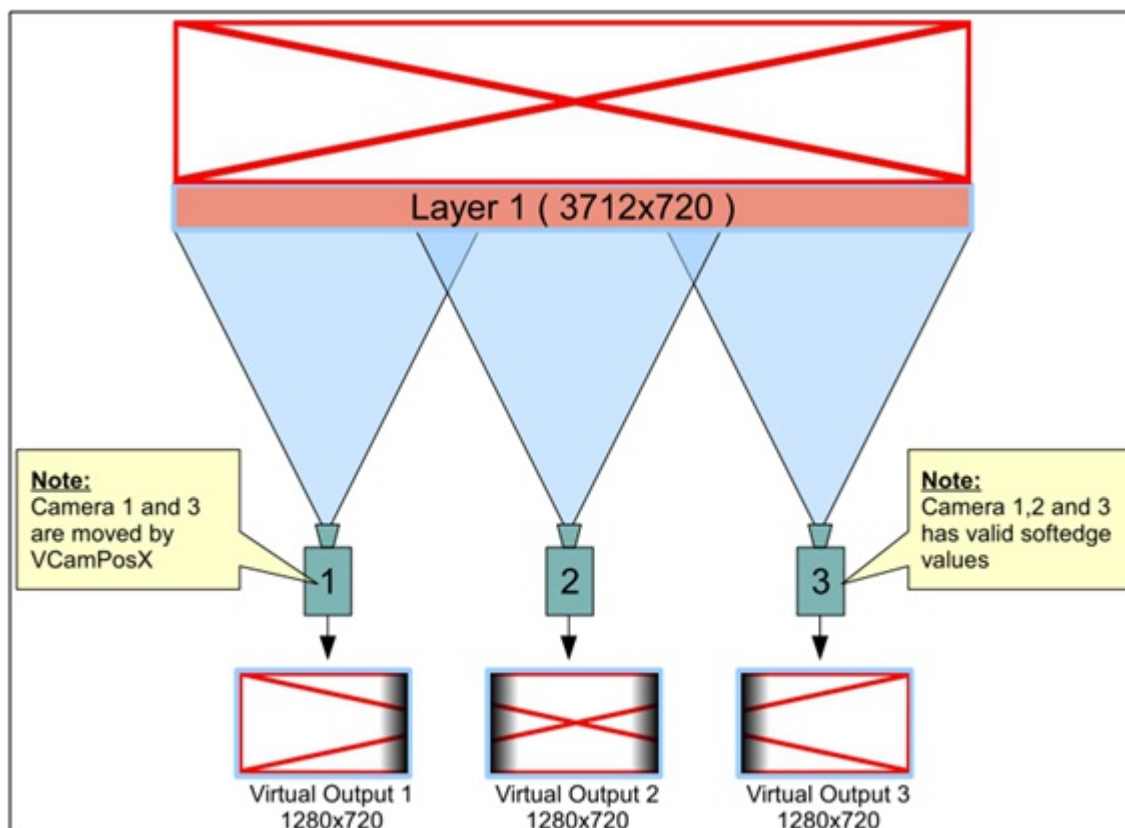
Inside the Pixelmapper Setup

- First step is to create an "Area" (see figure below). It's helpful to use the same ratio when applying values for the dimensions as they will be used for the "Virtual Outputs" - in this case e.g. 12.8 x 7.2 meters. It actually matters only for the visualization inside the Pixelmapper and has no influence to the final output

- Next step is to create inside the area "TripleHead2Go" Digital three "Virtual Outputs" each with a resolution of 1280x720. Next is the assignment of IDs for the "Virtual Outputs", (column "Virt Out", e.g. 1..3) and for the cameras (column Camera, e.g. 1..3). When a "Virtual Output ID" was entered the entry inside the column RenderIP of the same line will be automatically removed as no pixelmapper is to be used together with this output. The "Virtual Output ID" is important for mapping to layers. The individual attributes of the "Virtual Outputs" (e.g. Softedge) can be adjusted by selecting the proper camera by "Camera ID".



- The complete content which will finally range over all three displays will be played back using e.g. "Layer 1" with a resolution of e.g. 3712x720.



- Layer 1 will be parameterized in a way (using a MA Lighting console or onPC) that it is only visible for Camera 1, 2 and 3 (which are already linked with the corresponding "Virtual Outputs").



- Camera 1 and 3 will be shifted in a way to only show the wanted selection by using VCamPosX.



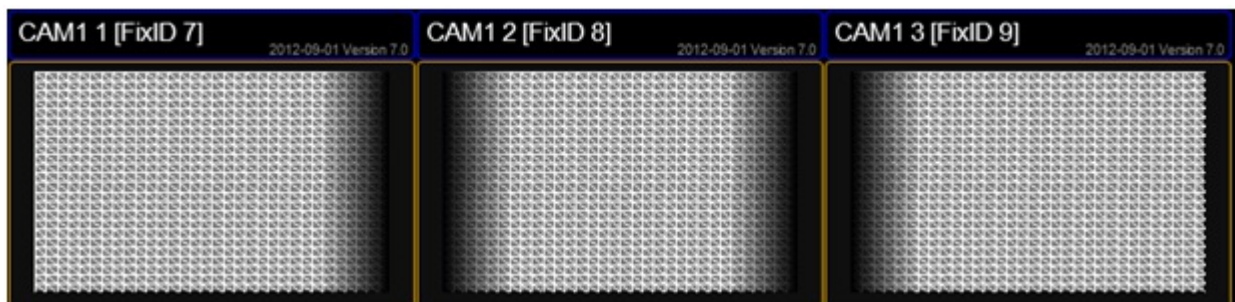
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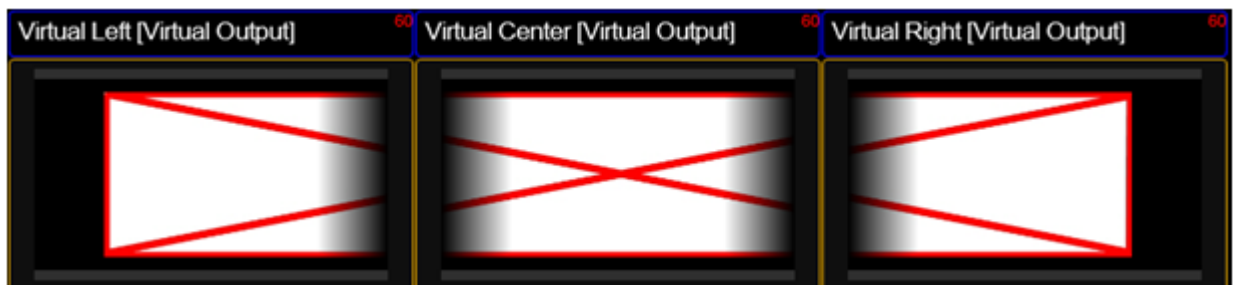
- The Softedge Parameter needs to be properly adjusted from the console or onPC software (Example for Camera 1, which is assigned to left part of the image)



- Provided Softedge is adjusted correctly the Camera Layer display of the VPU looks now like this:



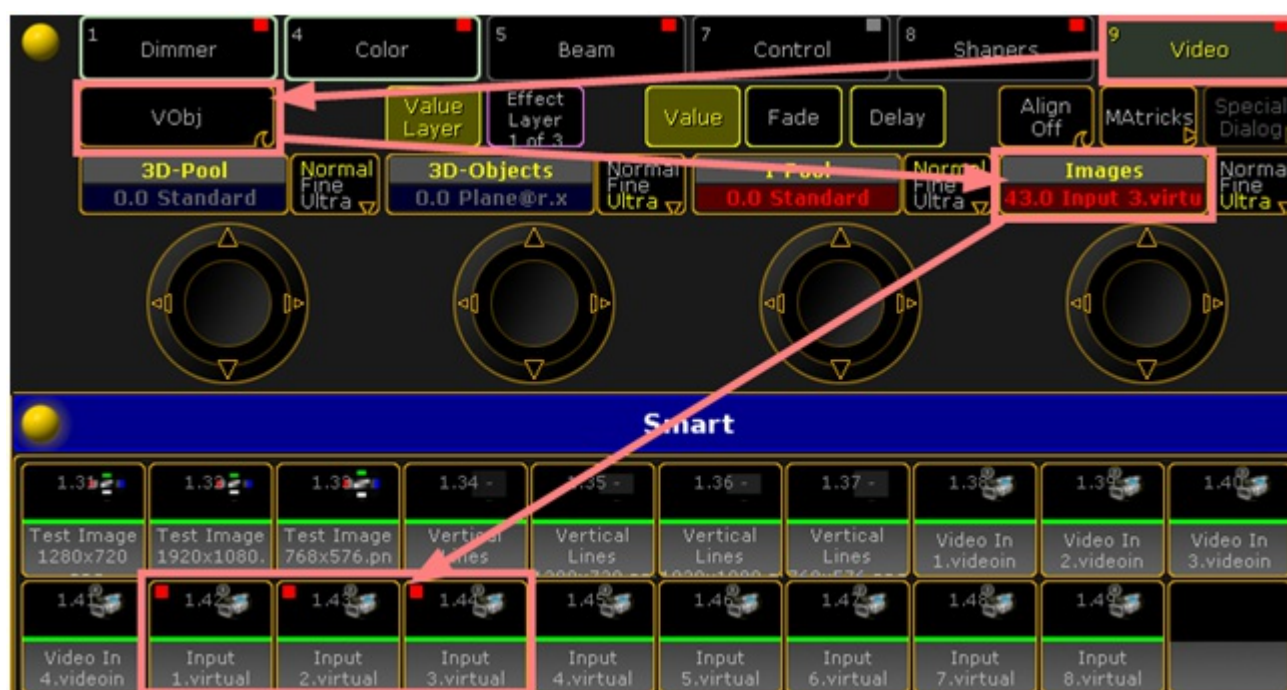
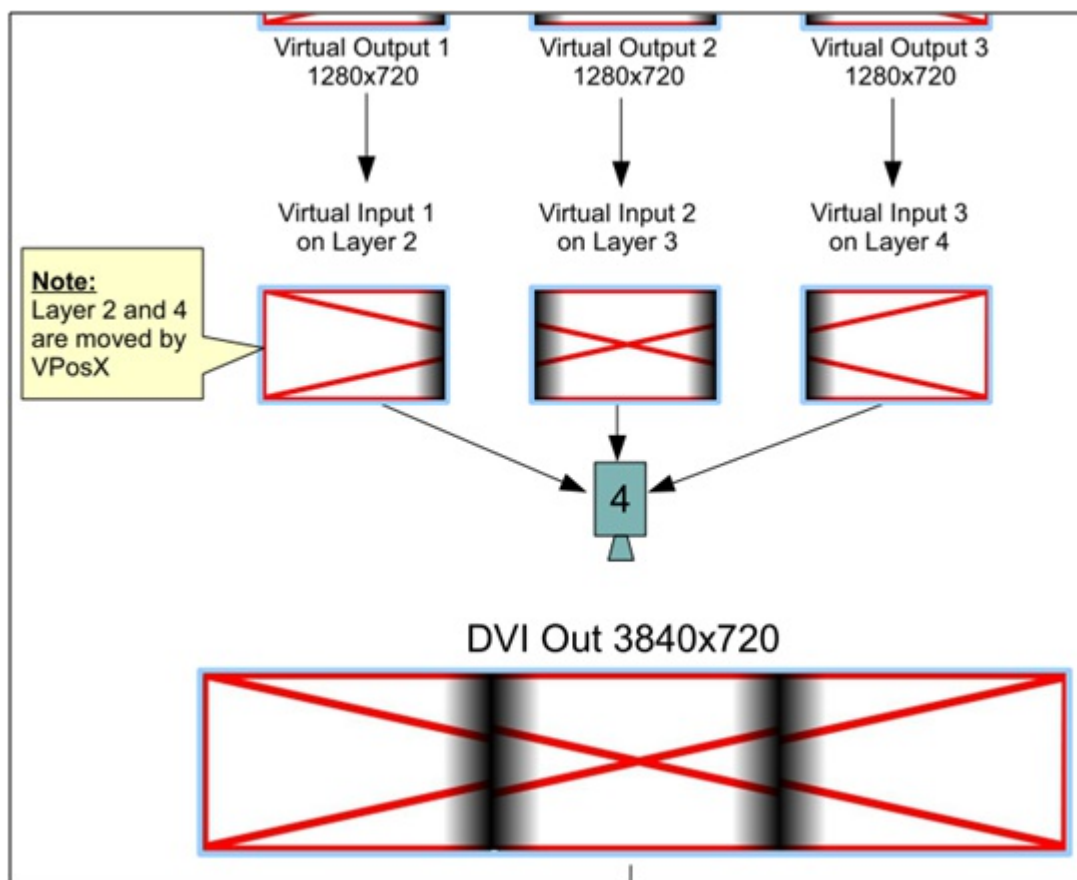
Inside the Multipreview the "Virtual Outputs" are displayed in the following way:



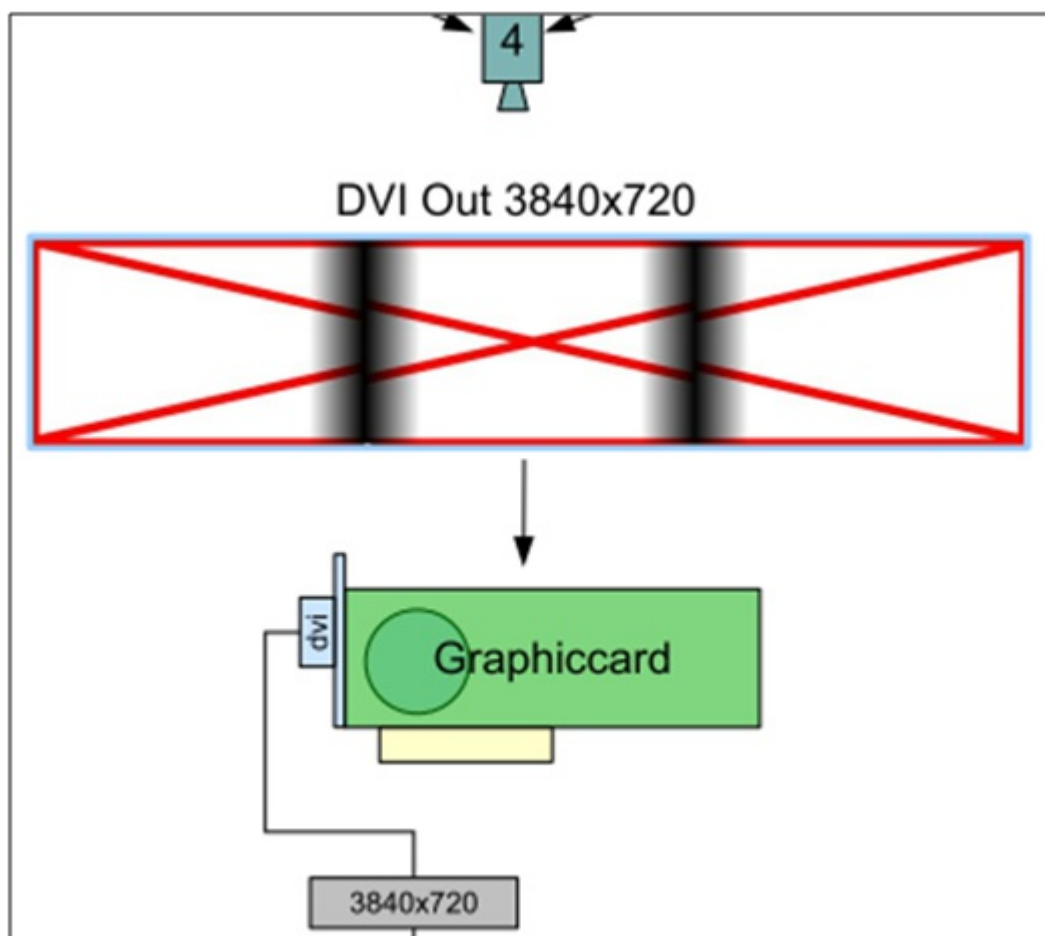
- Layer 2, 3 and 4 (referring to the figure below) are the carrier to apply the content of the virtual Outputs 1-3 via the channelsets "Virtual Input 1-3". Layer 2 receives its input from the virtual Output 1 via the virtual Input 1. Respectively Layer 3 receives its input virtual Output 2 via the virtual Input 2. Analog the same is true for Layer 4 and virtual Output 3.

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- Layer 2, 3 and 4 are parameterized to be only visible by Camera 4. Camera 4 is assigned to the physical DVI output of the VPU.



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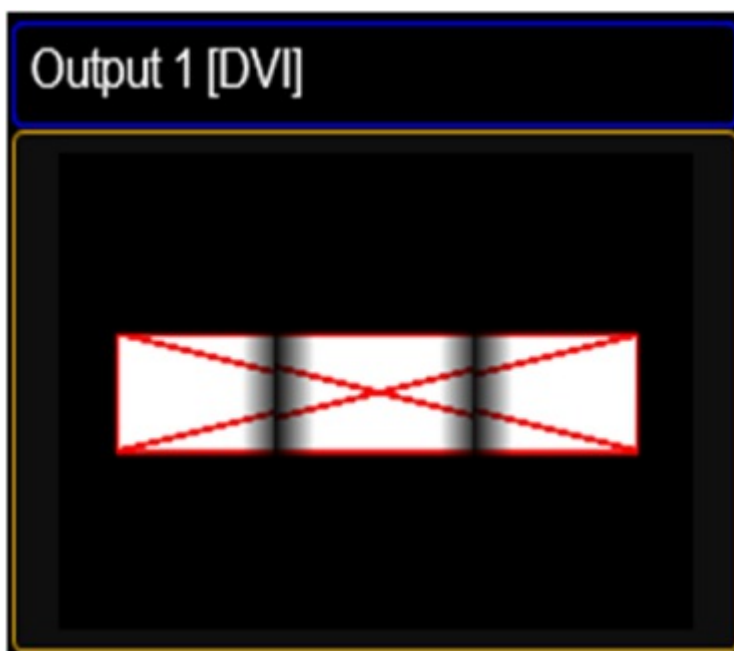
- The position of Layer 2 and 4 can be shifted by using the VPosX parameter.



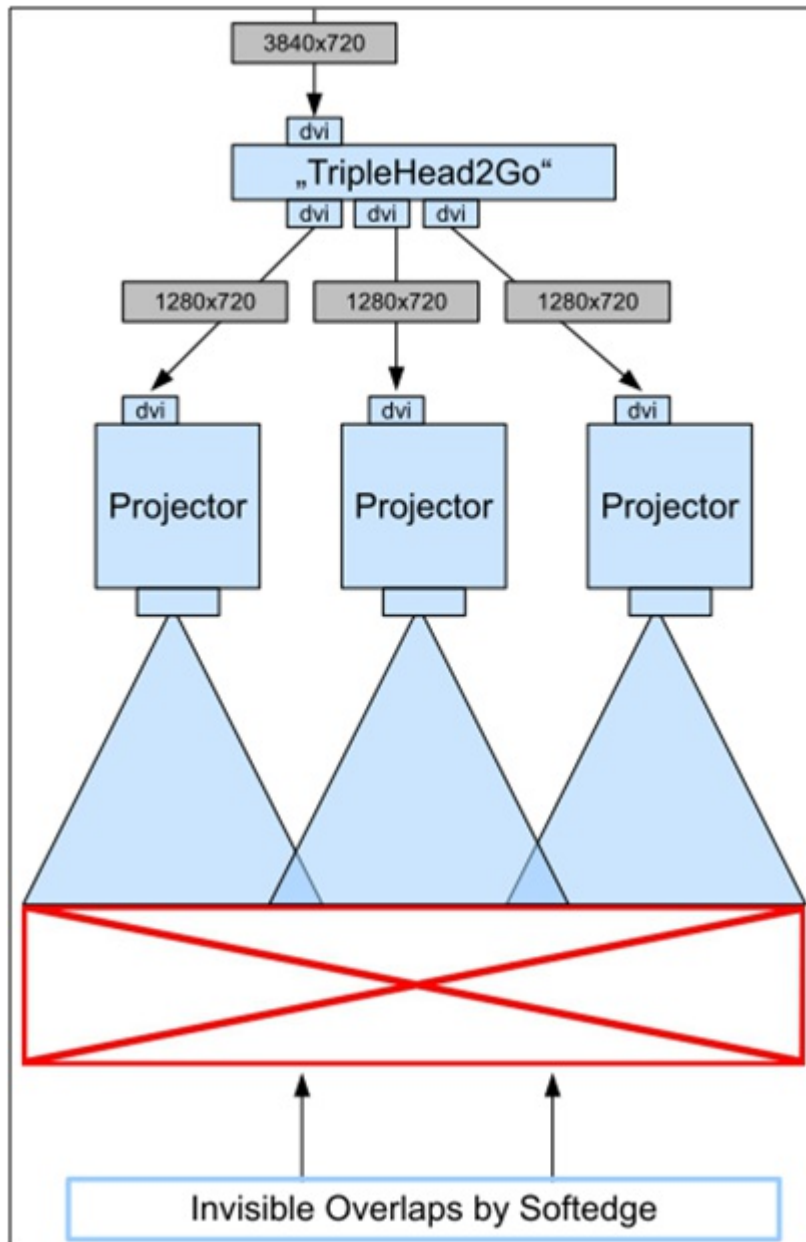
The Multipreview display of the Layer 2-4:



- The actual output at the DVI connector is shown below:



- The TripleHead2Go splits this signal into three independent single pictures. When send to three projectors and taken the soft edged overlap into account the complete images on the canvas looks like one big.



The above described example uses only one Layer for rendering the virtual outputs. The number of Layers can be higher and thus the number of possibilities. Virtual Outputs can be used in many more applications. They might be used as an effect, e.g mapping a cube on top of a complete scene consisting of several layers or exceeding the limit of applying just four effects at the same time. When rendering those into a virtual output and use the next four with the final output.

6.6. Predefined Constellation

If a MA VPU application is started, and a new show is created via „File - New Show" the application starts a show that contains two Fixture Layers with the following configuration:

	Video Layer	Camera	Master	Description
NewShow	6	4	1	Is created via ‚File - New'

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7. Several MA VPU applications in one grandMA show

Several MA VPU applications can be operated via one desk simultaneously.

Remember the maximum count of session members for a MA-Net2 session.

For each MA VPU application one fixture layer can be created in the desk.

A MA VPU application is working in the 'MA-Net' and is identified via the fixture layer name.

All PCs running MA VPU with the same fixture layer name will 'grab' what they need out of the data stream and show the same show with the same content. Several 'Video-fixtures' configured in the desk can be selected in the MA VPU application via a drop down menu in the status bar or directly via the touch-screen:



Example with one connected MA VPU with a grandMA2 console via **Setup** Patch & Fixture Schedule :



Patch & Fixture Schedule with one VPU fixture layer patched

A layer in MA VPU is analog to a fixture in the grandMA desk.

So if you use for example 6 video layers 6 fixtures are patched and shown in the fixture layer of the desk.

8. Quickstart with grandMA2

First start the VPU with grandMA2 network.

Startup and loading a show

Start the grandMA2 on PC.

Press **Backup**, select the tab **Demoshow** **Load Show**.

In the upcoming dialog select the 'vpu demo show.show.gz'.

Tap **Check all**, then tap **Load Show**.

The show will be loaded.

On the Display you see an overview of the layers and the fixture sheet:



You can configure the layout via the buttons on the right:



Connecting the VPU to a session

Now we will invite the VPU to the session:

To start a session press **Setup** and tap **MA Network Control**.

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In the upcoming dialog tap **Create Session**. The session will start:

The screenshot shows the 'MA-Net Control (Consoles only)' interface. At the top, it says 'Master 2' with a close button. Below this are two main sections: 'Sessions' and 'Stations'.

Sessions Table:

ID	Name	Master IP	Speed
2	VPU Demo	172.16.7.191	Fast

Stations Table:

IP	Status	Name	Version	Type	Link Speed
172.16.7.191	Master	VPU-PC	3.2.2....	Console	1000

Below the tables are input fields for session details:

- Session Id: 2
- Station IP: 172.16.7.191
- Session Name: VPU Demo Show
- Hostname: VPU-PC
- Session Password: (empty)
- Station Priority: Normal

At the bottom are buttons: Create Session, Join Session, Leave Session, End Session, Invite Station, Dismiss Station, and others.

Press **Setup** and tap **MA Network Configuration**.

In the upcoming dialog select the **VPU** tab:

The screenshot shows the 'Setup/Network/MA Network' configuration screen. At the top, it says 'Master 2' with a close button. Below this are tabs: Console, onPC, NPU, 3D, **VPU**, NDP Dimmer, DMX Node, and Network Switch.

The **VPU** tab is active, showing a table with the following data:

IP	Hostname	Session Member	Layer	Content	Backup VP	Version
ETHERCON 1(ETH0)						
172.16.7.152	VPU-DEMO-0009	Yes	VPU A 2			3.2.2.12
New						

At the bottom are buttons: Add, Delete, Add Present, Remove Absent, Remove Non-Member, Edit, Backup Manager, Content Distribution, and Global VPU Settings.

If your VPU is not listed, tap **Add Present**.

If the VPU is not already a member of the session, select the 'Session Member' entry and press the screen encoder.

The entry will change to 'Yes' and the VPU will join the session.

After that choose the 'Layer' entry and press the screen encoder. Choose the fixture layer 'VPU A 2'.



If the VPU does not join, check the VPU IP address and software version.

It is displayed in the VPU status bar e.g.:



In this case the desk IP is **172.16.7.191** and the VPU IP is **172.16.7.152**

Console and VPU must be in the same IP segment.

Playback of a still image

To select the first layer of the VPU demo show, press **Fixture 1 Please**, or select the first group '1: Lay1' in the group pool:



To see the layer at the output of the MA VPU, press **at 1 0 0 Please** to open the dimmer.

At the Fixture sheet you can see all attributes of layer 1:

ID	F/C	Name	3D-Obj	VPos	Pos	Scale	VRot	VPos<>	VRot<>	VScale	All	Split	VPos	VRot
1:		Layer1 1	Plane:Strand Colors Output	Centre	Centre	Centre	50	0	Stop:Stop:Stop:Stop:Stop:Stop:Stop	Stop:Stop:Stop:Stop:Stop:Stop:Stop	Normal			

On the Smart view all settings of the VPU Layer are displayed as buttons. Select the 'Images' attribute and you get an overview of all images of the selected I-Pool.

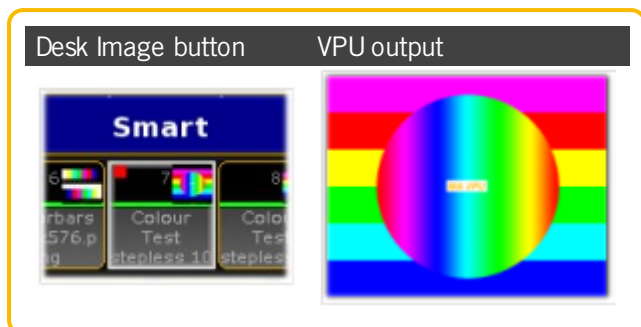


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Tap an image button and the appropriate image is displayed on the VPU output screen:



Hiding the VPU GUI

To hide the GUI of the MA VPU you can either press 'Shift + Enter' at the keyboard of the VPU station or use the fullscreen mode of the VPU master fixture.

To select the master fixture at the VPU demo show, press **Fixture 11 Please**, or select group 15 '11: Mas A' in the group pool.

Select the preset type 'Control':



The 'Smart View' offers the controlling possibility to watch the output in 'Fullscreen':



Playback of a video file

Press the **Clear** button, select layer 1 again, select the attribute 'I-Pool' and tap the channel set 'HD_25'.

Select the attribute 'Images':



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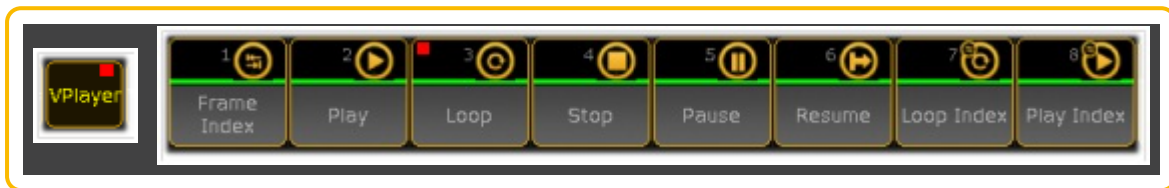


Now the 'Smart View' offers a choice of video loops in HD quality with 25 frames:



Select a video of your choice, tap the feature 'VPlayer' and select the attribute 'Playmode'.

Now you can choose how to play the video e.g. as a loop, select 'Loop':



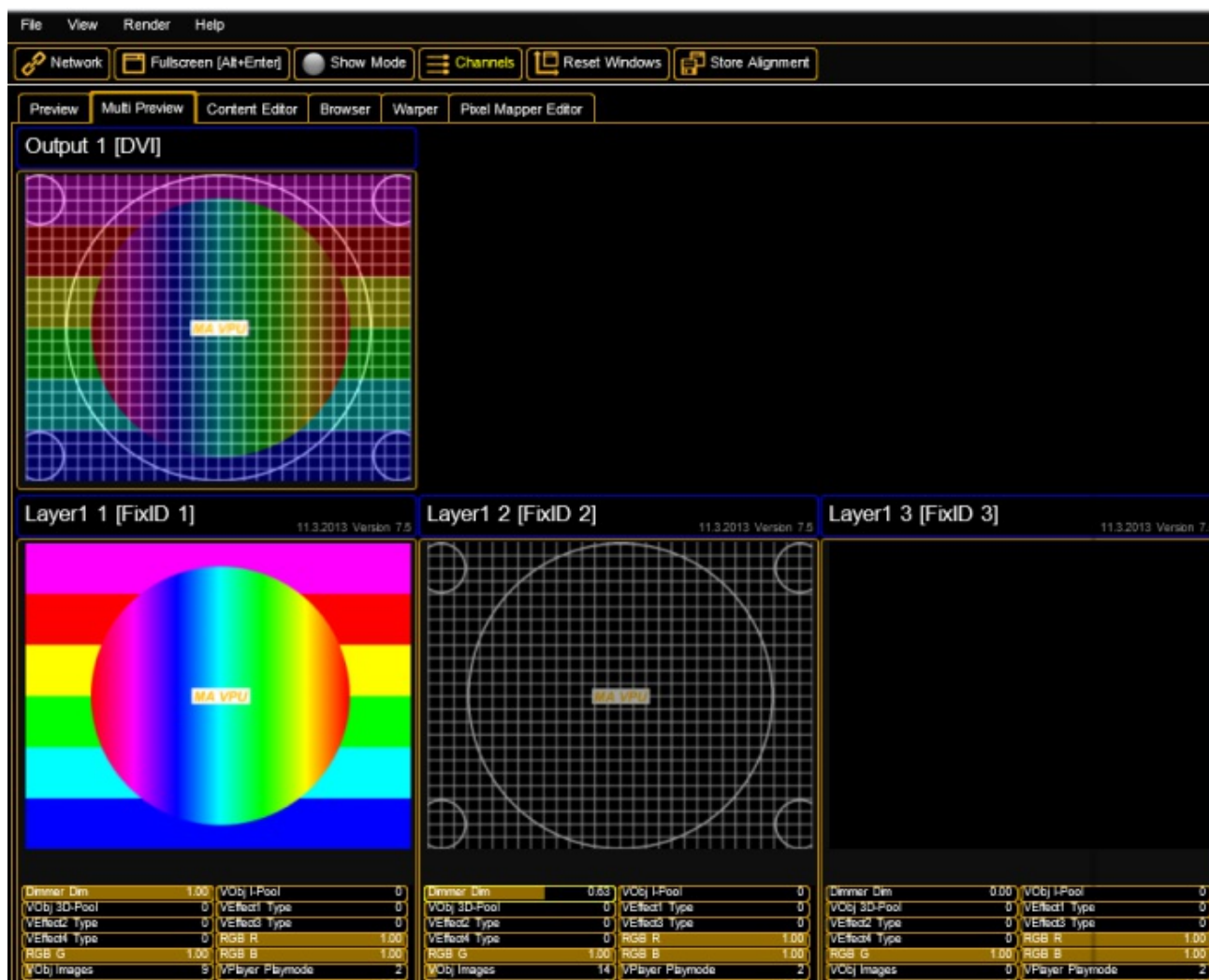
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9. Program surface

After starting the program an empty show will be opened or if connected with a desk or onPC the show will be loaded. The surface should look like this:



As already known from other applications, the program surface is divided into several parts:

Program Surface

Menu Bar

Toolbar

Preview Multi Preview Content Editor Browser Warper Pixel Mapper

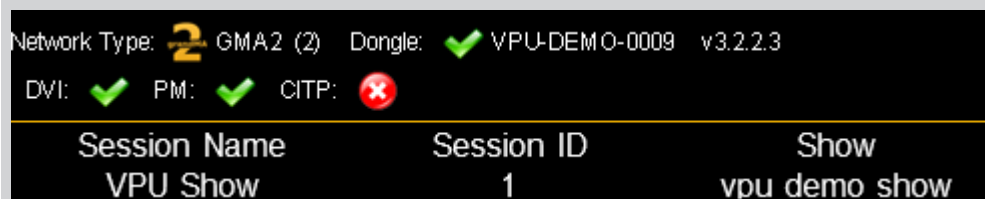
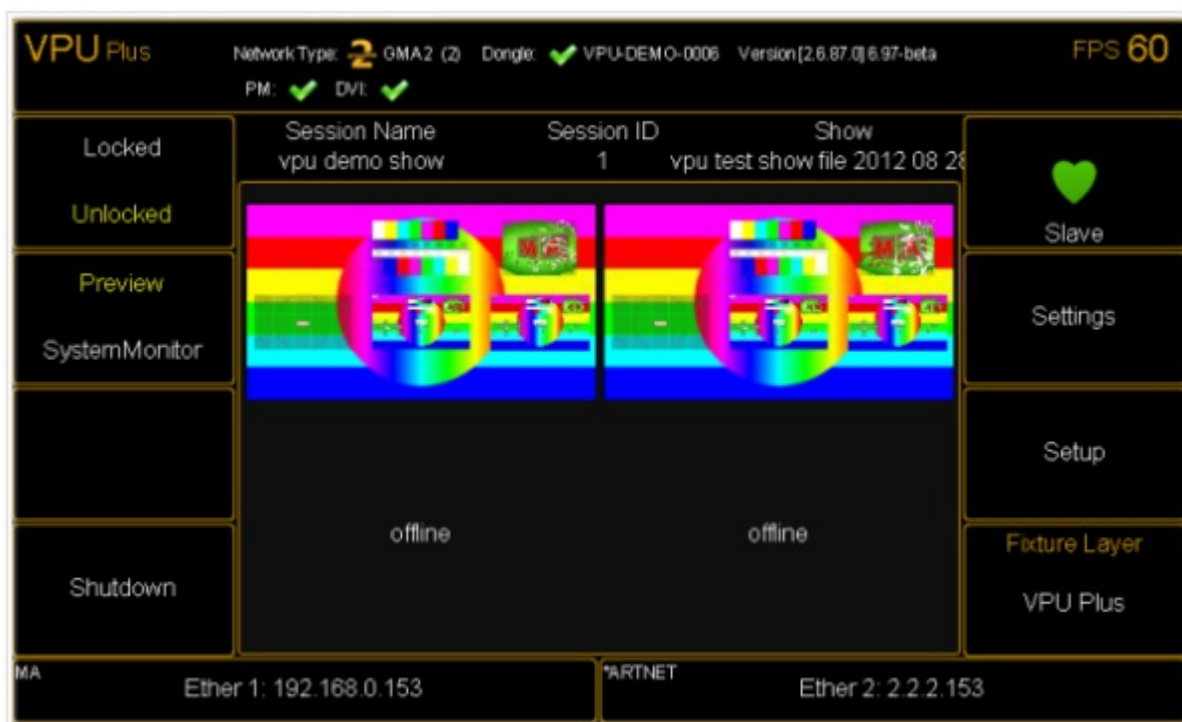
Overview window for example shows images and videos of the channel functions or the LED panels in the Pixel Mapper

Status bar

9.1. Internal Touch-Screen VPU plus

(Only MA VPU plus)

The touch-screen offers a direct access to important VPU functions and shows which content is send actually to the outputs:



The headline informs about the network type and VPU software version. Also the session ID, the name of the show and the state of the DVI and pixel mapper output is shown.

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The lower part shows the IP addresses of the MA-Net and the pixel mapper network adapters.

MA	Ether 1: 172.16.7.152	*PM	Ether 2: 2.2.2.152
----	-----------------------	-----	--------------------

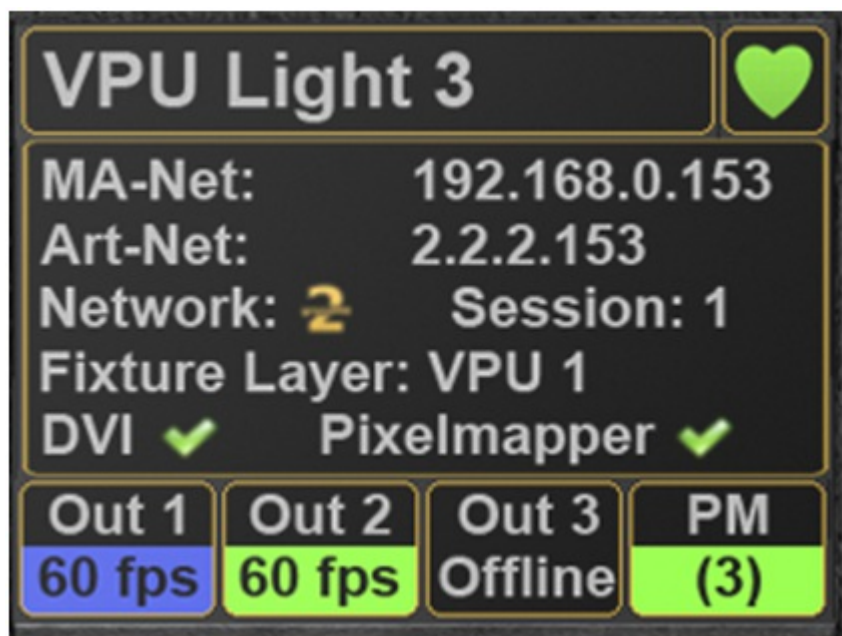
Locked Unlocked	- Lock / Unlock the touch-screen buttons
Preview SystemMonitor	- Switch between the output preview and system monitor information
Shutdown	- Shutdown or reboot the VPU

Most important VPU functions can be operated directly:

 Slave	- Indicates the status of the MA-Net see: Connection States
Settings	- Opens settings dialog (Display, Network, Main, Global VPU Settings, Video In, Content Editor, Browser) as described in File....Settings
Setup	- Opens the Setup dialog (New Show, Load Show, Save Show, Save Show as, Update Software, Enable Pixel Mapper, Enable DVI)
Fixture Layer VPU A	- Select the fixture layer

9.2. Internal Screen VPU light

The internal screen offers the following information:



Title	The headline informs about the name of the MA VPU light.
State	Indicates the status of the MA-Net. See in (1)
MA-Net	The actual IP-Address
ART-Net	The actual pixel mapper IP-Address
Network	grandMA1 or grandMA2 possible
Session	The number of the session this MA VPU is part of.
Fixture Layer	The selected fixture layer
DVI	green: active red: not active
Pixelmapper	green: active red: not active
OUT 1/2/3	blue: Output is active + EDID is active green: Output is active black: Offline, this output is not active fps: frames / second
PM (pixel mapper)	Number of outputs

(1): See in: [Connection States](#)

9.3. Menu Bar



Like in several other Windows applications you can store and recall files, and adjust the settings of the program:

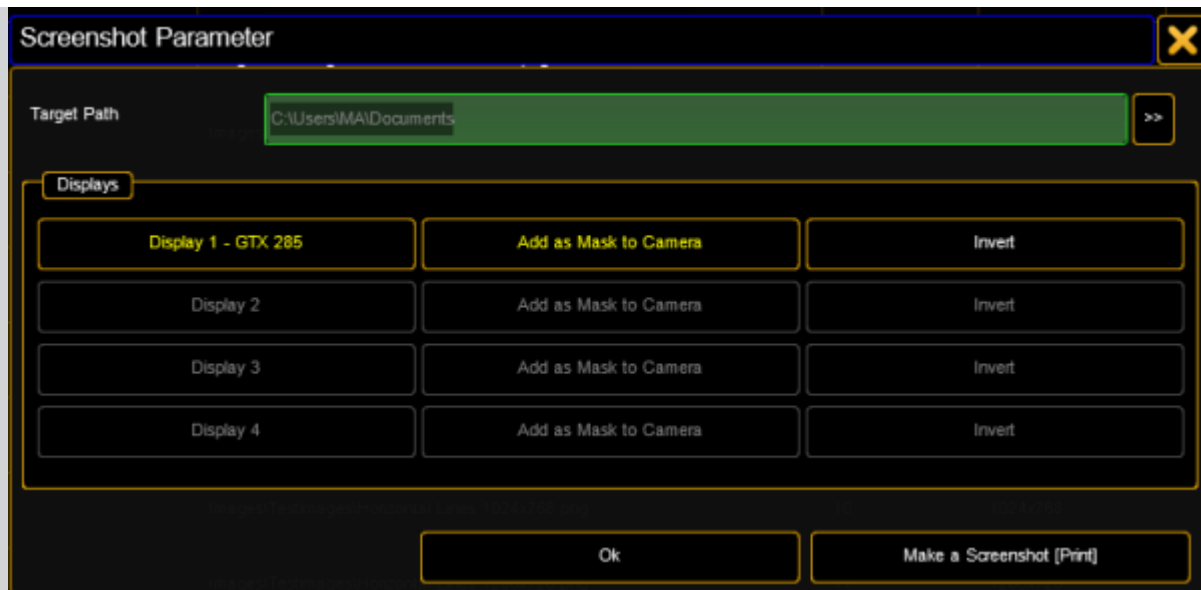
- [File](#)
- [View](#)
- [Render](#)
- [Help](#)

9.3.1. File...

New Show	Creates a new show with 2 VPU fixture layers each with 6 Layers, 1 Master fixture and 4 Camera fixtures.
Load Show...	Opens a dialog to load a show file (.gz - grandMA 2 file).
Save show as...	Opens a dialog to save the current show at a given filename.
Make a screenshot...	Opens a dialog to set the screenshot parameters.
Settings...	Opens the Settings dialog: Within this dialog you can set: - Display settings - Network settings - Main settings e.g. FOH feature - Global VPU Settings - Video In settings

Take a screenshot

Enter a path where the screenshot is stored.



Screenshot Parameter

With the button "Take a screenshot" a screenshot is made with the settings above.

The GUI is not displayed in the screenshot.

There are 4 possibilities to take a screenshot:

1. With the already described button

2. With the "Display" button of the keyboard

3. Via the display panel line of the console

4. Via the command line: VPU Screenshot <IP> e.g.:



Display Settings

Output: Up to 4 monitor outputs are supported.

- **Camera:** Each output can display a different camera.

- **GUI:** Select the output for the GUI (Graphical User Interface).

- **EDID:** State of EDID Manager see: [EDID Manager](#)
- **Monitor:** Name of the physical interface card.
- **Refresh rate in Hz:** Select the refresh rate for the output device.
- **Resolution:** of the output in X x Y pixels.
- **Delay:** To each graphic output a delay of 0...15 frames can be assigned. The value accords to the refresh rate of the graphic output (not of the video clip).

The delay also can be defined via the desk setting:

Setup - MA Network Configuration - Tab VPU - Edit - Display

Global:

- **Monitor Identification:** Shows an overlay to identify each output.
- **Fullscreen GUI:** Indicates if the Graphical User Interface is displayed.
- **Activate all Monitors:** Activates all outputs of the graphic card.
- **Test Image:** Outputs one of ten selectable test images related to the connected outputs ratio and resolution. These images can be used to adjust the output geometry and colors.



Hint:

To get the 1:1 pixel correct display of the test pattern make sure to use the @Native Object only!

Settings... Network

Within this dialog you can set the properties for the network.

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Settings

DisplayNetworkMainGlobal VPU SettingsVideo In

Sessions/Stations	IP	Ver	Type	Content [VPU]	OS
grandMA2-VPU	172.16.7.2	3.2.64.2	Console Fullsize		Linux
VPU-PLUS-XXXX	172.16.7.159	3.2.64.2	Video	Receiver	Win7
VPU-DEMO-0006	172.16.7.153	3.2.64.2	Video	Distributor	Win7
VPU-DEMO-0009	172.16.7.152	3.2.64.2	Video	None	Win7
VPU-PLUS-0322	172.16.7.155	3.2.64.2	Video	Receiver	Win7
VPU-XXXX	172.16.7.171	3.2.64.2	Video	Distributor	Win7
VPU-LIGHT-0XXX	172.16.7.156	3.2.64.2	Video	Receiver	Win7

Allow Invite

MA Net IP172.16.7.153

Session ID3

Content Distribution

sACN/Art-Net IP2.2.2.153

Session NameCreated By NDP

Network Settings

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The dialog shows the actual state of all machines in the MA net:

Red text: Allow Invite Disabled.

Green background: selected station.

Red background: version is not compatible.

The different states in the network are described in detail in chapter [Connection](#).

You can select the role of the VPU for the content distribution like 'Receiver' or 'Distributor'.

A click on the button 'Start Distribution' will start the distribution process.

Change... MA/sACN/Art-Net IP

Change MANet IP Address

Current IP

192.168.178.20

Adapter

LAN-Verbindung

Mode

DHCP

Static

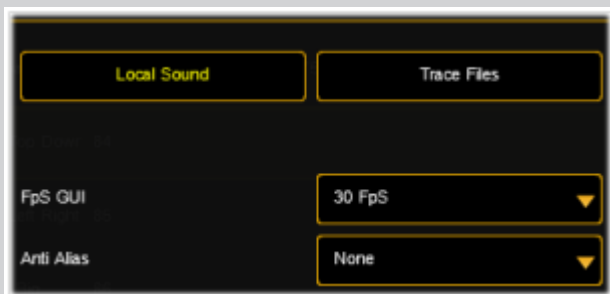
Change IP

192.168.178.20

Ok

Current IP shows the current IP address **Adapter** allows the selection of the network adapter.... **Mode:** - **DHCP** - The Adapter tries to receive an IP address from a DHCP server in the network. If this fails the VPU generates an (APIPA class B) address like 169.254.x.y... **Mode - Static** - allows to enter a static IP address.

Settings... Main



Within this dialog you can select the **FOH**

features: If this button is checked an additional buttons appears at the toolbar. The button "Blind" preserves the blind programming preview. **No**

Output if Standalone: If no desk is connected the output is suppressed. **Frame Blending:** Frame

interpolation allows smoother motion when you slow down or speed up a layer. **Show Mode:** This

mode avoids interruptions of the running show caused by manual operations of a user. It can be

set by a channel in the Master fixture or this button.

See also: [Toolbar](#)

Local Sound Disable playback of audio on this

VPU. **Trace Files:** To get log files (in case of crashes) this must be switched on. The trace files

can be found in the trace file folder on the

desktop. **Fps Internal Screen or GUI:** Set

the **Framerate** per second for the internal screen and the VPU Graphical User Interface to optimize

the performance. The lower the rate the better the performance.

Anti Alias: This filters are useful for Warper and Keysone projections. Examples:

none: no Anti Alias filter



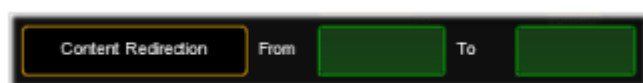
Multi Sampling:



Super Sampling:



Note: Multi and Super Sampling costs performance!



Content Redirection If your content has moved to another location you can redirect the search folder e.g. from drive "D:" to drive "E." The redirection is indicated by a button in the toolbar:



and can be switched on or off

Settings..... Global VPU Settings



Clip Time Format: Clip timing calculation, e.g. clip with 30 fps and clip time Format 30 Fps, Encoder Speed finest/ultra: you can step framewise through the clip. If you prefer to step Frame Index in seconds you select „seconds“. The setting will be spread via network so all VPUs have the same clip time format.

Clip Thumbnail Offset Time(s): Thumbnails show the first frame of a clip, if this is empty you can add an offset to get a meaningful image.

Thumbnail Distribution Speed: Thumbnails are distributed in the background. If new content is inserted after the program start this parameter has to be set. **Copy bandwidth:** Sets the copy bandwidth for the content distribution. The distribution of new content stresses the network so reduce this value if you have too much network load.

Slot 0/1 default content: Set the default image of the first slot to black or white. This affects only new created Function Blocks.


Global Art-Net: Enable or disable Art-Net.

Global Sound: Enable or disable Sound.

Ignore when inserting content...: If a whole folder of content is imported you can ignore files by specifying the extension e.g. if the folder contains also '.avi' files and you only want to import the '.mov' files the '.avi' entry suppresses importing of all '.avi' files.

The following dialogs are only available in the Windowed Mode:

Video in...



SDI In Configuration: The first line shows the actual status of the SDI input signal. **Device:** Enable/disable SDI input. **Watchdog:** If SDI signal is missing an automatic initialization is done every 30 ms. **Config:** There are 3 preconfigured files for SDI In MA provides: MA default 1080i (Full HD 1920x1080) MA default 720p (HD 1280x720) MA default 576i (PAL 720x576) i (interlaced) p (progressive) **Resolution:** Select SDI input resolution **Signal:** Interlaced or progressive **Interlacing:** see list below:

Reinit: Reinitializes the SDI input

Show Graph: Shows a performance graph

Frame Blend: Use Frame Blending to enhance the quality of time-altered motion.

Interlacing Formats: Here you can define how images are handled within the application. Since grandMA VPU does only output progressive scanning via DVI these settings may effect your image quality.

- Interleave 1 and 2: field one is interleaved into field two
- Field 1 then 2: field one is displayed first (and stretched to full ratio) then field two
- Field 1 only: field one is displayed (and stretched to full ratio), field two is not displayed

Video in... Start external Configuration



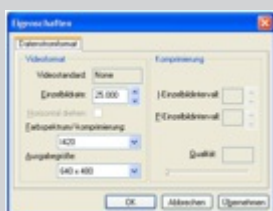
If you are not using SDI but want to use other external video feed like a webcam you can run 2 external devices: You cannot access this button via the touch screen, only via the GUI. **External Video Configuration:** This interface allows the input of a live video stream. It is realized via the Microsoft® DirectShow mechanism. **Video In 1..4:** In this dialog up to 4 different „Video In“ devices can be assigned. Every Video Capture Device supported by Windows can be used as input source for MA VPU. **Available Devices:** All recognized Video Capture Devices are listed in this selection bar. By selecting one device this will be assigned to the „Video In“ source and is available for MA VPU. **Start / Stop [D]:** Additional options to restart drivers in case of synchronization faults.

Video in... Device



Device...: If a Capture Device with a driver is installed, its property dialog will be opened after the selection of this button. In this dialog the device specific properties of the manufacturer can be managed. The following example shows the property dialog of a webcam: If no device property is available, nothing happens.

Video in... Device Settings



Stream...: If a Capture Device with a driver is installed, its streaming dialog will be opened after the selection of this button. In this dialog the device specific streaming properties of the manufacturer can be managed. The following example shows the property dialog of a webcam: If no device property is available, nothing happens.

Exit

Leave the application.

9.3.2. View...

View	Description
Dialog Docking Frame	Opens a dialog to arrange your views, see below.
Timing	Opens a window with timing information to check the performance e.g. FpS, runtime and resolution.
Info	Opens an Info window for internal purposes.
Layer	Opens a window with information about the layers as type, scale etc..
System Monitor	Opens the system monitor that shows communication data between the desk and VPU.
Video Clips	Opens a window that offers information about the used video clips. This can be helpful for trouble shooting.
Local Drives	Shows the state of the connected drives e.g. total capacity and free disk space.
Memory	Opens an overview window of the usage rate of the system memory and the memory of the graphic card.

CITP Information

Window

Opens a window that shows the CITP Information (see [CITP / MSEX Protocol](#)).

Teaser Mode

Opens a window that offers information about the restrictions of the Teaser Mode.

Thumbnail

distribution

Shows information about the thumbnail distribution.

Hap converter

Shows the Hap Codec converter window, see: [Hap Converter](#).

Start in Black

If this option is enabled, the GUI (Graphical User Interface) is disabled (black) when the VPU starts.

To enable the GUI press 'Shift + Enter'. This option is stored local for each VPU.

Show FpS in

Fullscreen

Show the frame rate in FpS (Frames per Second) in the fullscreen output.

The following entries are only visible if the option `View` - `Show Extended Menu` is selected:

Thumbnail Manager

Opens a window that offers information about cached thumbnails.

Error

Shows an info window about errors that have occurred during runtime.

This can be helpful for troubleshooting.

Dialog Docking Frame:

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Thumbnail Distribution

Process Done

Teaser Mode

System Monitor

Layer

Memory

System Memory: Complete <8.1 GB> Free <5.4 GB> Used <641.0 MB>

Process Memory: Complete <8.1 GB> Free <7.5 GB> Used <641.0 MB>

Device [Device 0] 1 Create <4.0 GB> Now <3.9 GB> Used <60.0 MB>

Local Drives

Drive	Free	Total
Lokaler Datentiger (C:)	17.4 [GB]	238.4 [GB]
Volume (D:)	699.0 [GB]	931.5 [GB]
DVD-RW-Laufwerk (F:)	0.0 [KB]	0.0 [KB]

CITP Information

Overall Statistics

Sent Framerate: 0 [FpS] Number of feeds: 0 MulticastAddr: 224.0.0.180 CITP:

Network load: 0.0 [KBit/s]

Framerate Limitation: 0%

Name	Dimension [Pixel]	Framerate [FpS]	ID
------	-------------------	-----------------	----

Docking Frame

The Docking Frame contains all opened views. Views can be minimized or opened by pressing the star or removed by clicking the x. So now it is possible to keep dialogs open for monitoring reasons and close all dialogs by one click and open exactly the same views by only one click. You can scroll in this frame and the preview or multi preview will be down scaled when Docking Frame is opened.

9.3.3. Render...

**Hint:**

DVI and Pixel Mapper outputs can be enabled simultaneously (not with dongle version)

DVI

Enable the output signal to DVI (**D**igital **V**isual **I**nterface) output.

Pixel Mapper output will be enabled and video output will be transformed into DMX values.

Pixel Mapper

Finally output via ethernet adaptor (e.g. Art-Net) to RGB/CMY devices/fixtures.

Enable the Pixel Mapper see also chapter: [Pixel Mapper](#).

9.3.4. Help...

Release Notes...

Opens the release notes document.

Info...

Shows the about box with the current version number. In the lower part of the box you can find the license information and the Dongle Serial Number.

9.4. Toolbar

The toolbar contains several buttons that are related to the general operations of the program.



Toolbar

Network...

Shows the actual network state or opens the MA Network dialog as described in: [File...](#)

Toggle GUI <-> Fullscreen:

Switches the GUI (Graphical User Interface) off. You can also use the 'Shift + Enter' key on the keyboard to switch the GUI off.

Leave or switch to fullscreen mode with the 'Shift + Enter' button.

**Hint:**

MA VPU always runs in fullscreen view.

Only if the VPU is installed on a PC with a protection dongle (former grandMA Video application) the switching between windowed and fullscreen is relevant.

Therefore you can use the „Alt + Enter" key.

Show Mode:

This mode avoids interruptions of the running show caused by manual operations of a user.

Also non essential functionality is reduced or disabled to increase the performance.

It can be set by a channel in the Master fixture or this button.

The following actions are performed:

- GUI is disabled
- Thumbnails are not distributed to avoid network traffic
- Preview of the outputs of the VPU is set to Pause
- Frame rate of the GUI screen (if turned on) is limited to 10 fps
- Frame rate of the VPU Plus internal screen is limited to 5 fps
- No clip preview is displayed at Content Editor
- Speed of content distribution is reduced to 10 %
- Highlight functionality of the pixel mapper is turned off
- CITP is disabled
- Testpattern is disabled
- Monitor identification is disabled
- Hap Converter is paused

If the Show Mode is set permanently (via control channel in the master fixture) the user cannot turn on the GUI of the VPU and the internal screen shows "Show Mode locked"..

Accept Blind: (Only enabled if the 'FOH Features' in the Options dialog is enabled)

You can take or reject the 'Blind Preview' from the desk by selecting the appropriate check buttons. If the 'Blind Preview' is active, the button gets blue.

Channels: (Only enabled if 'Multi Preview' tab is selected)

Toggle the Channel controls in the 'Multi Preview'.

Reset Windows:

Resets the window layout of the 'Multi Preview' to the standard.

Store Alignment:

Stores the alignment of the window layout on the local VPU (not in the showfile).

9.5. Status Bar

The status bar offers an overview about the system status:



Connection: 2	Not connected (red heart) or connected (green heart) as described in: Connection The number indicates the number of the session.
Show: vpu demo show	Name of the show file
Dongle: (green checkmark)	Shows the status of the dongle
IP: 172.16.7.160	Used IP address for MA Net
DVI: (green checkmark) PM: (red X)	Shows the render settings states: DVI- output and Pixel Mapper
Invite enabled (yellow heart)	Inviting of the VPU can be enabled or disabled



User: administrator	Shows all existing users, e.g. administrator, guest...! Some features e.g. the blind-functionality need the assignment to a user.
F Layer: VPU A	Shows the used fixture layer. You can switch the fixture layer via this drop down menu.
Out 1: CAM 1	Assign a VPU camera (e.g. Camera 1) to an output. This function is identical to the former "Softedge ID"

9.6. Preview

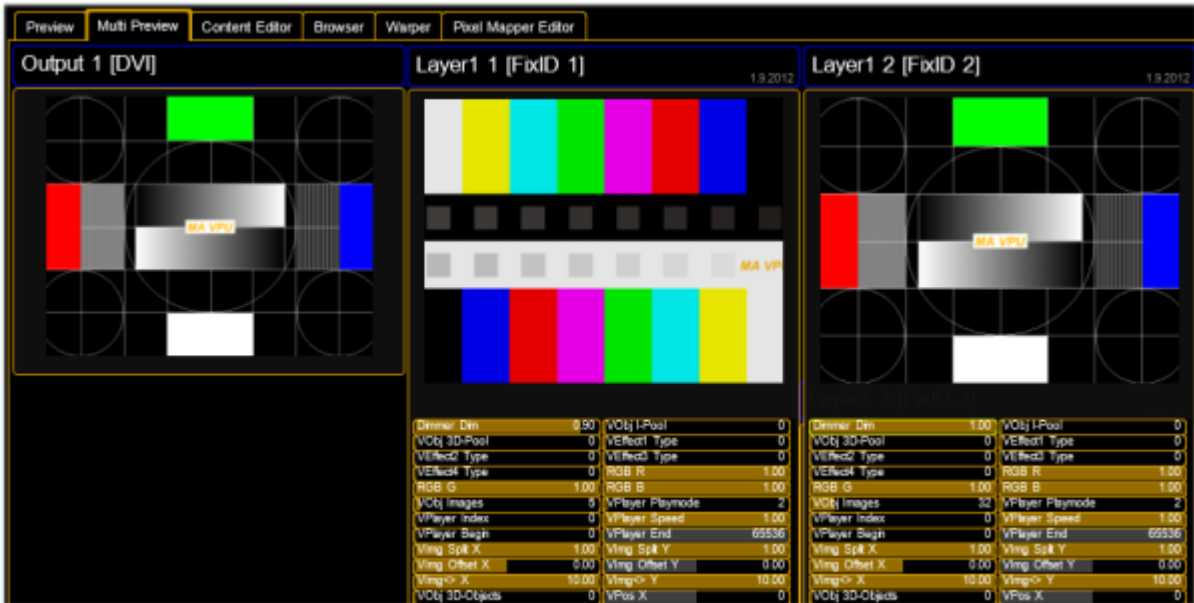
This view offers a preview of the resulting output video.



If you enter the tab, MA VPU receives the commands from the desk and shows the resulting output, but in opposite to the fullscreen view the menus, the toolbar and the status bar are also active.

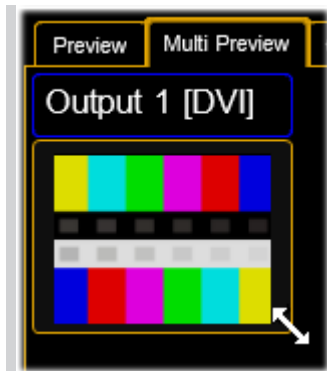
9.7. Multi Preview

This view allows an overview of all layers, their values and the resulting output:



The example above shows 2 layers with the resulting output picture for a single head output.

If additional outputs are enabled via the menu entry 'File - Settings - Display', the outputs for the additional displays are presented too.



The size and position of the single windows can be changed via the left mouse button. You can reset or store the arrangement via the buttons in the toolbar:

Reset Windows: Restets the window layout of the 'Multi Preview' to the standard.

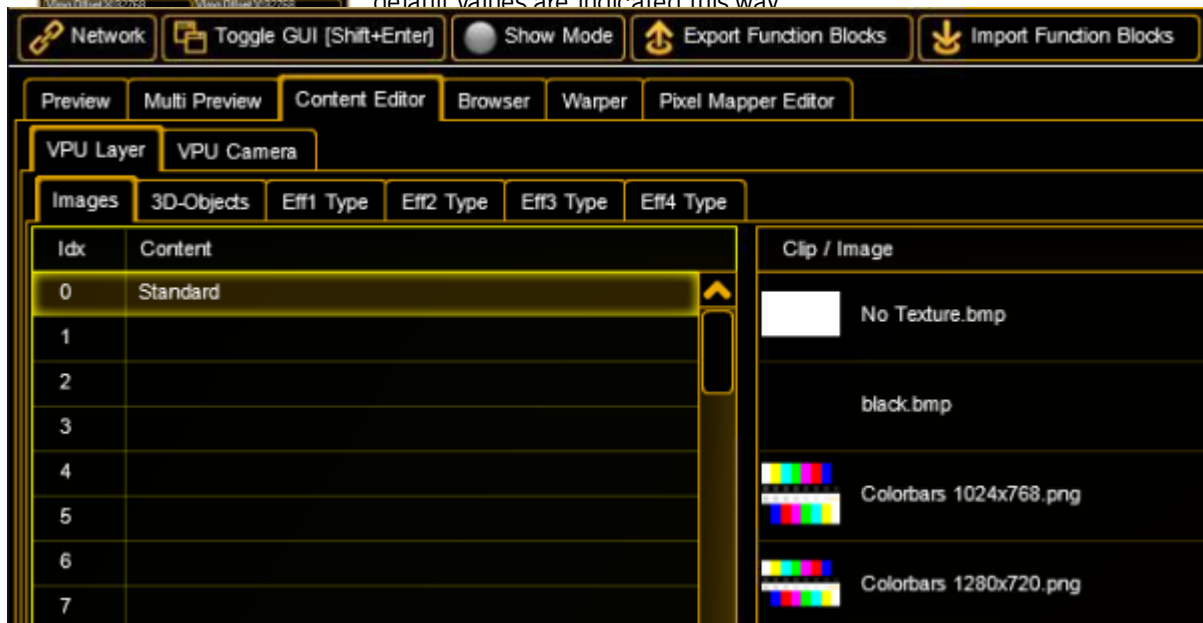
Store Alignment: Stores the alignment of the window layout on the local VPU (not in the showfile)



The content of each layer is shown in a small window. The controls below allow watching the values for each channel in the layer.

The horizontal bar in each control indicates the setting from 0...100 %. Changing values are highlighted.

9. By selecting the Content Editor tab, please note that these are no programmer values but all changes from the default values are indicated this way



Content Editor tab

In this view you can edit the content for VPU Layer and VPU Camera e.g. videos images and 3D objects:

VPU Layer: „Images“, „3D-Objects“ and „Eff Type“

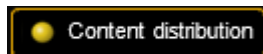
VPU Camera: „Images“, „Eff Type“ and „3D-Objects“

Content Redirection:



If your content has moved to another location you can redirect the search folder e.g. from drive “D:” to drive “E:” The redirection is indicated by a button in the toolbar and can be switched on or off.

Content Distribution:



A click on the Content distribution button will start the content distribution process.

9.8.1. Content: Image Pool (I-Pool)

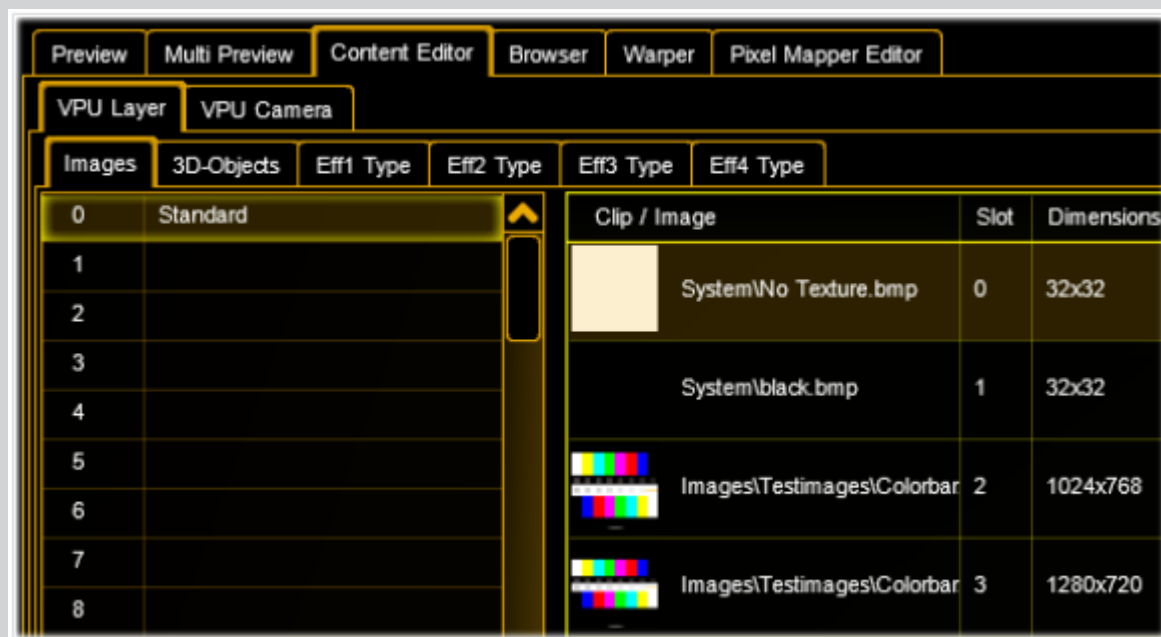
MA VPU comes with a sample library containing images, gobos and video clips. This content is preinstalled on the VPUs and can be ordered from MA Lighting.

Similar to the magazine of a slide projector such a folder behaves like a slide magazine. Up to 255 folders can be accessed directly from the desk. The different images and videos of a folder correspond to the „Channel Sets“ of the

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desk and can be accessed from there. To insert images and videos click with the right mouse button somewhere in the 'I-Pool Folder' or 'Channel Functions' field and navigate in the upcoming dialog to the folder where the images and videos are located. It is not recommended to use an external drive for the content, we recommend to copy the files to the content drive D:. After the selection of the folder and confirming with „OK" it will take a while until the images are shown because MA VPU has to build a so-called thumbnail (little image) for all items. Therefore each file has to be opened and searched for a usable picture.



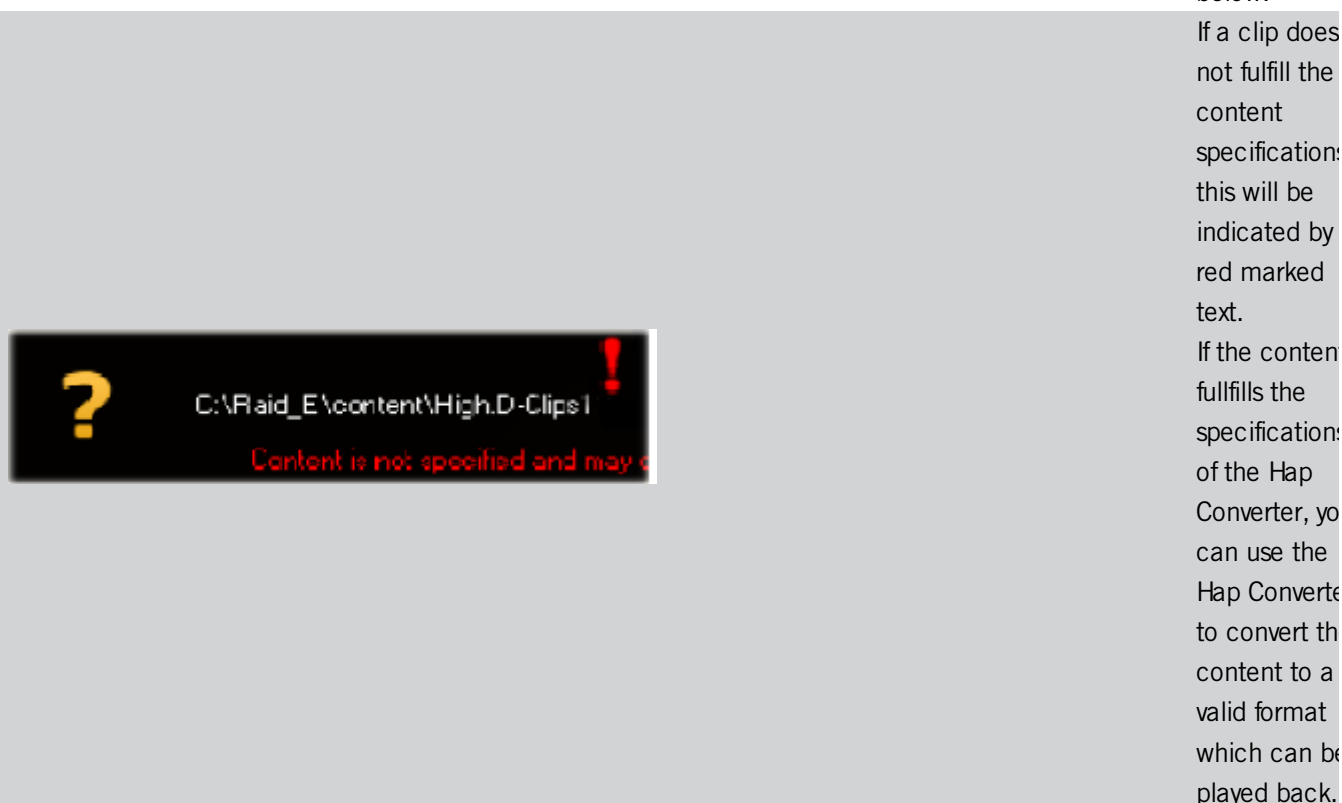
Items can be edited, changed or deleted via the context menu of the right mouse button. Data of the items like size, framerate and length are shown in a grid.

If an item is selected its preview is shown in the preview window at the lower left side of the screen. Multiple items can be selected if you hold down the 'Ctrl' key while selecting items or use the mouse as a lasso. Hotkeys, 'Ctrl' + x, c, v (Cut, Copy, Paste) and 'delete' are allowed.



Video clips d
have a video
thumbnail
showing the
first frame of
this clip. If th
clip contains
sound this is
indicated by
yellow speak
icon.

If the clip is
selected you
can see a
preview in th
left corner
below.

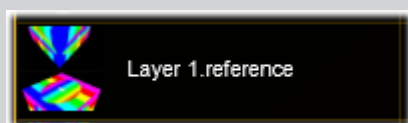


If a clip does
not fulfill the
content
specification
this will be
indicated by
red marked
text.

If the conten
fulfills the
specification
of the Hap
Converter, yo
can use the
Hap Converte
to convert th
content to a
valid format
which can be
played back.

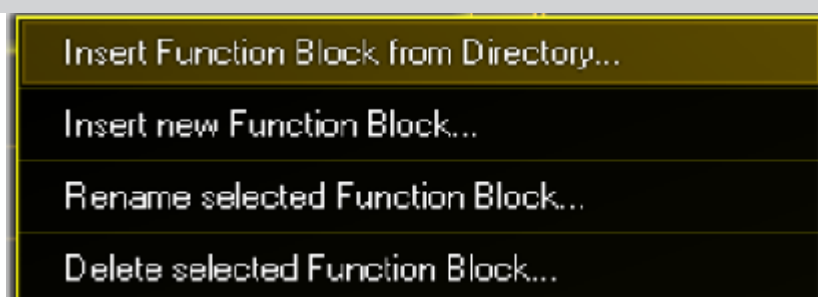


Sound only
files like mp3
or wav are
displayed with
a speaker
icon.

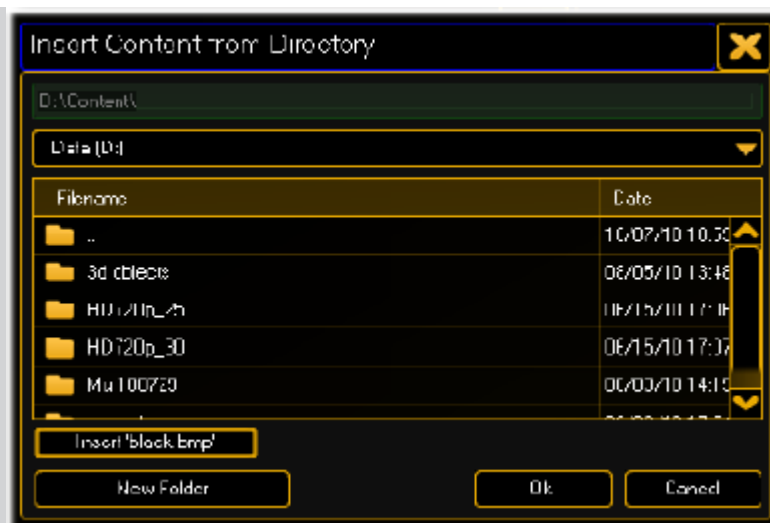


Layer Reference:
This allows a Layer to take the output of another layer as input. This saves performance because a video must not be decoded twice.

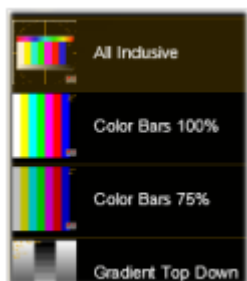
Note: Only the video itself is feed into the other layer, not the changes in color or effect etc.



To assign a new folder to a 'Channel Function' click with the left mouse button into a line.



A context dialog appears. After selecting the entry a browser window appears where you can navigate to the folder containing the videos.



After the selection of the folder its name is taken as a name for the 'Channel Function' as shown in this example, 'Test Images'.

You can change the name via the context menu with the right mouse button.

Insert **Dynamic Test Images** This function generates 10 different test images related to the connected outputs ratio and inserts them into the next free slot.

These images can be used to adjust the output geometry and colors.

Note: To get the 1:1 pixel correct display of the test pattern make sure to use the @Native Object only!

Export and Import Function Blocks

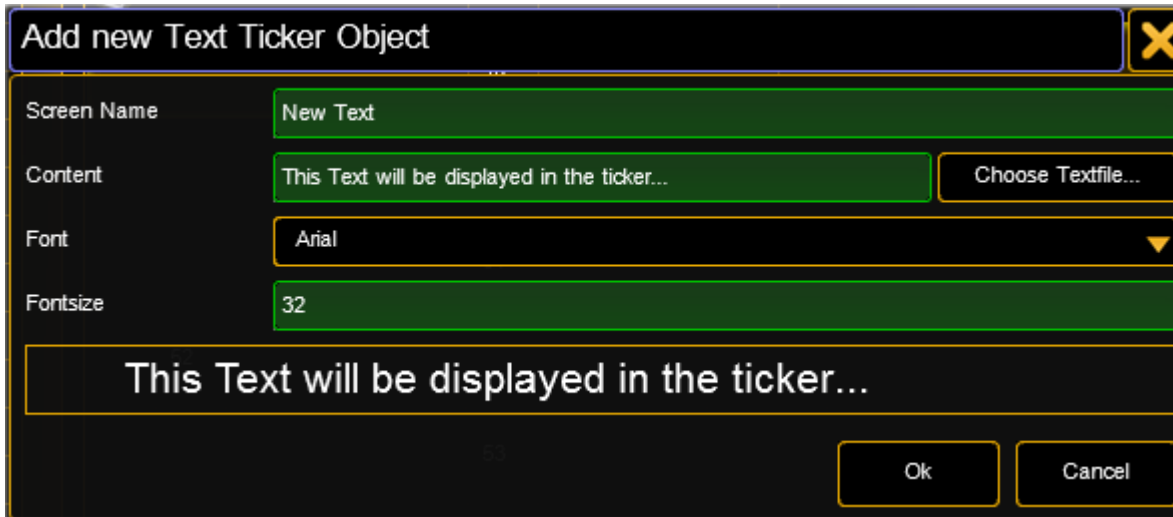


With this function it is easy to change Fixture Types of old shows without losing content information or manually inserting it again.

1. Export Function Blocks
2. Exchange Fixture Type
3. Import Function Block again
4. The show can go on!

9.8.2. Content: Text Ticker

Text Ticker elements can be inserted into free content slots. Do a right mouseclick into the 'Clip/Image' column slot and select 'Insert Text Ticker'. The following dialog appears:



Screen Name:	Name of the Channel Set in the console
Choose Textfile...:	Browse to a text file (*.txt) This text file is part of the Content Distribution triggered from the grandMA2 console if "Distribute Show Content" is selected. Be sure that it is available on all VPUs in the session in the same location as any other content.
Content:	Enter the text to be displayed in the ticker
Font:	Choose the font types that are included
Fontsize:	Choose the size of the displayed text

Already created Text Ticker items can be adjusted by using the option "edit" in the context menu. To display the Text Ticker item on screen, simply select it via the IPool / Image Channel.

Four attributes allow the use of the text ticker

Compos Type: Choose how the Text Ticker is animated

Compos Speed: Choose how fast the animation is done

Compos P1: Choose how long the pause in the middle of the animation is

Compos P2: For Future Use (currently not implemented)

The animation can be edited via the grandMA2 command line (incl. import and export). The animations are based on keyframes. They can be adjusted or new frames can be added. They are located in the PixelMapperContainer/Videocompositioncontainer.

9.8.3. Content: Eff1 Type...Eff4 Type

The tabs 'Effect Type 1.....4' show the possible effect types for the layer and camera fixtures:



Effect Type tab at the Content Editor

The effect engine is based on the Direct3D standard. Effects are defined within .fx files. An effect file is a text file with an .fx extension. It defines how something is to be rendered. It includes state information along with vertex and shader declarations. The shader code is written in HLSL (High Level Shading Language).

The following example shows the assignment of a sepia effect to a test image:



MA VPU comes with a default setup of effect files.

New effect files can be added as 'Channel Set' via the context menu in the 'Effect Type' view with the right mouse button.

Examples:

Despite Ocean and Water effect others only use 1 parameter (1 Encoder Wheel)

Water Par1 Circulation; Par2 Intensity; Par3 Speed


Ocean Par1 Amplitude; Par2 Wavecount x; Par3 Wavecount y






9.8.4. Content: 3D Objects

The tab '3D-Objects' shows the projection objects of the layers.

In the simplest case a layer contains a 2D plane object. This is a canvas where images or videos are shown like on a TV screen. But this screen mustn't be flat. You can use 3D boxes, cones or other 3 dimensional objects to render your images or videos.

The file format is DirectX with the file extension '.x' see: [Creation of customized 3D Objects](#).



3D Object	Slot
 Plane@r.x	0
 Mask Plane.x	1
 @Native.x	2
 @Output.x	3
 @OutputR.x	4

Items can be edited, changed or deleted via the context menu of the right mouse button. Data of the items like name and size are shown in a grid. To assign a new item insert a 'Channel Set' via click with the right mouse button.

3D object definitions:

If you use objects with the extension ,@r' like ,Plane@r.x' the aspect ratio of the object fits automatically to the aspect ratio of the texture (Ratio of width / height e.g. 16/9). So we recommend using this object (Plane@r.x) for the easy projection of videos.

@Native.x: pixelexact keeps image resolution. This is a 2-dimensional object with defined size (defined by image resolution!). Scaling, Rotation and Position Z is possible, but leads to the loss of nativity.

@Output.x: scales to full output resolution and ignores ratio. Scaling, Rotation and Position Z not possible as this is a 2-dimensional object with defined size (defined by output resolution!).

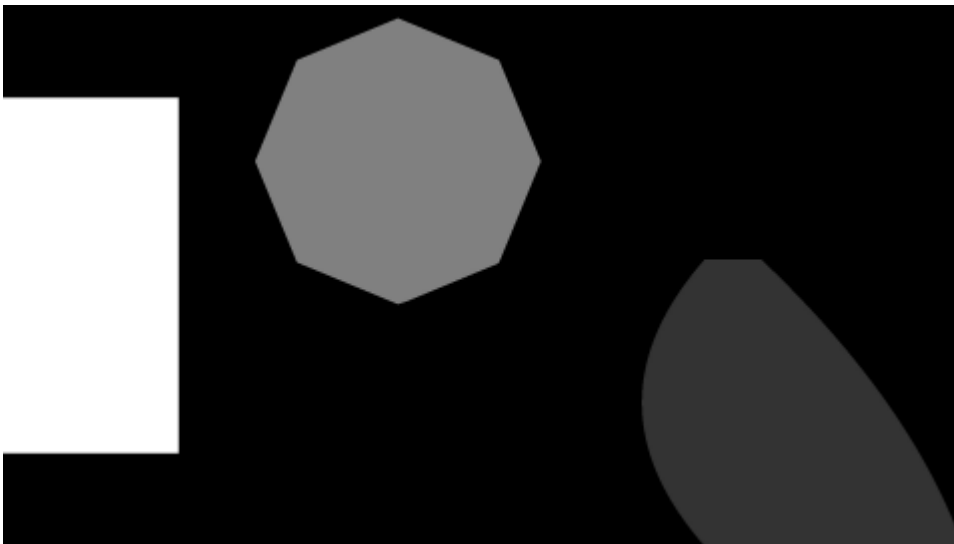
@OutputR.x: scales to full output resolution and keeps image ratio (Letterbox). Scaling, Rotation and Position Z not possible as this is a 2-dimensional object with defined size (defined by output resolution!).

9.8.5. Content: Mask

Grey scale images can be used as masks for images with the camera.

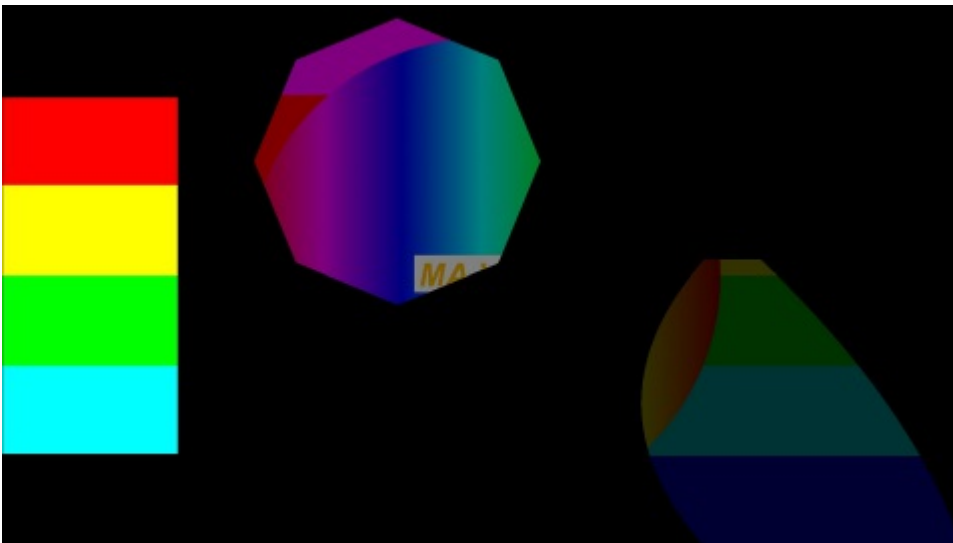
E.g. If you want to coat (lamine) a region where nothing is projected you can build a mask to coat the regions. This regions remain black in the projection.

Example - Mask made of 3 layers:



Greyscale mask

Using of the mask within the camera:



Resulting output

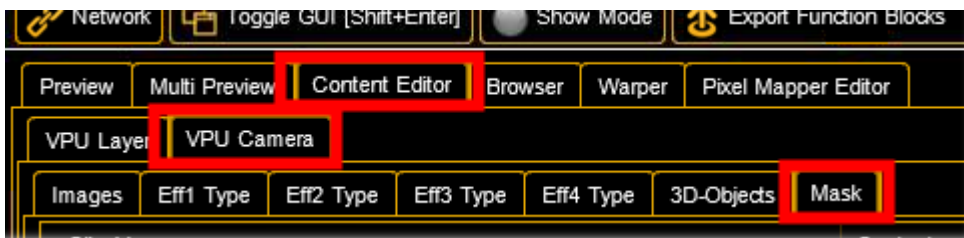
The brightness of a pixel determines the transparency.

Black - opaque ... white - transparent.

You can use a color or black and white image for the mask.

If a color image is used only the brightness information is used.

In the content editor a channel function is used. You find it as a list in the content editor similar to the camera iris objects:



Content editor - mask channel function

You can insert the images in the common way as you insert the content.

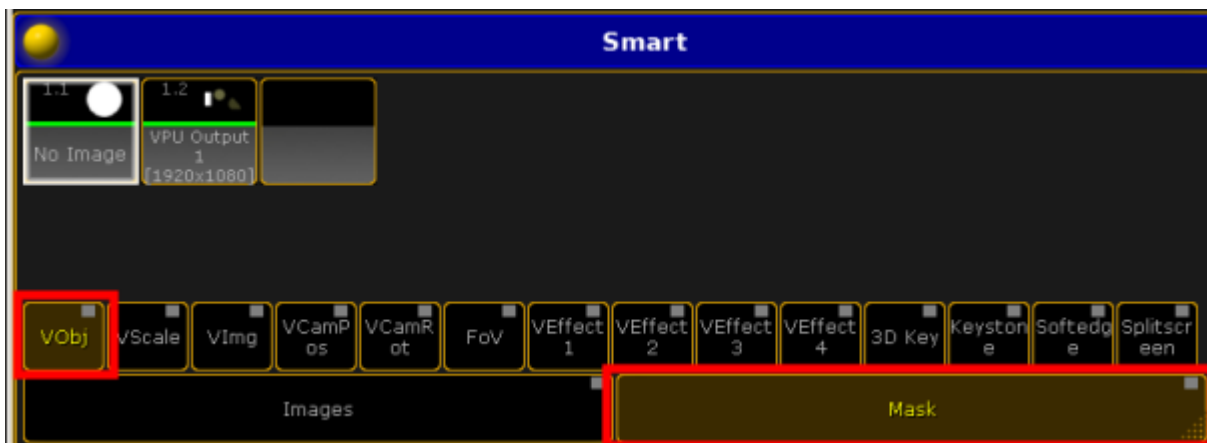
Then select the camera and select the preset type "Video" feature "VObj" attribute "Mask".

Here all inserted masks are shown.

Select the mask:

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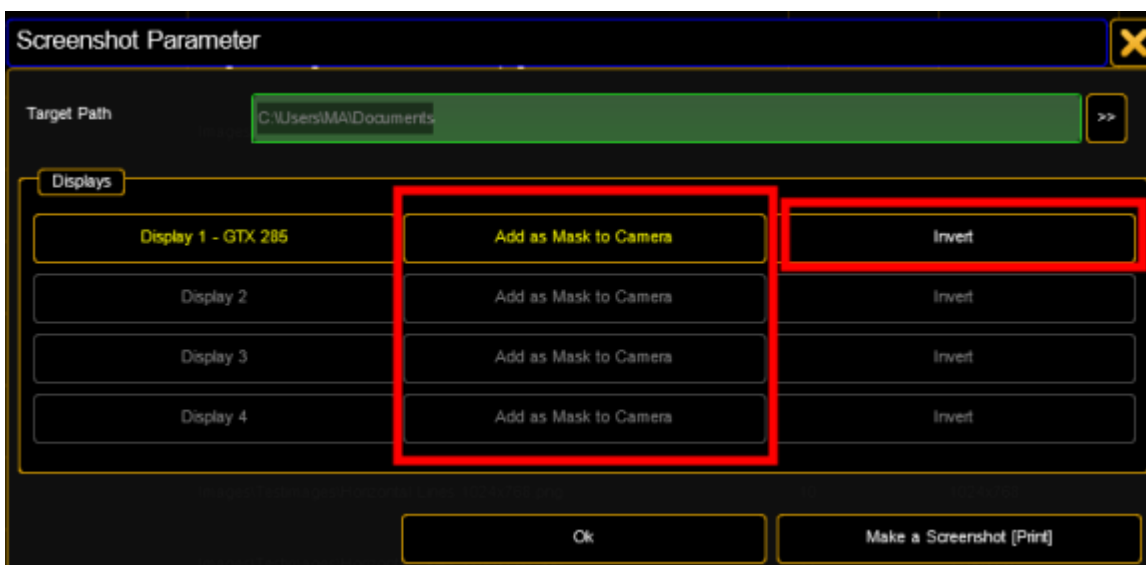


Mask attribute at the smart view

A screenshot can be directly inserted as mask.

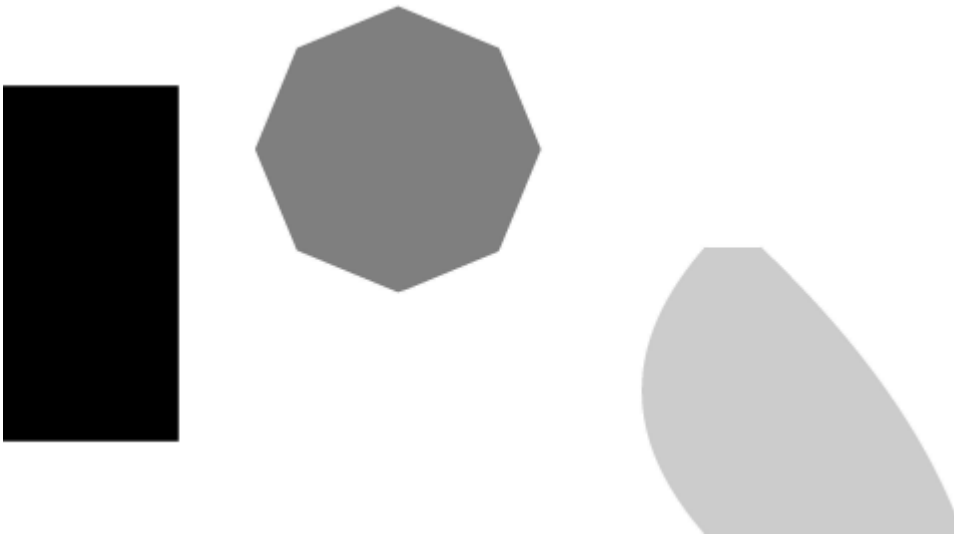
Therefore the parameter has to be selected as option in the screenshot parameter dialog.

With "Add Mask to Camera" a channel set is created in the mask channel function that refers to the location of the screenshot:



Screenshot parameter

With the function "Invert" the mask can be inverted:

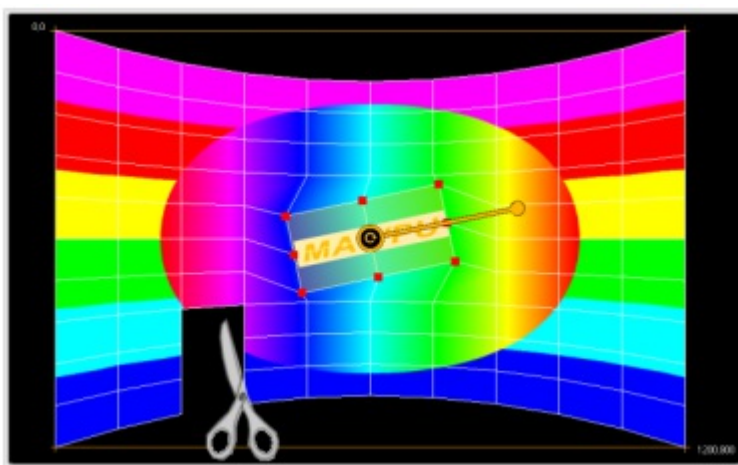


Inverted mask

Masks should be created in the same resolution as the used output. If the resolution is not the same, the mask will be crushed or stretched.

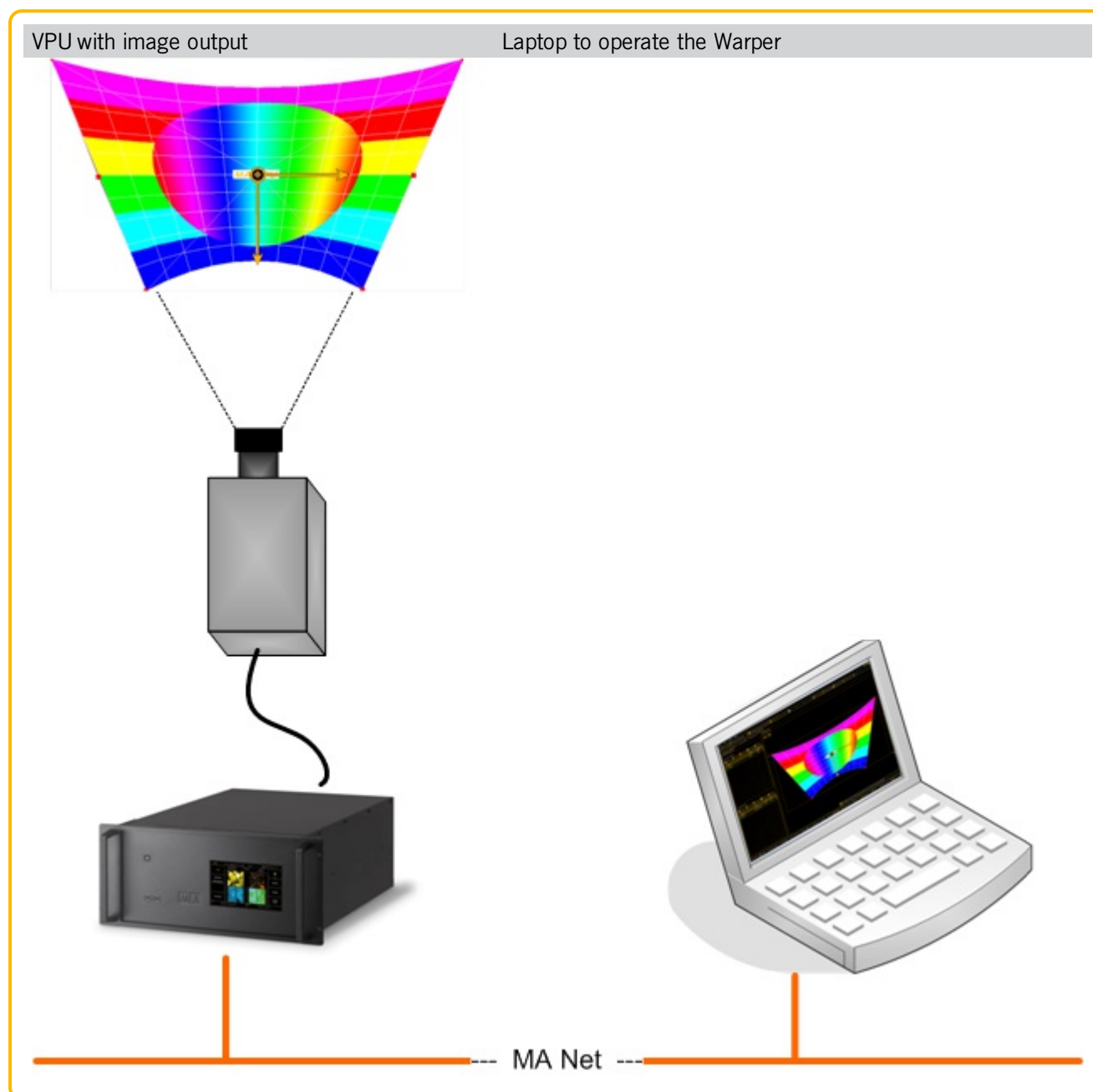
9.9. Warper

The Warper enables you to warp or straighten out the image output on a bended area, stretch, shrink and rotate selected parts of the image and cut out parts of the projection:



9.9.1. Warper Fullscreen View

You can toggle the GUI (via Ctrl + Enter) and watch the manipulated output in real-time while dragging the image into the right position of the projection screen. Editing the warper objects can be done on the VPU machine simultaneously in the Warper Window and the Warper Fullscreen View. Or the VPU is remote controlled by another VPU PC that is connected via MA-Net. In both cases the warped output can be checked in real time:



9.9.2. Warper Basic Operation

If a new warper object is added you can define the properties of the object in the upcoming dialog.

Name; Width; Height and the Render Mode:

A warper 3D object supports three modes. These are "Stretched", "3D" and "Orthogonal".

The mode can be set when creating the object and can be changed at the edit dialog of the warper 3D object at the warper editor.

The default mode is "Stretched" which is also the behavior of prior versions of the MA VPU.

When using a warper object on a camera the mode "3D" is not supported and behaves like "Stretched".

Using the warper object on a layer:

- o Stretched: The warper object is stretched to fit the output and ignores the ratio of the warper 3D object.

This mode does not support any 3D functionality like positioning, rotation or scaling.

- o 3D: The warper object is drawn with its defined resolution.

The center of the object matches the center of the output.

This mode supports full functionality inside the 3D space.

The object can be positioned, rotated and scaled like other 3D objects.

But remember the warper object itself is still a 2-dimensional object.

- o Orthogonal: The warper object is drawn with its native resolution.

The center of the object matches the center of the output.

This mode does only support positioning on the x- and y-axis.



New Warper Object	
Name	Warper 1
Width [Pixel]	1920
Height [Pixel]	1080
Render Mode	Stretched Stretched 3D (only Layer) Orthogonal



Positioning in this mode moves the object without interpolating pixels, so the mesh stays pixel accurate.

As orthogonal mode is a 2-dimensional mode, it is the most pixel accurate one of the three modes.

Using a warper object on a camera:

- o Stretched: The warper object is stretched to fit the output.

3D functionality like positioning, rotation or scaling is not supported.

- o 3D: This mode can be used on a layer only.

If it is used on a camera it behaves like "Stretched".

- o Orthogonal: The object is drawn with its native resolution.

The center of the object matches the center of the output.

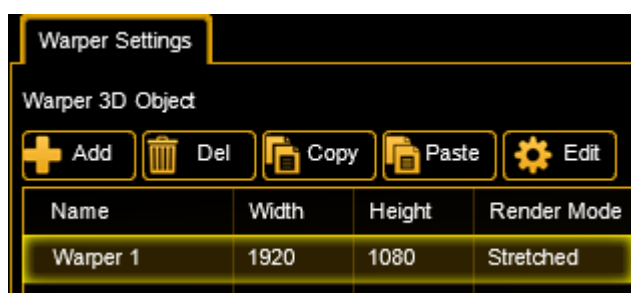
The object can be positioned with the PosX and PosY attribute of the cameras 3D Key feature.

Orthogonal mode is also the most pixel accurate one when using the object on a camera.

In the 'Warper Settings' you can define the Warper object. It is handled by the VPU like the other 3D objects but it only has 2 dimensions X and Y.

In prior versions the calculation of UV mapping referred to the width and height of the parent warper 3D object. Now the width and the height of a texture can be defined as base values of the calculation of the corresponding UV E.g. a warper object has a dimension of 1920 x 1080 which also fits the resolution of the output. The content has a resolution of 7680 x 1080 (4 times full HD). In this example the warper object is used on a layer and shall "grab" the third full HD space from the texture using the UV mapping. For this case the UV mapping is: U from 3841 to 5760 of 7680 and V from 1 to 1080 of 1080.

The UV parameters are based on pixels and are scaled to one. If you have a texture with a resolution of full HD, enter the parameters from 1 to 1920. All position parameters of the warper are pixel based and scaled to zero. Position 0,0 corresponds to the top left of the screen.











Warper 3D objects can contain several meshes. These meshes divide the projection area into several parts that are defined in the window 'Warper Meshes'. E.g. if your projection area is only one big bended plane you only need one mesh. If the area is splitted into different objects it favorable to use different meshes for these objects E.g. if the projection plane is covered with a box you can define a separate mesh for this box, put this box in front position and edit the characteristics.

Meshes even can overlap. To define the order use the context menu:

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Warper Meshes			
 Add	 Del	 Copy	 Paste  Edit
Name	Type	ResX	ResY
upper left	Bezier Mode	10	10
upper right	Bezier Mode	10	10
lower left	Bezier Mode	10	10
lower left	Bezier Mode	10	10

	Import all Warper
	Export all Warper
	Edit
	Copy
	Paste
	Convert Object to
	Increase Resoluti
	Linear
	Move Mesh to fro
	Move Mesh on st

If a Warper 3D object is created a dialog comes up to describes the mesh:

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All coordinates refer to the upper left corner.

Name: Enter a name
Width, Height, Position: Enter the width, height, and position of the mesh created with 'Add' it (0,0).

If the mesh is edited, the center of the mesh is the center of the 3D object in pixels. A mesh can have a maximum size of 16384 x 16384. Please note that using large meshes does cost performance.

Maximum Size of Submesh Tile: Enter the maximum size of the submesh tile. Warper meshes with a large size will be rendered with a higher resolution to reduce artifacts. This option is enabled by default. The maximum tile size of 32 is the default. The options are 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192, 16384. The default is set to 32. The higher the tile size, the coarser the texture. If the value is set to "None", the resolution equals the texture resolution to improve the texture quality and not warp the mesh.

Resolution X/Y: Describe the resolution of the mesh. The maximum resolution is 128. The grid divides the texture into a grid of squares. The grid can be manipulated.

U From, To: V From, To: Enter the original image is mapped to the mesh. If the U and V values are not the resolution of the image, the VImg Split effect will be applied.

Add new Grid Mesh...

Name

Mesh 1

Note: The position parameters are based on pixels and are scaled to zero. Position 0,0 corresponds to the top left of the screen.

Width [Pixel]

1920

Height [Pixel]

1080

Position X [Pixel]

0

Position Y [Pixel]

0

Note: This parameter reduces the artifacts in distorted meshes. The setting None does not cause any disadvantages in an undistorted mesh.

Maximum Size of Submesh Tile

32

Resolution X

10

Resolution Y

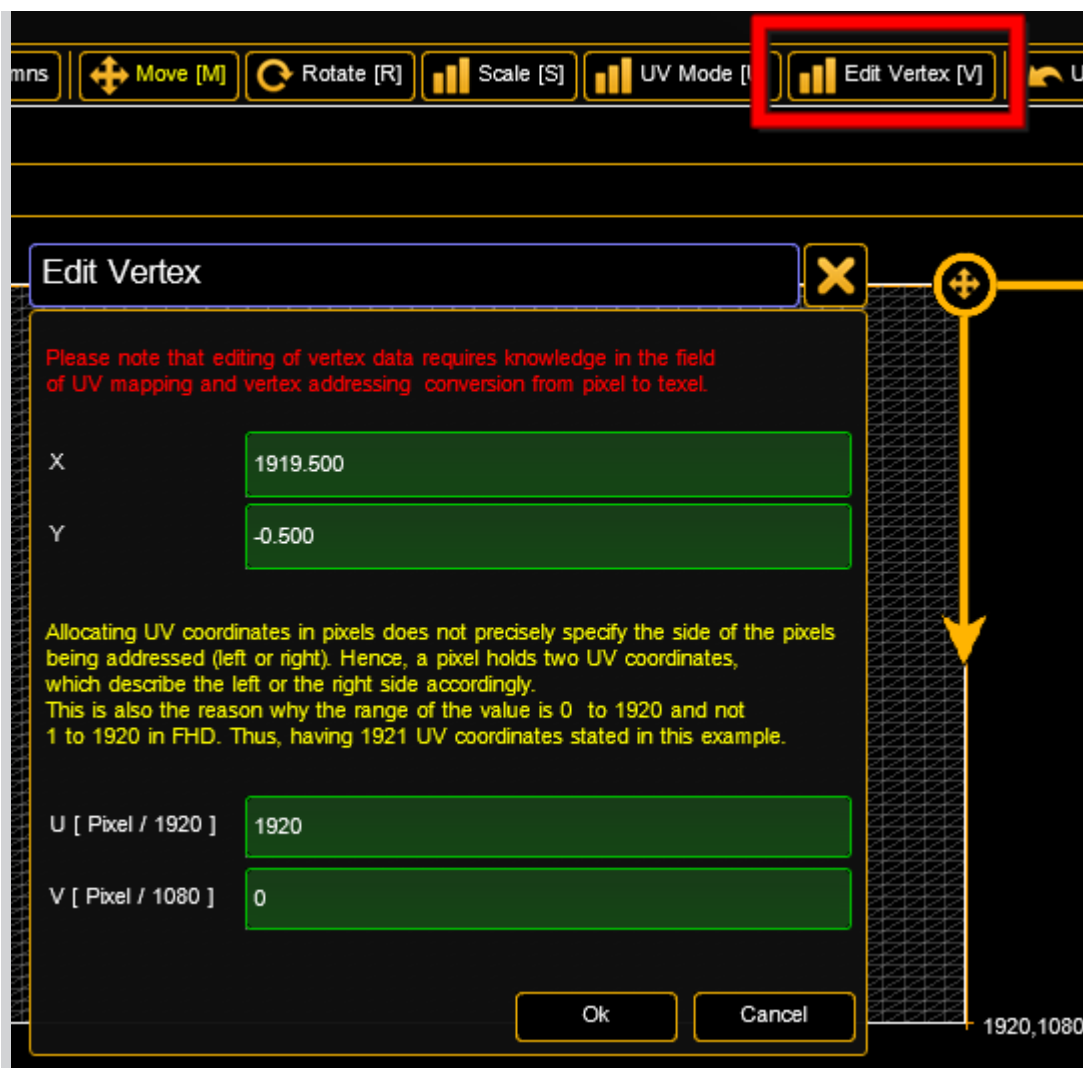
10

Note: The UV parameters are based on pixels and are scaled to one. If you have a texture with a resolution of full HD, enter the parameters 1 to 1920.

	Position	Texture Width
U From [Pixel]	1	/ 1920
U To [Pixel]	1920	
V From [Pixel]	1	/ 1080
V To [Pixel]	1080	

Note: Resolution X*Y should not exceed 32*32 (1024)

Ok



The UV mapping of a mesh can be edited graphically.

This can be done in the 'UV mode' by clicking the button 'UV mode' in the warper editor.

You can also use the keyboard to toggle the 'Move', 'Rotate' and 'Scale' modes. The UV mapping of a mesh can be edited by selecting the mesh itself.

A mesh now can also be edited using the arrow keys.

Vertex data of a mesh can be edited numerically. The vertex data can be edited by clicking the 'Edit Vertex' button.

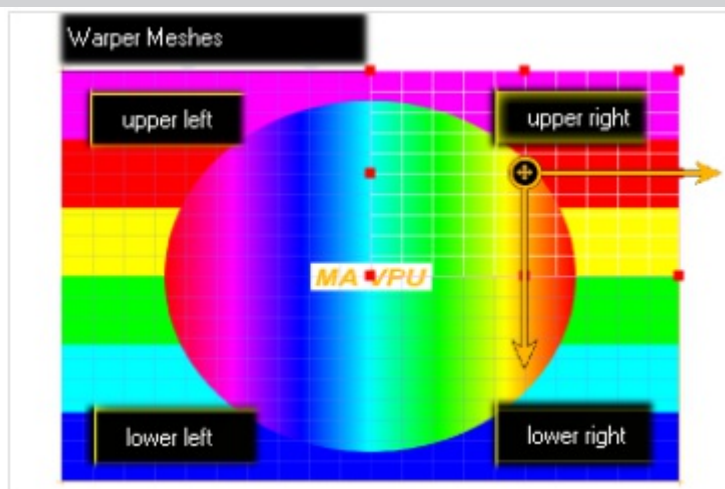
To edit a vertex, first select a vertex. Then click 'Edit Vertex' in the toolbar. The 'Edit Vertex' dialog box will appear.

Then click 'Edit Vertex' in the toolbar. The 'Edit Vertex' dialog box will appear.

Editing of vertex data requires knowledge in the field of UV mapping and vertex addressing conversion from pixel to texel.

Meshes can be edited always via a doubleclick into the graphic view on the mesh or the mesh list table.

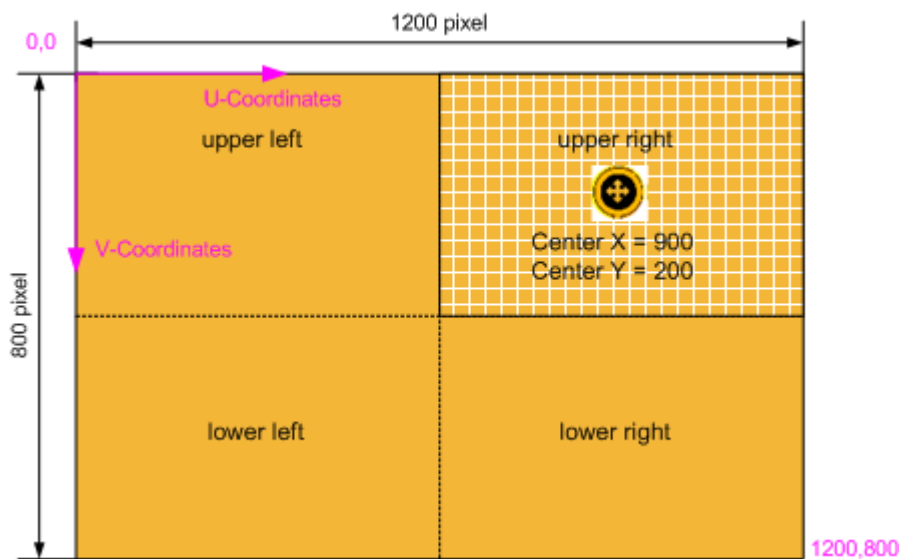
Example: The projection plane is divided into 4 even planes:



This Warper 3D Object is divided into 4 even planes:

- upper left
- upper right
- lower left
- lower right.

Placement of the 4 meshes:



The output image contains meshes. The coordinates are described via the origin (0,0) of the UV upper left corner of the

9.9.3. Warping

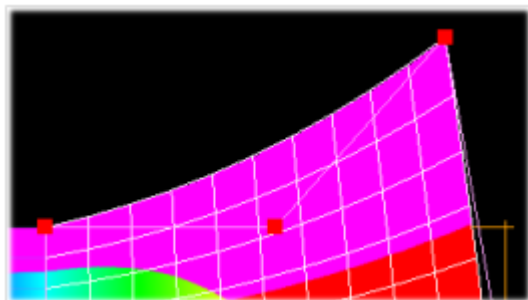
If the Meshes are defined the image can be warped.

The outer frame of the mesh can be edited in the 'Bezier Mode'.

The inner points or faces can be edited in the 'Grid Mode'.

Switching between the modes can be done via the context menu with a right mouse click.

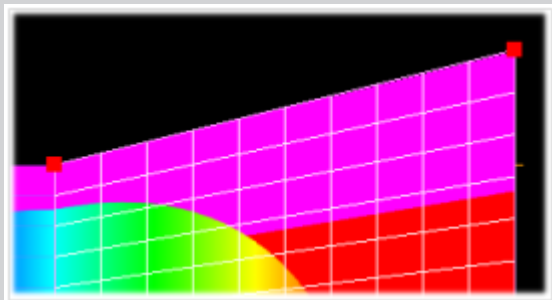
Bezier Mode - the outer frame can be edited



Manipulate the outer frame of the mesh by dragging the red marked points. This example shows a **Bezier function**

The toolbar shows how the points can be





This example shows a **Linear function**.

You can switch between the functions via the right mouse click context menu:



Grid Mode - inner points and faces can be edited

The Grid Mode offers a more detailed adjustment of the output frame.

The grid is a uniform distribution of the mesh into



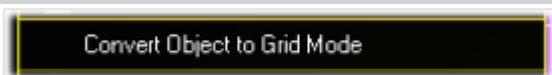
rectangles. 4 points in the grid describe a face.

The mesh is tiled into a grid with a resolution of XY points.

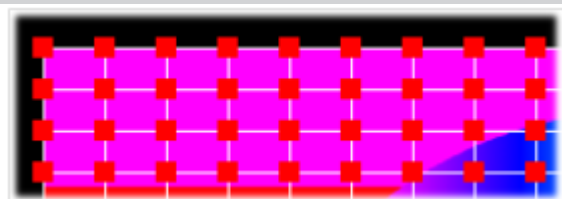
The resolution can be increased via the context menu with the right mouse button or edited in the list directly.

The resolution of the grid is limited to 128x128.

To change into the Grid Mode do a right mouse click on the preview:



All points in the preview are selected:



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Warning: Switching back from Grid- to Bezier Mode forces a recreation of the 3D vertex data (a new 3D Object is build).
The manually changes of the points are lost because they are converted into vertex data!
This is always announced via a warning dialog.

9.10. File Browser

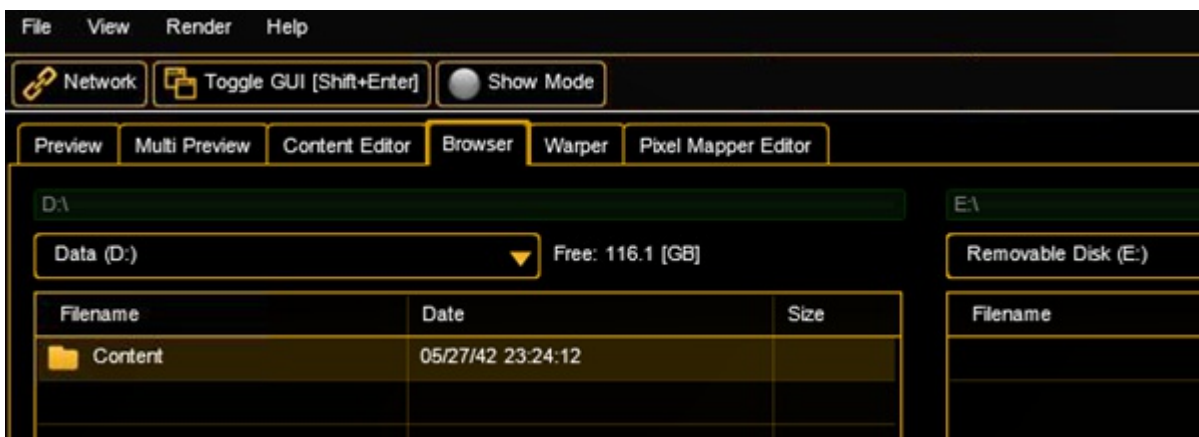
With the File Browser you can import content from external hard drives or USB devices into the VPU or move content to drive D: or wherever by a simply drag & drop.

You can delete and rename files or folders and create new folders.



Restriction:

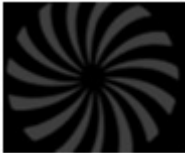



You cannot drag & drop on touch-screen without using a mouse.



10. Features Attributes and Functions

To explain the layer effect engine it is illustrative to imagine grandMA VPU as a model of a several movable cameras where every camera looks at a layer object like a 2D plane or a 3D cube.

In these examples an image may be a texture (picture), or a video.

Layer Features and Attributes	Example
Dimmer Dimmer function. To facilitate fading between different layers the dimmer controls the transparency of an object. If the dimmer is 0 the object is transparent and the projection is invisible. If the dimmer is "full" the object is opaque and you can only see the front layer (front Z-position)	with values in % Dimmer 50 % 
MixColor (R; G; B) Tint the output with the RGB (Red; Green; Blue) color mixer	Color (0,0,0) 
HSBC (Hue shift, Saturation, Brightness + Contrast) Set Hue, Saturation and Brightness of a layer	HSBC (50,50,50,50) 
Colorkey Set the transparency for the foreground object. First select the color then set the tolerance. The switch 'Alpha' decides if the pixel gets complete transparent or opaque in dependency to the color key. The switch 'Type' decides if the calculation is done in the RGB (Red Green Blue) or HSB (Hue Saturation Brightness) model.	Image Layer 1 
Colorboost (ColBoost-R; -G; -B)	ColBoost (50,50,50)

Manipulate the intensity of red, green or blue color of the image separately.



Borders

soft Borders

(Left Hard, Left Soft, Right Hard...Top Hard, Top Soft) Borders can be used for realizing PiP (picture in picture) applications.

Softborder works with alpha channels so that the layer underneath can even shine through the top layer to merge the layers.

For example first cut the layer to a smaller size (which is NOT scaling!) and then create a soft edge by using the soft parameter for the respective side of the layer.

This makes the layer underneath shine through (see picture).

Borders also can be changed via the special dialog in the desk:

Therefore select the layer, select the feature 'Border' and press the button 'Special Dialog' at the desk.



VObj. (3D-Objects)

cross

Select an 2D or 3D object on which surface the image or video is shown



VObj (Transistion Type)

Single Layer Transistion **Note:** (grandMA 2 only)

Select a fade effect between images on the layer.



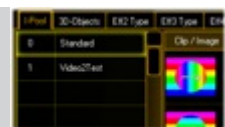
VObj (Transistion Time)

The transistion time can be set from 0...3600 seconds

VObj. I-Pool

Pool 'Standard' selected

Selection of the 'I-Pool'. One 'Pool' can contain up to 255 images or videos



VObj. Images

Image 1

Choose the image or video from the selected 'Pool'



VPos (X; Y; Z ; Scale)

X= 50%; Y=50%; Z=50%

Scale modifies the range of X;Y ;Z

Positioning of the projection object in X; Y; Z - direction



VRot (X; Y; Z)

X=40%; Y=60%; Z=50%

Rotate the projection object around the X; Y; and Z-axis



VPos <> (X; Y;Z)

X=50%; Y=50%; Z=50%

Animate continuous moving of the projection object in X; Y and Z - direction



VRot<> (X; Y;Z)

X= 50%; Y=50%; Z=50%

Animate continuous rotation of the object around the X; Y and Z - axis



VScale (X; Y; Z)

X= 50%; Y=50%; Z=50%

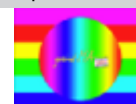
Scale the dimensions of the object in X; Y ;Z direction



VImg (Split X; Split Y)

Split X 0; Split Y 0

Split the image or video in X and Y



VImg (Offset X; Offset Y)

Offset X=0; Offset Y=0

Offset of the image or video



VImg<> (X; Y)

X= 50%; Y=50%

Animate continuous scrolling of the image or video on the object



VPlayer (Playmode Speed; Begin; End; Index)

Frame 100

(Only for videos)



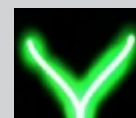
Frame Index: Select a single frame with the Index channel

Play: Starts the Video once forward from the beginning to the end

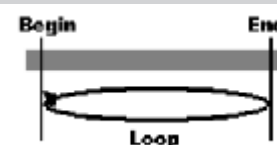
Stop: Stops immediately **Pause:** Pauses

Resume: Continues after Pause (even with the Looping)

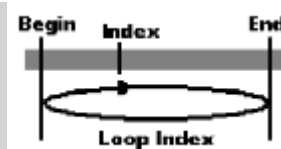
Play Index: Plays the video from the index frame which has to be set first



Loop: Starts the video endless looped forward from the beginning



Loop Index: Loops around the frames index which has to be set first



Play Ignore Dimmer; Loop Ignore Dimmer; Loop Index Ignore Dimmer;

Play Index Ignore Dimmer; Pause Ignore Dimmer;

These modes start/pause the video and keep on playing regardless if the dimmer is on or zero

VPlayer (Speed) modify the playback speed

VPlayer (Begin) Set an inpoint

VPlayer (End) Set an outpoint

VPlayer (Index) Select a frame index

VEffect 1.....4 (Eff Type; Eff part)

Eff Type = 0

Several effects based on the Direct3D standard can be selected.

Effects are defined within .fx files as described in [Content: Eff1 Type...Eff4 Type](#).



Sound (Volume)

SndVol = 0%

Control the sound output for video files with a soundtrack

Sound is off

*As described in [Eff1 Type...Eff4 Type](#)



Hint:

Camera effects manipulate the complete output signal!

Camera Features and Attributes

Example with values in %

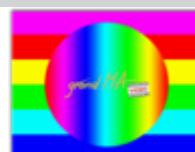
Color

HSBC (Hue shift, Saturation, Brightness + Contrast)

HSBC (50,50,50,50)

HSBC (50,0,50,50)

Set Hue, Saturation, Brightness and Contrast of a layer



Colorboost (ColBoost-R; -G; -B)

ColBoost (50,50,50)

ColBoost (50,50,100)

Manipulate the intensity of red, green or blue color of the image separately.



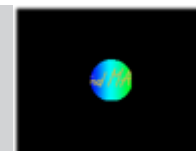
Beam

Iris (Iris)

Iris = 10 %

Iris = 80 %

Open or close the Iris



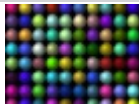
Shapers

Shaper1 (1A; 1B; 2A; 2B; 3A; 3B; 4A; 4B)

1A=0; 1B=0; 2A=0;
2B=0; 3A=0; 3B=0;
4A=0; 4B=0 %

1A=30; 1B=0; 2A=30;
2B=0; 3A=30; 3B=0;
4A=30; 4B=0 %

With the beam shapers the resulting image can be masked variable with four shapers each with 2 channels A and B.



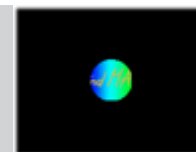
Video

VObj (Images)

Image = no Image

Image = Circle

Select the image for the iris mask



VScale (X; Y; Z; All)

X= 50%; Y=50%; Z=50%

X= 50%; Y=30%; Z=50%

Scale the dimensions of the object in X; Y ;Z direction



VImg (Split X; Y Offset X; Y)

Split X 0; Split Y 0

Split X 2; Split Y 2

Split the image in X and Y. Split offset of the image.

This offset can be understood as the Point of View (PoV).

By using this function the perspective doesn't change. Try this with the cube and you will clearly see the difference!



VCamPos (X; Y; Z)

X=50%;Y=50%;Z=50%

X=46%;Y=52%;Z=54%

All layer views are mixed up to one view for the main cameras whose images are send to the physical outputs.

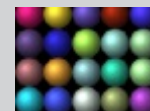
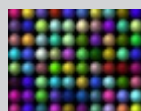
These imaginary cameras can be moved to show only parts of the whole image.

So several applications can be connected together to project a huge image.

If the camera position moves the perspective changes:

Take a cube, rotate it a bit and then move the camera.

You can see that the perspective changes - you can see that the „world's“center is still the centre of your monitor.



VCamRot (X; Y; Z)

Rotate the camera around its own centerpoint

VEffect 1.....4 (Eff Type; Eff part)

Several effects based on the Direct3D standard can be selected.

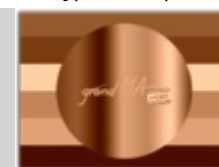
Effects are defined within .fx files as described in

[Content: Eff1 Type...Eff4 Type.](#)

Eff Type = 0



Eff Type = Sepia



3D Key (PosX;Y;Z Rot X;Y;Z Scale X;Y;Z; All)

Select a 3D object for the camera.

This is useful to manipulate the complete output e.g. for projecting on a cyclorama or display all layers on a sphere.

Keystone (1A; 1B; 2A; 2B; 3A; 3B; 4A; 4B)

1A=0; 1B=0; 2A=0;
2B=0; 3A=0; 3B=0;
4A=0; 4B=0 %

1A=0; 1B=0; 2A=0; 2B=30;
3A=0; 3B=0; 4A=0;
4B=30 %

All layer views are mixed up to one view for the main camera.

Each edge of this view can be moved towards the opposite edge to generate a keystone effect.



Keystone Corr. (X - Corr.; Y - Corr.)

X Corr. = 0 %; Y Corr. = 0 %

X Corr. = 75 %; Y Corr. = 0 %

If a picture is projected distorted on a surface, a perspective correction is necessary to distribute the content on the surface correctly.

Therefore the distribution of the picture content can be manipulated in X- and Y-direction.



Softedge (1A; 1B; 2A; 2B; 3A; 3B; 4A; 4B)

1A=0; 1B=0; 2A=0;
2B=0; 3A=0; 3B=0;
4A=0; 4B=0 %

1A=0; 1B=0; 2A=50; 2B=0;
3A=0; 3B=0; 4A=0; 4B=0 %

If several projectors should show one common image, the borders must be cross faded.

For every border one channel for the position and one channel for the dispensation of the black wedge exist.

This example shows a soft edging for the left border of the image.



Splitscreen (Offset X; Offset Y)

Changing the X or Y offset doesn't change the point of view. Camera axis stays on the object axis.

This is different from VCamPos.

CP-X, CP-Y, CP-Z

Rotate the camera around the center point of the 3D-world

FOV

Change the field of view of the camera.

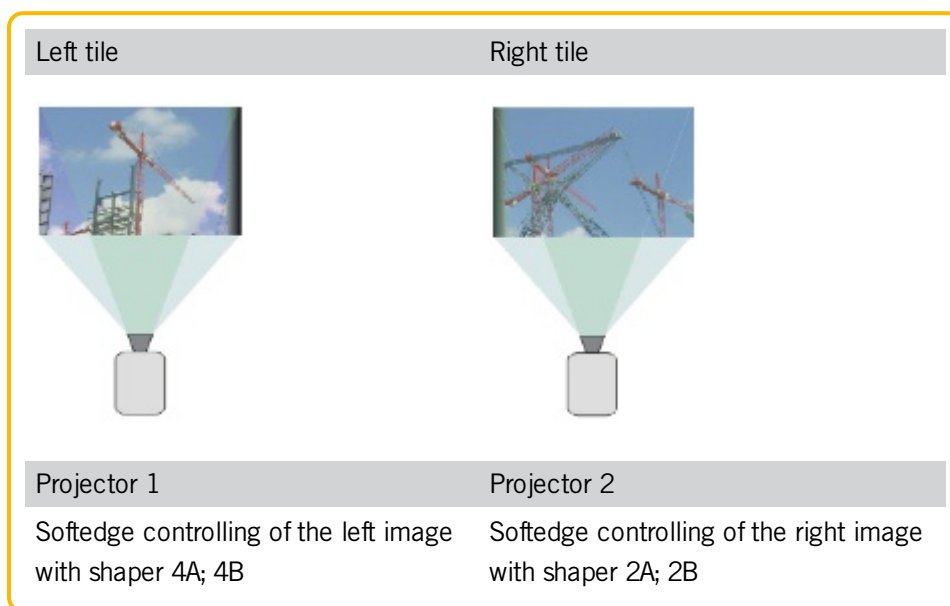
11. Order of Effect Execution

Effects are executed in the following range (top-down):

- Texture Color
- Color Key
- Effects (SW or Sepia or stuff like that)
- RGB Values (**R**ed **G**reen **B**lue)
- Color Boost
- Saturation
- Contrast
- Brightness
- Dimmer
- Alpha
- Blendmode

12. Softedging

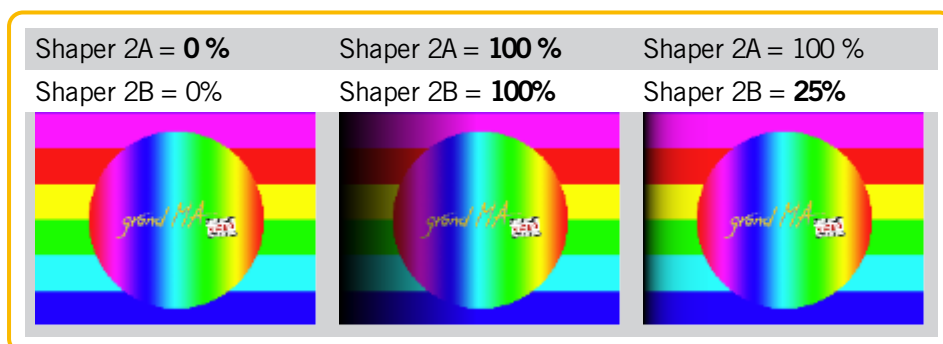
Softedging or Soft Edge Blending is a technique to split a complete picture into several smaller tiles. Therefore the margins of the flanking edges overlap. Inside the overlapping range both images show the same content, but with decreasing brightness to the borders. The MA VPU supports this technique for videos and images. This is realized via four controllable grayscales (gray wedges) at the borders of the image. Position and distribution of the grayscale are controlled by the grandMA desk with each two attributes:



Projection of the complete image:



The following example shows the functionality of the Softedge attributes:





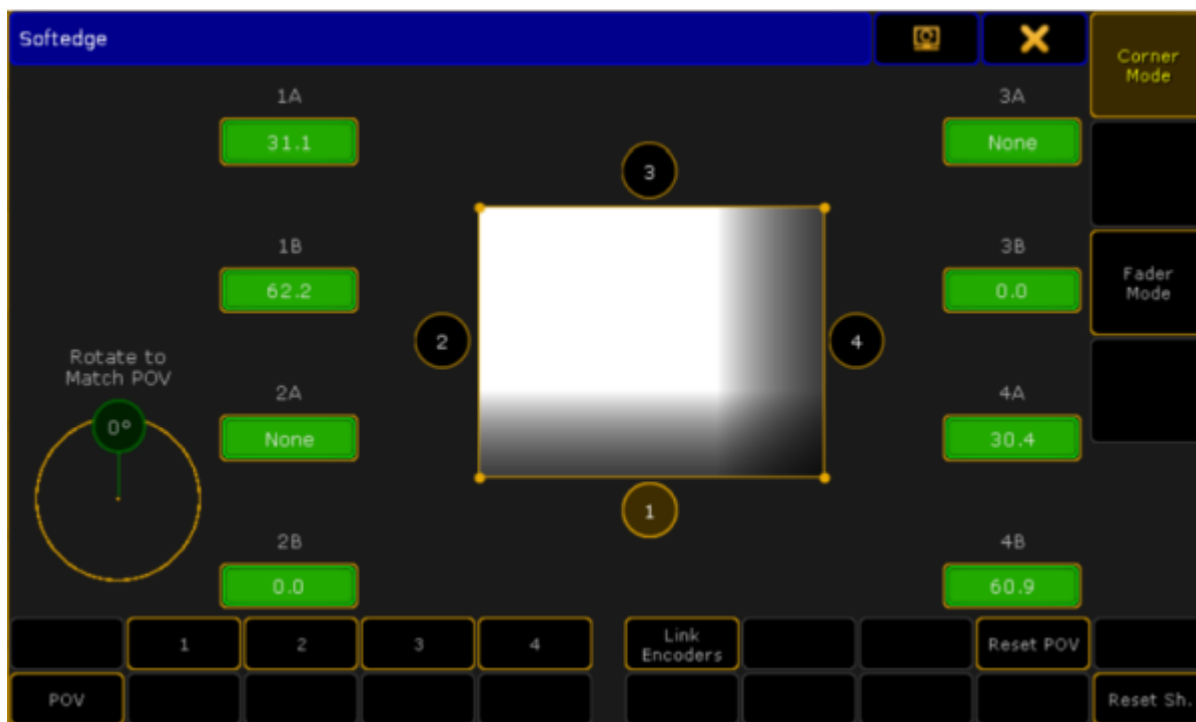
Hint:

On the desk you can use the special dialog to edit the values for the softedge values.

Selecting the Softedge attribute of the camera fixture will enable the 'Special Dialog' button.



All values can be entered in a graphical way with a preview in this special dialog:



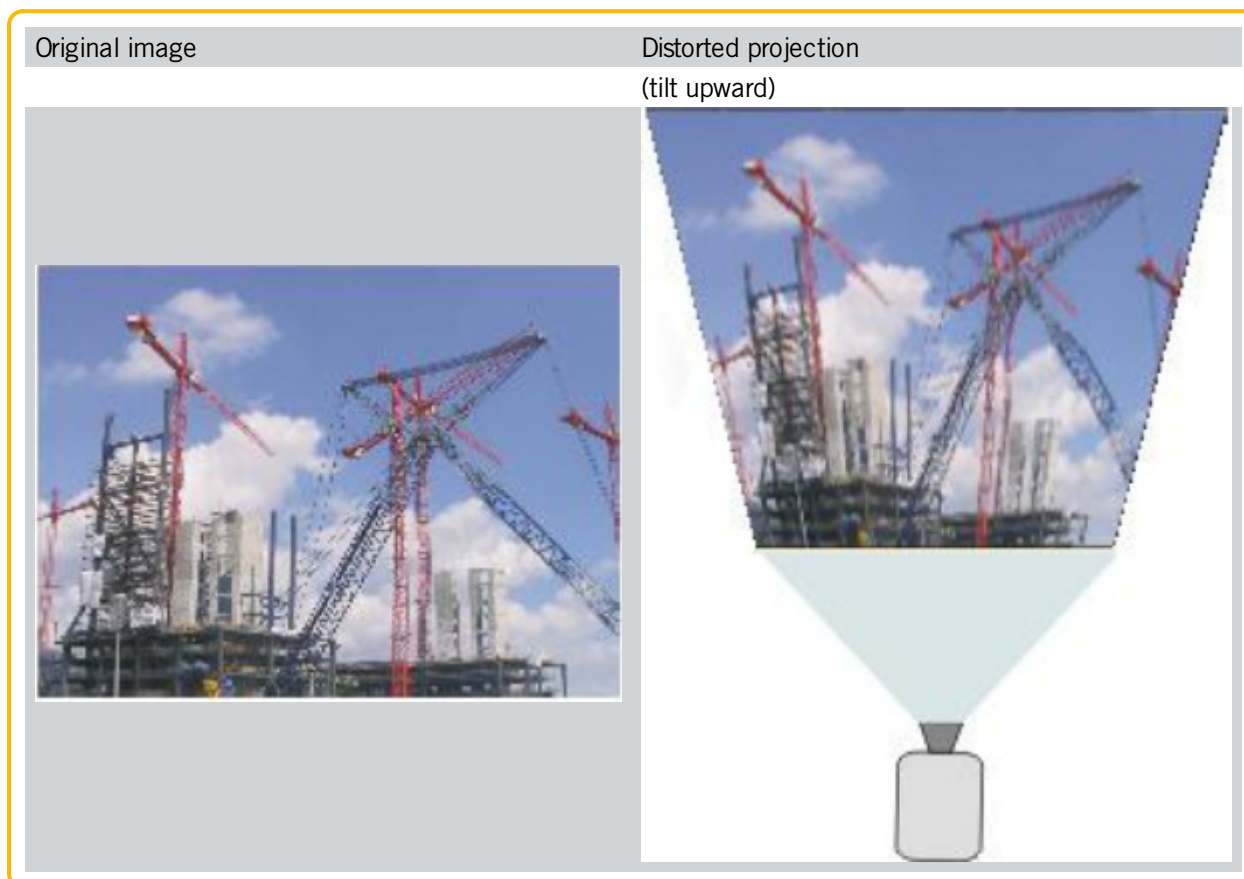
Special Dialog 'Softedge'

13. Keystoning

If a projector is parallel to the screen, the image is a right-angled plane.

If the projector is shifted horizontally or vertically the right-angled projection gets trapezoid.

This effect is called keystoning.



This effect can be minimized by using the keystone correction.

Keystone correction recalculates the image that it is shown right-angled independent of the position of the projector. Therefore the pixels must be compressed and the image is made smaller.



Important:

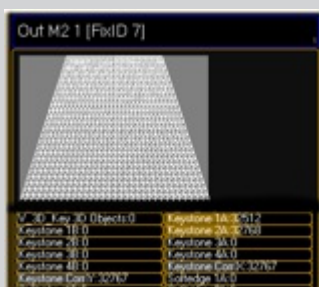
The keystone correction always causes a compression of the projected image. This causes a loss of quality of your projection.

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This correction is done in the camera fixture:

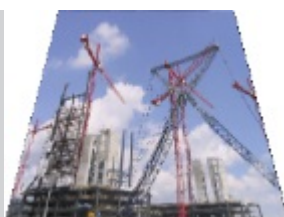


For every edge of the image 1..4 there exists two attributes (Keystone 1A-1B... Keystone 4A-4B). With these attributes the edges can be moved in horizontal



and vertical direction:

Attributes keystone: X and Y are for the distribution of the picture content in X and Y direction.



The resulting output image for this distorted layer looks like the image beside.



Hint:

On the desk you can use the special dialog to edit the values for the keystone values.

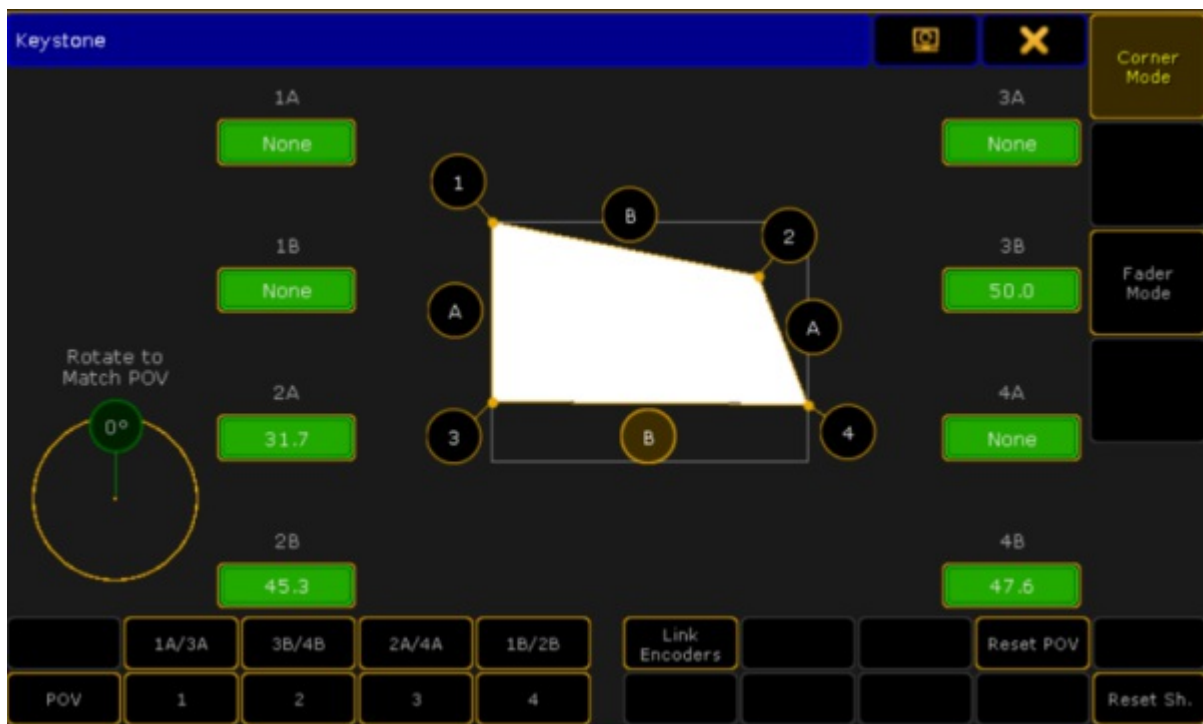
Selecting the keystone feature of a camera fixture will enable the special dialog button:



All values can be entered in a graphical way with a preview in this special dialog:

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Special Dialog 'Keystone'

14. Pixel Mapper

The Pixel Mapper allows the presentation of the video output to a DMX matrix.

DMX data is sent directly from the MA VPU PC via Ethernet using the Art-Net, sACN or MA-Net2 protocol.

The MA VPU uses the library of the grandMA2 console and will automatically copy patch, position, and fixture type into the VPU.

If needed, changes of these values are automatically copied into the VPU as well.

So if the positions are set up in the grandMA2 Stage View, the setup of the Pixel Mapper can be linked to grandMA2 console.

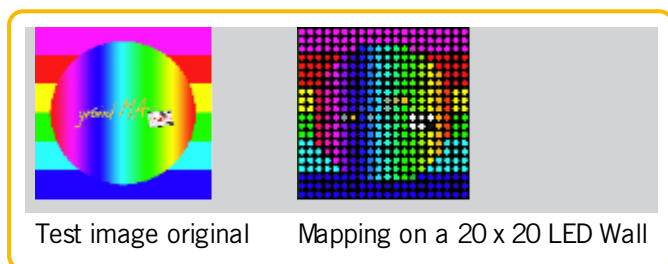


Hint:

The output of the Pixel Mapper can be routed as a virtual input of a layer.

LED Panels are defined similar to dimmer or multi function spots via fixture types in the desk fixture library.

The following example shows a test image mapped on a 20 x 20 LED wall:

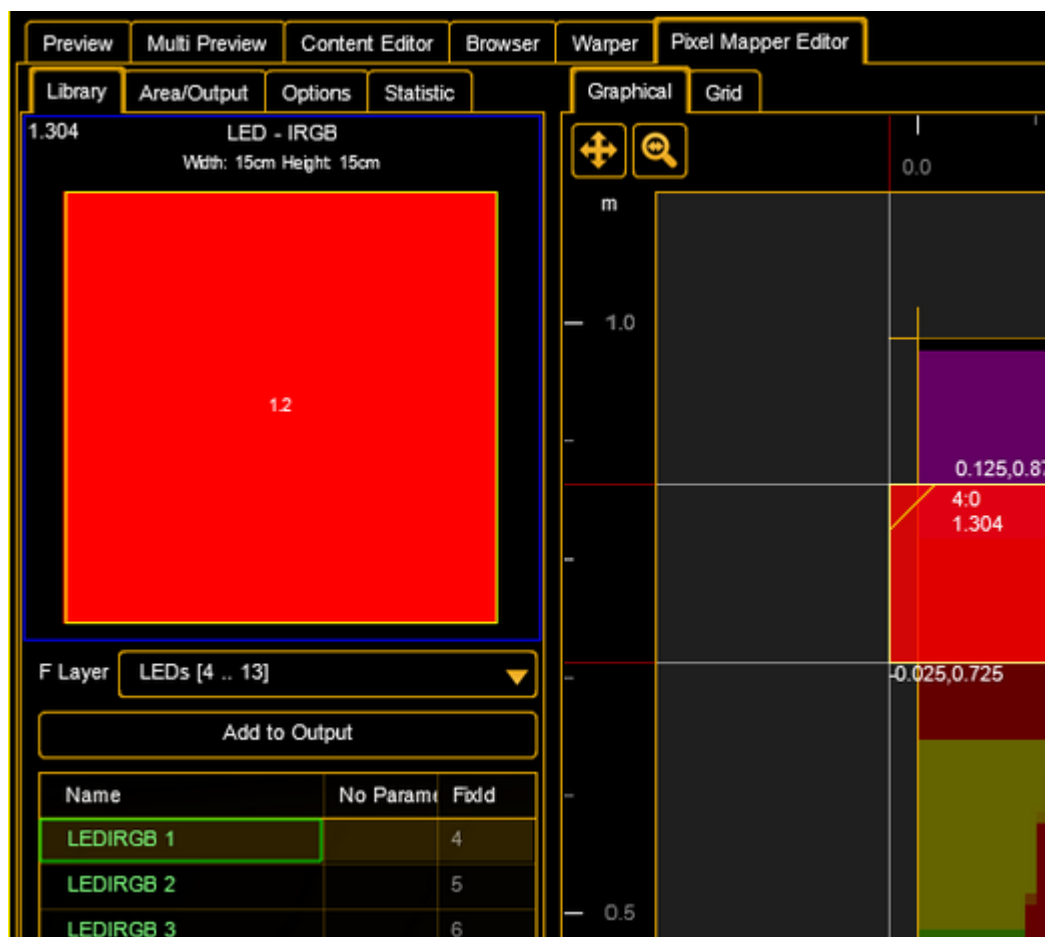


Enable the Pixel Mapper mode via the menu: or touch screen .

The general output of MA VPU is now done via Ethernet Art-Net, sACN or MA-Net2 instead of the graphic card of the PC.

14.1. VPU - Pixel Mapper Graphical View

This view presents the graphical LED wall arrangement and allows a comfortable editing and controlling of the used fixtures:



VPU Pixel Mapper Editor - Graphical View

14.1.1. Pixel Mapper Toolbar

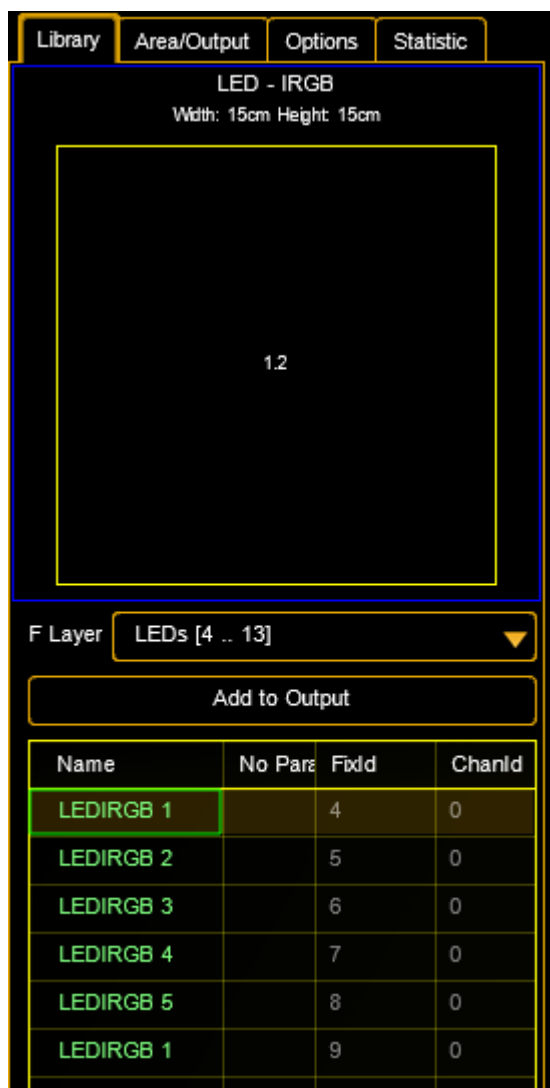


Pixel Mapper Toolbar

Center	Shows the center of the Pixel Mapper Editor
Zoom to fit	Zooms the editor automatically so that all panels are visible.
Select ^S	If this button is selected, fixtures can be selected AND moved. To arrange them inside the LED wall or show their attributes via right mouse click. It is possible to move fixtures by mouse as well as the arrow-keys of the keyboard.
Move ^M	Move selected panel via keyboard
Zoom ^Z	Zoom the render window to fit. Zoom with the mouse wheel or with the rubber band via pressed left mouse button.
Delete	Delete the selected LED panel.
Undo	Undo the last action
Prev	Select the previous panel
Next	Select the next panel
Highlight	Highlight the selected fixture output to white (RGB 255,255,255). Attention: The real output channels are highlighted, so it is not recommended if you are on air.

14.1.2. Pixel Mapper Editor

Library



Library: In the library tab on the left side you can select each fixture layer of the setup that contains fixtures you want to use.

Select these fixtures and press the **Add to Output** button. A pop-up will ask, which axis is used: any combination can be done and each axis can be inverted.

This is used to "transfer" the position from the 3D stage view environment into the 2D footprint in the VPU.

This process is comparable to the option "take Camera" in the Layout View, but with fixed positions.

Area / Output

Area/Output: The general output of MA VPU is done via Ethernet protocols like Art-Net instead of the graphic card of the PC.

Therefore the physical dimensions of the LED matrix (Area) and the number of pixels (Output) can be set:



Areas: Here the physical width and height of the LED matrix is determined.

This must not conform to the whole size of the LED Panels.

So e.g. only sub ranges of the general view of the LED Panels can be set.

To set the dimensions of an area, select the area and press **Edit**. The area is defined in n * m cm.

Outputs: List of the outputs. Every pixel mapper output can contain several fixtures. Network settings can be defined separately for every output.



Virtual Output: The output of the Pixel Mapper can be mapped as a virtual input of a layer.

In this case the render IP is suppressed.

Render IP: Set which MA VPU shall render the output by choosing its MA-Net2 IP.

Camera Idx: Index of the camera used for this output.

Delay: To each graphic output or Pixel Mapper output a delay can be assigned.

The value accords to the refresh rate of the output (not of the video clip).

For each output of the pixel mapper a delay from up to 8/30 Seconds can be set (refresh rate for DMX signal is 30/s).

Protocol: Choose between Art-Net, sACN or MA-Net2 protocol. sACN is comparable to Art-Net but allows the multicast option to reduce network traffic. (American National Standard E1.31.2009)

Priority: Set a priority for the output regarding to the playback priorities of the grandMA2 desk. Default is "low".

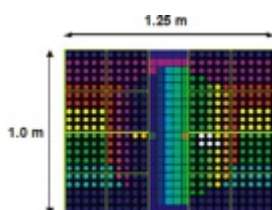
Example: The physical dimensions of the source picture must not confirm to the whole size of the panels.

The LED panels can display, for example only a sub range of the whole output.

In this example the area size is 1,25m x 1,0 m with 25 x 20 pixel.

There are only 16 panels used (5 x 5 LEDs).

The middle stripe is not equipped with LED panels and is not used.



Hint:

The Pixel Mapper works best if the resolution X of the output can be divided by 8.

Start Universe Art-Net and sACN:

To each output of the Pixel Mapper a start universe can be assigned for Art-Net or sACN.

This function is necessary to adress control data via Art-Net or sACN independent from their patch addresses:

sACN:

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If the start universe is not changed by the operator, data will be sent as patched in the desk.

If a start universe is defined here, the lowest patched universe of the corresponding Pixel Mapper output will be used. Other patched universes gear to this start universe.

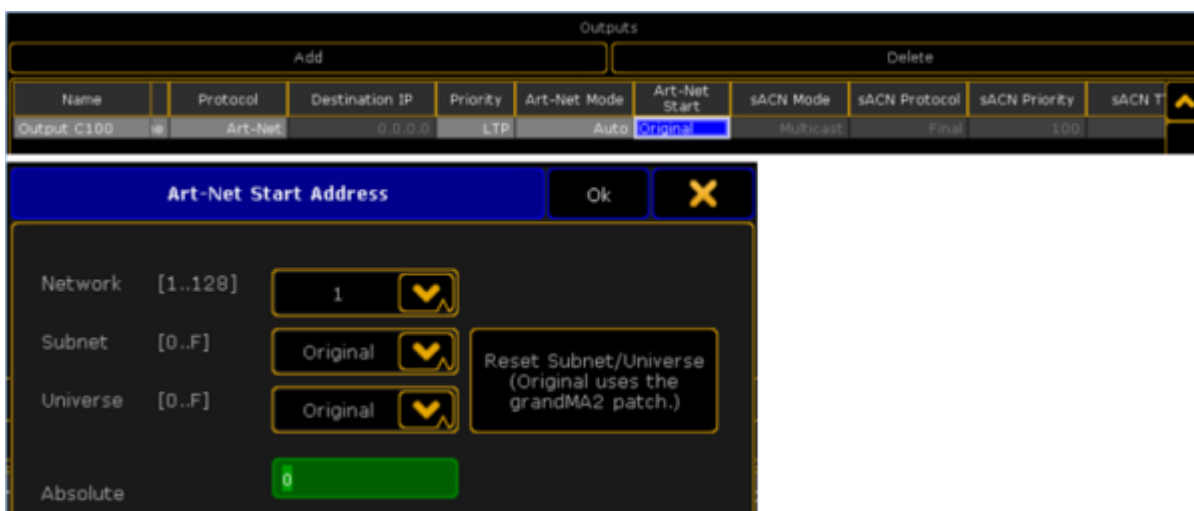
Example: 4 LED panels are patched to universe 11, 12, 13 and 20 and the sACN start universe is set to 1.

Then control data are sent on universe 1,2,3, and 10.

The user can choose a start universe (as defined in sACN specs.) between 1 and 63999.

If the user sets the "Original" button, DMX data will be send again as patched in the desk.

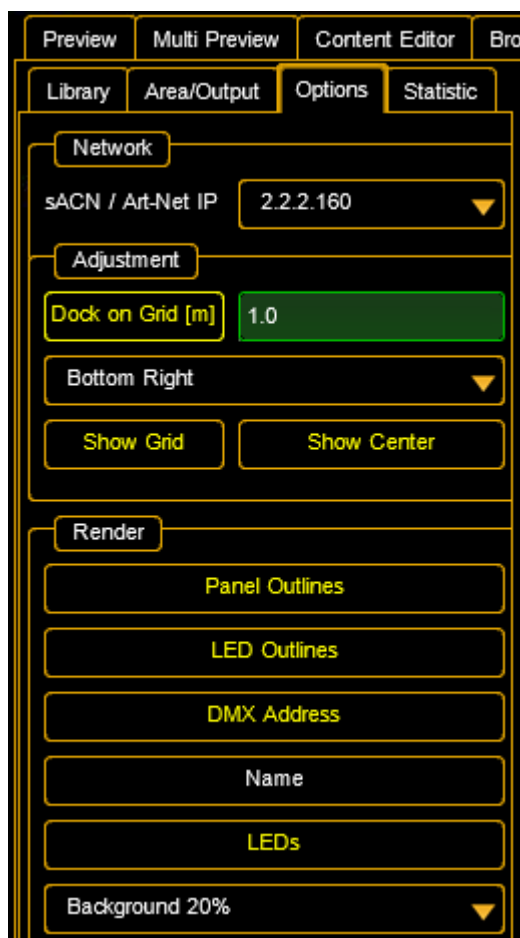
Art-Net:



Same principle with Art-Net. In this case with Art-Net specific entries of the start universe.

If the user sets the "Original" button, DMX data will be send again as patched in the desk.

Options



Network:

sACN / Art-Net IP: Select the IP of the Ethernet adaptor that shall be used to send sACN- or Art-Net data.

Adjustment:

Dock on Grid: enables the docking to the grid, you can enter the pitches to snap in.

Also you can select where to snap: Top left, Bottom Right or Center.

Render:

Panel Outlines: Marks the panel borders.

LED Outlines: Marks the LED borders.

DMX Addresses: Shows the universe + DMX start addresses of each panel.

Name: Display the fixture name of each panel.

LEDs: Preview content for each LED.

Background: Select the transparency.

If the part of the output area is not equipped with a panel, the background image is indicated transparent.

Statistic

Topic	Value
Universes ok	62527
Universes fault	0
Universes per second	90.3
Universes Per cycle	3
Fps	30.1
Bytes received	0.0 Bytes
Bytes sendend	41.7 MB

Statistic: This tab offers information about the used universes, DMX channels and the performance.

14.2. VPU - Pixel Mapper Grid View

Via the tab 'Grid View' you can switch to the Grid View of the Pixel Mapper:

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Index	Name	FixId	ChId	Patch	P
1	LEDIRGB 1 4	4	0	1.304	0
2	LEDIRGB 2 5	5	0	1.308	0
3	LEDIRGB 3 6	6	0	1.312	0
4	LEDIRGB 4 7	7	0	1.316	0
5	LEDIRGB 5 8	8	0	1.320	0
6	LEDIRGB 1 9	9	0	1.324	0
7	LEDIRGB 2 10	10	0	1.328	0
8	LEDIRGB 3 11	11	0	1.332	0
9	LEDIRGB 4 12	12	0	1.336	0
10	LEDIRGB 5 13	13	0	1.340	0

Pixel Mapper Editor - Grid View

This view offers an overview about all used fixtures of the selected output.

Most values can be edited directly in the grid. Values which can not be edited are displayed in light grey.

Selected fixtures are displayed with an orange background. Patch collisions are indicated and marked **red**.

You can use common functions like:

Multiselection: select first row while pressing <Shift> and select last row (still hold <Shift>)--> all rows inbetween are selected.

Select or deselect several rows by pressing Ctrl. Press F2 for editing a value and all selected values will take over the new value.

Selecting multiple values can also be done by using the rubberband, means to lasso a certain area.

The edit control (to type in the value) can be opened by a left mouse click on a selected value.

Holding <Ctrl> while lassoing (selecting) values allows toggling the selection.

The selection of several rows (multiselection) is marked by green frames.

All green highlighted values of the same column will take over the new value.

Export- Import to Excel: You can Export or Import the panels to an Excel (.csv) file via the context menu

Copy & Paste from an Excel Sheet:

Note: you can only do this on a Media PC or on a external PC running the VPU Software. Only the Name of the fixture, PosX, PosY and Rot can be manipulated.

If you want to use the functionality in combination with a VPU, this external PC has to be in a session with the VPU

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or the same showfile that you just edited.

It has to be uploaded to the VPU afterwards. Create an Excel sheet or Tab separated .txt file that fits the options in the VPU change all cells to the desired values:

	A	B	C	D	E	F	G	H
1	Index	Universe	Address	X[m]	Y[m]	Rot[°]	Paneltype	Name
2	0	50	1	0,2	3	25	C100	Circle 1
3	1	53	1	0,3	3	25	C100	Circle 1
4	2	56	1	0,4	3	25	C100	Circle 1
5	3	59	1	0,5	3	25	C100	Circle 1
6	4	62	1	0,6	3	25	C100	Door 4
7	5	65	1	0,7	3	25	C100	Door 4
8	6	68	1	0,8	3	25	C100	Door 4
9	7	71	1	0,9	3	25	C100	Door 4
10	8	74	1	1	3	25	C100	Door 4
11	9	77	1	1,1	3	25	C100	Door 4
12	10	80	1	1,2	3	25	C100	Door 4

Excel Spreadsheet

Copy these settings to the clipboard by pressing CTRL + C (only values shall be selected, not the headline, numerical values comma or Tab separated, so e.g. only values like "2,3" are valid).

Open the VPU software; go to the grid view in the pixel mapper mode.

Select the row, where you want to insert new values:

Index	Universe	Address	X [m]	Y [m]	Rot°	Paneltype	Name
0	1	1	0.500 [m]	39.500 [m]	0.0 [°]	C 100	PM Fixture 0
1	3	241	1.500 [m]	39.500 [m]	0.0 [°]	C 100	PM Fixture 1
2	5	481	2.500 [m]	39.500 [m]	0.0 [°]	C 100	PM Fixture 2
3	8	209	3.500 [m]	39.500 [m]	0.0 [°]	C 100	PM Fixture 3
4	10	449	4.500 [m]	39.500 [m]	0.0 [°]	C 100	PM Fixture 4
5	13	177	5.500 [m]	39.500 [m]	0.0 [°]	C 100	PM Fixture 5
6	15	417	6.500 [m]	39.500 [m]	0.0 [°]	C 100	PM Fixture 6

Pixel Mapper editor - Grid view

Right click into the grid view and select "Paste". The result looks like this:

Index	Universe	Address	X [m]	Y [m]	Rot°	Paneltype	Name
0	1	1	0.200 [m]	3.000 [m]	25.0 [°]	C 100	Circle 1
1	3	241	0.300 [m]	3.000 [m]	25.0 [°]	C 100	Circle 1
2	5	481	0.400 [m]	3.000 [m]	25.0 [°]	C 100	Circle 1
3	8	209	0.500 [m]	3.000 [m]	25.0 [°]	C 100	Circle 1
4	10	449	0.600 [m]	3.000 [m]	25.0 [°]	C 100	Door 4
5	13	177	0.700 [m]	3.000 [m]	25.0 [°]	C 100	Door 4
6	15	417	0.800 [m]	3.000 [m]	25.0 [°]	C 100	Door 4

Pixel Mapper editor - Corrected Grid view after pasting

You can change Name, PosX, PosY und Rot of the panel. If you select e.g. only PosX in the Excel Sheet (and copy that into the clipboard), then set the marker in the cell from where you want to change the values and you paste this information into the VPU software, only these values will be overwritten. So selected copy paste is possible as well.



Hint:

If no real keyboard is connected you can use the on screen keyboard to enter values into the grid. Therefore do a right mouse click into the grid.

14.3. Console - VPU Pixel Mapper View

The VPU Pixel Mapper can be configured in the grandMA2 desk too.

A visual representation of the Pixel Mapper editor of the VPU is implemented in the grandMA2 console:

Create a new window in Other / VPU Pixel Mapper View. This window looks very similar to the window in the VPU. Only the library tab is missing. To work with this window, you can do the following:

Areas and Outputs can be created, deleted, and edited as known from the VPU.

To store fixtures and channels into an existing Pixel Mapper Output, select them, press **Store** and click into the area of your chosen output.

If fixtures or channels have been selected, you can also use



```
[Channel]> store PM 1.2 /axis=+X+Z
```

to store into Area 1, Output 2 with the Axis +X +Z.

All parameters of each Pixel Mapper Area / Output can be controlled by the command line, too.

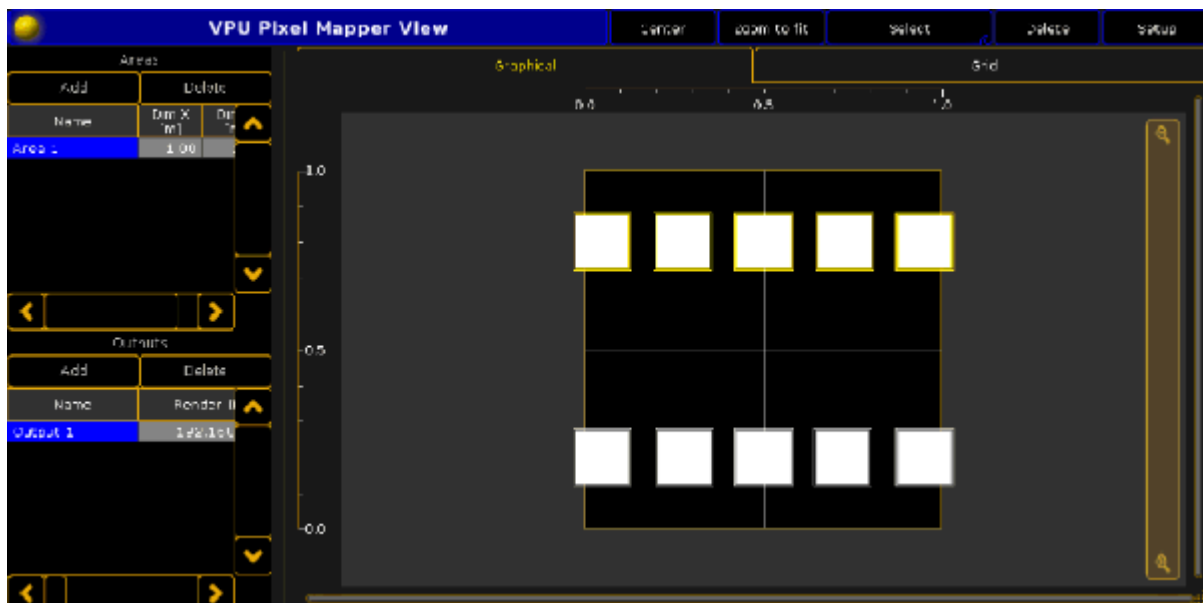
Use "cd PM" to get to the Pixel Mapper containers in the root.

Pixel Mapper setups can also be copied or deleted. They can also be merged via command-line. E.g.



```
[Channel]> copy PM 1.1 at 1.2 /merge
```

The following example shows 10 LED Tiles arranged on a 1 x 1 meter square:



VPU Pixel Mapper View - Graphical View

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After the Fixtures have been inserted into the Pixel Mapper, they can be selected by a rubber-band, moved and rotated, just as in the VPU Pixel Mapper editor.

Use the top-line buttons **select** / **move** to change mouse behavior.

To allow editing, activate the **Setup** button in the headline of the window.

Also the encoder bar can be used to change these values.

The Grid View shows the numerical representation of the mapped fixtures:

Index	Name	Field	Child	Patch	Pos X	Pos Y	Rotation (deg)	Axis	LED
1	LEDIRECT 1 1	1	0	1.304	0.05	0.30	0.00	+X-Z	LED
2	LEDIRECT 1 5	5	0	1.304	0.40	0.30	0.00	+X-Z	LED
3	LEDIRECT 1 6	6	0	1.312	0.10	0.30	0.00	+X-Z	LED
4	LEDIRECT 1 7	7	0	1.315	0.75	0.30	0.00	+X-Z	LED
5	LEDIRECT 1 8	8	0	1.320	0.15	0.40	0.00	+X-Z	LED
6	LEDIRECT 1 9	9	0	1.324	0.15	0.20	0.00	+X-Z	LED
7	LEDIRECT 1 10	10	0	1.328	0.28	0.20	0.00	+X-Z	LED
8	LEDIRECT 1 11	11	0	1.332	0.10	0.20	0.00	+X-Z	LED
9	LEDIRECT 1 12	12	0	1.335	0.22	0.20	0.00	+X-Z	LED
10	LEDIRECT 1 13	13	0	1.343	0.55	0.20	0.00	+X-Z	LED

VPU Pixel Mapper View - Grid View

The grid mode shows all the options of each panel (the abstraction of fixtures and channels in the Pixel Mapper Editor) in a tabular view.

Values can also be edited here, too. To send the data via MA-Net2, select the protocol in the options of the Output and enable the Pixel Mapper Main Render flag.

A maximum of 256 universes can be send, and all 3 protocols share the same amount.



Hint:

So e.g. you can send 200 universes of MA-Net2, 20 Universes Art-Net and 36 Universes sACN. MA-Net2 is put out on Ethernet1, sACN and Art-Net are put out on Ethernet 2(on a VPU). To send the Pixel Mapper data back into the console, no additional Ethernet cable is required.

15. Creation of customized 3D Objects

3D objects can be created with 3D CAD programs. Please note, that the amount of polygons affects the performance because for each polygon the projection has to be calculated. The lower the number of polygons the better is the frame rate.

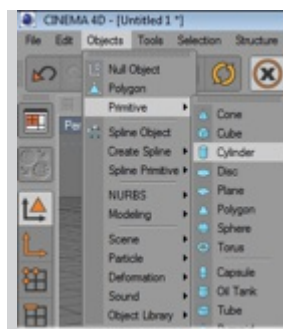
MA VPU supports the following formats for 3D objects:

- **x** - DirectX file format
- **3ds** - Format for drawing 3 dimensional objects will be supported in future

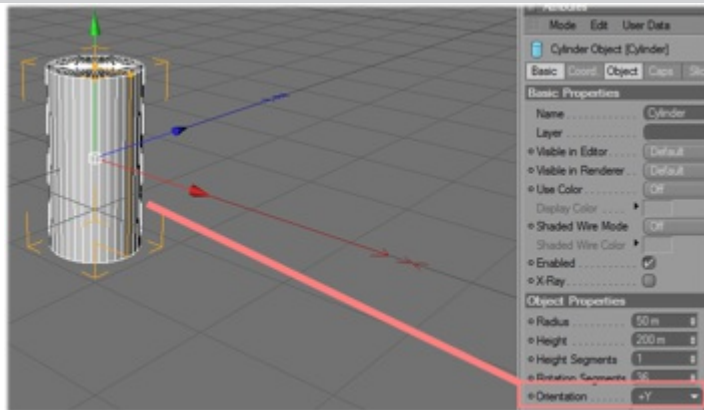
Note the following regulations:

- The orientation of the object should fit
- Normals have to be organized correctly
- UV coordinates for the textures have to be setup correctly

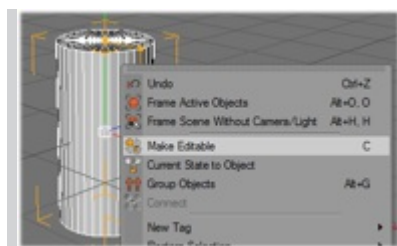
The following example shows the creation of a cylinder with the 'Cinema 4D' (Copyright by MAXON Computer GmbH) software.



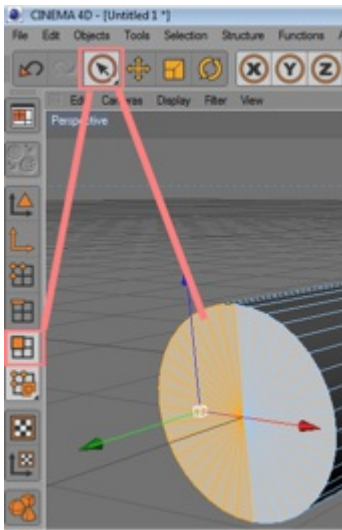
Insert an object of type 'Cylinder'



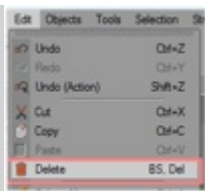
Set the orientation to 'Y+'. For a correct visualization in MA VPU Z is the depth, Y the vertical and X the horizontal axis.



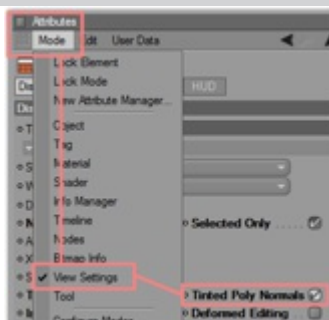
Make the object editable.



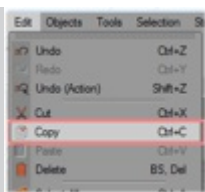
Select not used polygons...



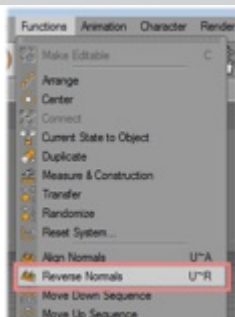
and delete them.



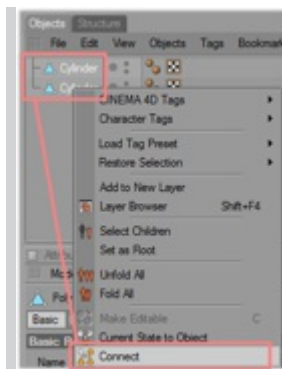
Set the visibility of normals on.



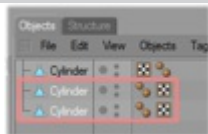
Copy the object...



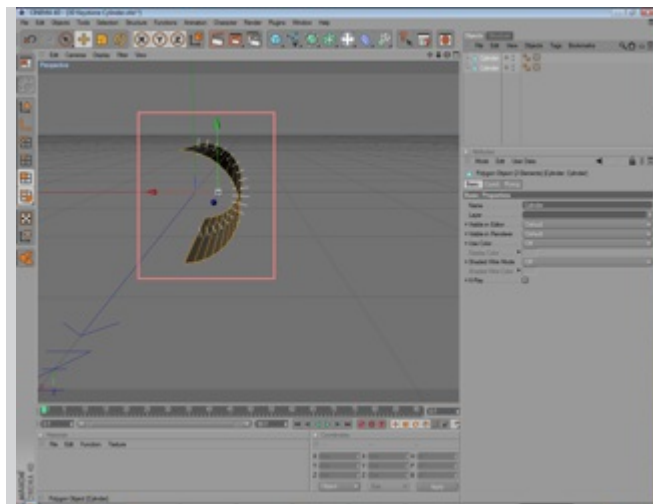
and reverse the normals of the copy.



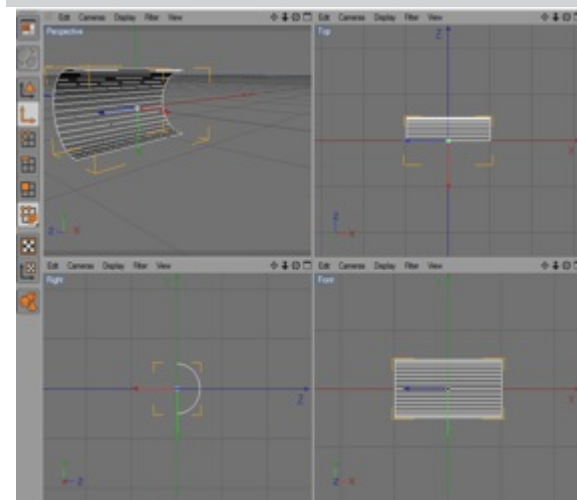
Select both cylinder objects and connect them to one new cylinder.



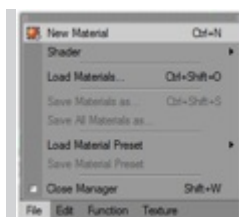
The old cylinder objects can be deleted.



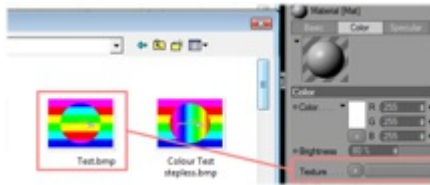
Now you can see two objects with normals in both directions.



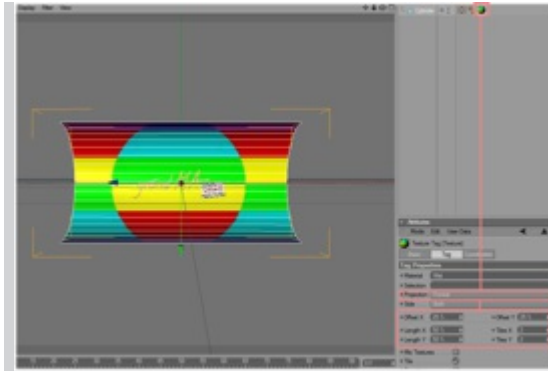
Check the orientation of the resulting object.



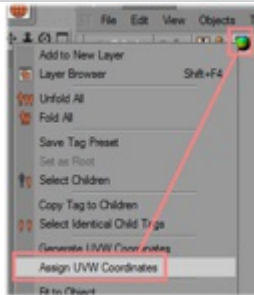
Insert a new material for the texturing.



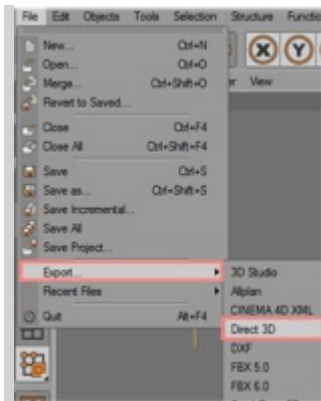
Assign an image to the texture and the material to the object.



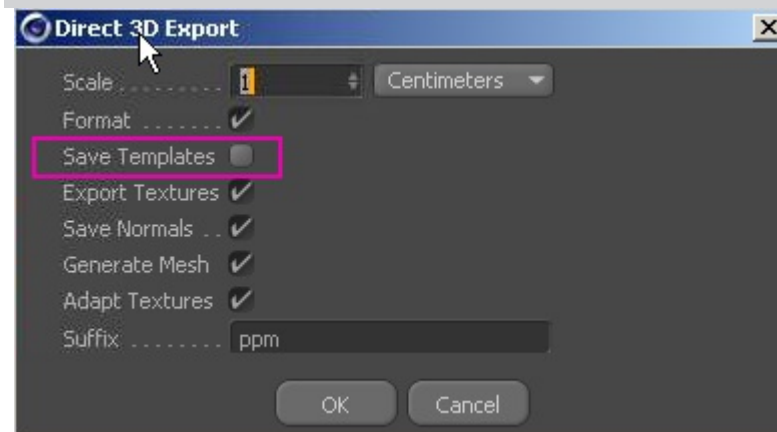
Adjust the texture mapping parameter.



Assign the UV coordinates for the texture mapping.



Export the object to Direct 3D format. Objects created in this way can be added to the Channel Set via the context menu in the '3D Objects' view with the right mouse button.



Note: At the export-options of newer releases of Cinema4D, you need to switch off "Save Templates" in order to make the 3D-object visible at the VPU.

16. Content Specifications

VPU content should require to the following specifications.

To convert video content into MPEG2 see subchapter: [Rovi TotalCode Studio for converting your content into MPEG2](#)

To convert video content into HAP see subchapter: [Hap Content Converter](#)

Video content requirements format 'MPEG':

'MPEG' Video requirements	
Video codec	MPEG-2
Bit rate	Constant Bit Rate (CBR) 10 - 30 Mbps (Mega bit per Second), Variable Bit Rate (VBR) (1)
Frame rate	24 fps, 25 fps, 29,97 fps, 30 fps, 50 fps, 60 fps (2)
GOP-Structure (Group of pictures)	GOP 12, I-Frame only (3)
Container format	Program Stream (with sound) or Elementary Stream (without sound)
Audio stream	LPCM (uncompressed, 48 kHz, 16 Bit) or MPEG-1 Layer 2 (48 kHz, 384 kbps)
Color space / Chroma format	4:2:0
File extension video	.mpg, .mpeg, .m2v, .mpv (4)
Pixel aspect ratio	1:1

(1) Please note that VBR is also possible but prevents frame-exact playback from first to last frame. We strongly recommend CBR. Please also note that the bit rate heavily depends on the resolution of your video clip and on the content itself (e.g. lots of signal changes) !!! Using variable bit rate (VBR) causes loop problems, so please use constant bit rate (CBR)!!!

(2) Please note that frame rates above 30 fps are extremely resource-consuming and will decrease the performance. Use these high frame rates only for specific reason.

(3) GOP 12 is possible for simple playback without jumping within the frames (indexing). The more B- and P-frames are used the higher the compression, the smaller the file size. I-frames only is also possible but increases the data rate.

(4) Files with a leading "." e.g. "._test.mpeg" are ignored by the VPU software because these files are created by the MAC OSX operating system.

General notes:

Program Stream => contains video and audio files, typical file extension .mpg

Elementary Stream => contains video or audio files, file extension .mpv for video data and.mpa for audio data.

File names must not exceed 63 characters.

Please keep in mind: Aggressive compression (reducing the bit rate) causes loss of quality. The less signal changes and information the video sequence contains, the more you might go down with the bit rate without necessarily

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having visible artefacts. Compression artefacts: Loss of edge clarity, tone fuzziness, blocking / contouring artefacts.

Recommended bit rates

Resolution	4:3	16:9	Bit rate
PAL	720x576		10-20 Mbps
NTSC	720x480		10-20 Mbps
VGA	640x480		10-20 Mbps
SVGA	800x600		10-20 Mbps
XGA	1024x768		15-20 Mbps
HD 720p		1280x720	15-20 Mbps
HD 1080p		1920x1080	20-30 Mbps



About MPEG-2

MPEG stands for “Moving Pictures Expert Group” who created a couple of international standards. An important one is the MPEG-1/2 (ISO/IEC 13818-part x) standard which will be used for the MA VPU. As opposed to MPEG-4 this standard keeps a good balance between file size and calculation power that is needed to decode the video information.

The MPEG-2 standard allows a couple of settings which will highly influence the quality of the picture and the way the VPU handles this data. They are defined to be able to run several resolutions like full HD for example. That influences also the bit rate which can vary from approx. 3 to over 80 Mbit/s.

The higher the bit rates the more workload for the CPU, RAM and so on. Because of that MA Lighting choose settings that form a good compromise between bit rate and resulting frame rate.

To gain safe and proper performance with the VPU, we strongly encourage encoding any content as described here.

Non-linear video editing systems and compositing tools such as Avid Composer / Adobe Premiere Pro / Adobe After Effects / Final Cut Pro do also feature high quality MPEG-2 encoding tools that are very versatile and produce MPEG-2 conform content.

However: you have to test this content with the VPU for correct and stable performance before doing a production with this content.

If you do not know the origin and quality of the MPEG-2 encodings of your content, we strongly encourage you to re-encode the complete material even if you are afraid of slightly visible artefacts.

If you want to gain the best quality, use un-encoded raw video and audio material as the source.

Since Main Concept Reference can be downloaded for free to do test encodings (watermark is inserted into the video and audio is cut off after 30 seconds in the trial version), you can also use that tool to check your content by re-encoding it in case of problems related to content issues.

You cannot gain high performance of parallel video stream decoding with guaranteed performance with not conforming and correct encoded content.

Video content requirements format 'HAP':

Hap for Direct Show Codec

This codec is available only for Windows. It creates a Hap video file inside an avi-container.

Link: <http://renderheads.com/product/hap-for-directshow/>



Important:

We strongly recommend to use the Hap for Direct Show Codec Version 1.0.10. Video files created with other versions of the Hap for Direct Show Codec maybe can't be played back.

'HAP' Video requirements

Supported formats	Hap1, HapQ, HapAlpha
Frame rate	24 fps, 25fps, 29,97 fps, 30fps, 50 fps, 60 fps (2)
Bit rate	Variable Bit Rate (VBR) (3)
Maximum resolution	depends on MA VPU hardware: – using a MA VPU MK2 the maximum resolution is 7680 x 4320 (5)
File extension video	.avi
Aspect ratio:	Pixel 1:1

Hap for Quicktime Codec

This codec is available for OSX and Windows. It creates a Hap video file inside a mov-container (1).

Link: <https://github.com/Vidvox/hap-qt-codec/releases>



Important:

We strongly recommend to use the Hap for Quicktime Codec Version 8. Video files created with other versions of the Hap for Quicktime Codec maybe can't be played back.

'HAP for Quicktime' Video requirements

Supported formats	Hap1, HapQ, HapAlpha
Frame rate	24 fps, 25fps, 29,97 fps, 30fps, 50 fps, 60 fps (2)
Bit rate	Variable Bit Rate (VBR) (3)
Maximum resolution	3840 x 2160 (4)(5)
File extension video	.mov
Aspect ratio:	Pixel 1:1

1. Hap video files inside a mov-container can only be played back, if the installation of additional 3rd party codecs was accepted at the EULA-prompt of the MA VPU.
2. Please note that frame rates above 30 fps are extremely resource-consuming and will decrease the performance. Use these high frame rates only for specific reason.
3. The encoders do not support to set a bit rate in Mbit/s by user. The bit rate is set automatic and depends on the content of the video file.
4. Hap for Quicktime encoder does not support higher resolutions. If you need to encode a video clip with a higher resolution, we recommend to use the Hap for Direct Show codec.

- Resolution of width as well as height of a Hap video file needs to be divisible by 4. File names must not exceed 63 characters!



Hint:

Hap1: Good quality, higher compression, smaller files, higher CPU load (but less compared to MPEG-2), less hard disk load.

HapQ: Best quality, lower compression, bigger files, less CPU load, higher hard disk load.

HapAlpha: Hap1 with support of alpha channel.

Video content requirements for images:

Images

Image format	File extension
Bitmap	.BMP
Portable Network Graphics	.PNG
Graphics Interchange Format	.GIF
Joint Photographic Experts Group	.JPEG, .JPG, .TGA

Uncompressed images have to be in RGB 24bit/ 32bit colour space. CMY is not supported. We recommend 32 bit .png for alpha channel support. Max. 8192 x 8192 resolution for still images.

Audio content requirements:

Audio

Audio format	File extension
16Bit 44,1kHz / 48kHz Stereo PCM	.WAV
32-320kbps 44,1kHz / 48kHz MPEG-1 Layer 3 (MP3) Stereo	.MP3

3D Objects content requirements:

3D Objects

3D Object format	File extension
DirectX	.X

16.1. Rovi Total CodeStudio for converting your content into MPEG2

To convert your content (e.g. *.avi or *.mov) into the MA VPU conform MPEG2 format, we recommend to use the Rovi TotalCode Studio transcoding tool.

The free demo version of the application can be downloaded at the Rovi homepage: <http://www.rovicorp.com>

The demo version is fully functional, though it adds a watermark to processed video (without harming your source material). Moreover, it has an AAC Audio encoding limitation of 30 seconds. Then audio output is cut. When you are interested in obtaining the full version, you have to contact Rovi to obtain a license for the software. Unlike the

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previous version of the software, Main Concept Reference, you can only buy the complete version. The purchase of single codecs is not supported any more. The documentation of Rovi TotalCode Studio is included in the demo version. Press F1 on your Keyboard to open it. An Adobe PDF Reader has to be installed.

A Preset File created by MA Lighting is available in the download section for the Rovi TotalCode Studio software, that does cover the most important applications. It is labelled "MA_VPU_Rovi_TotalCode_Studio_Presets_V*.mps". Please note that this is not pre-installed on the VPU.

How to use Presets in Rovi TotalCode Studio:

MA Lighting provides the most important presets to convert video and audio content in Rovi TotalCode Studio. These presets cover the most important applications. The next passage will cover how to import and use these presets. If the presets do not cover the needed purpose, the user can load and adjust the settings. These settings also regard to explanations in the [Chapter Content Specifications](#)

The preset files can be categorized in Program Stream (Video and Sound are within the encoded file) and Elementary Stream (only Video is encoded). So each preset has a _PS (Program Stream) or _ES ending.

The following Resolutions are selectable from the list:

FramerateResolution [Pixel]PAL25fps720x576NTSC29.97fps720x480VGA 25 / 30fps640x480SVGA25 / 30fps800x600XGA25 / 30 fps1024x768HD720p25 / 30 fps1280x720HD1080p25 / 30 fps1920x1080

Description	Framerate	Resolution [Pixel]
PAL	25 fps	720x576
NTSC	29.97 fps	720x480
VGA	25/30 fps	640x480
SVGA	25/30 fps	800x600
XGA	25/30 fps	1024x768
HD720p	25/30 fps	1280x720
HD1080p	25/30 fps	1920x1080

E.g. selecting the preset „MA_VPU_XGA_30fps_15MBits_PS“ means:

Resolution XGA: 800x600 Pixel

Frame Rate: 30fps progressive

Bitrate: 15 Mega Bit per Second

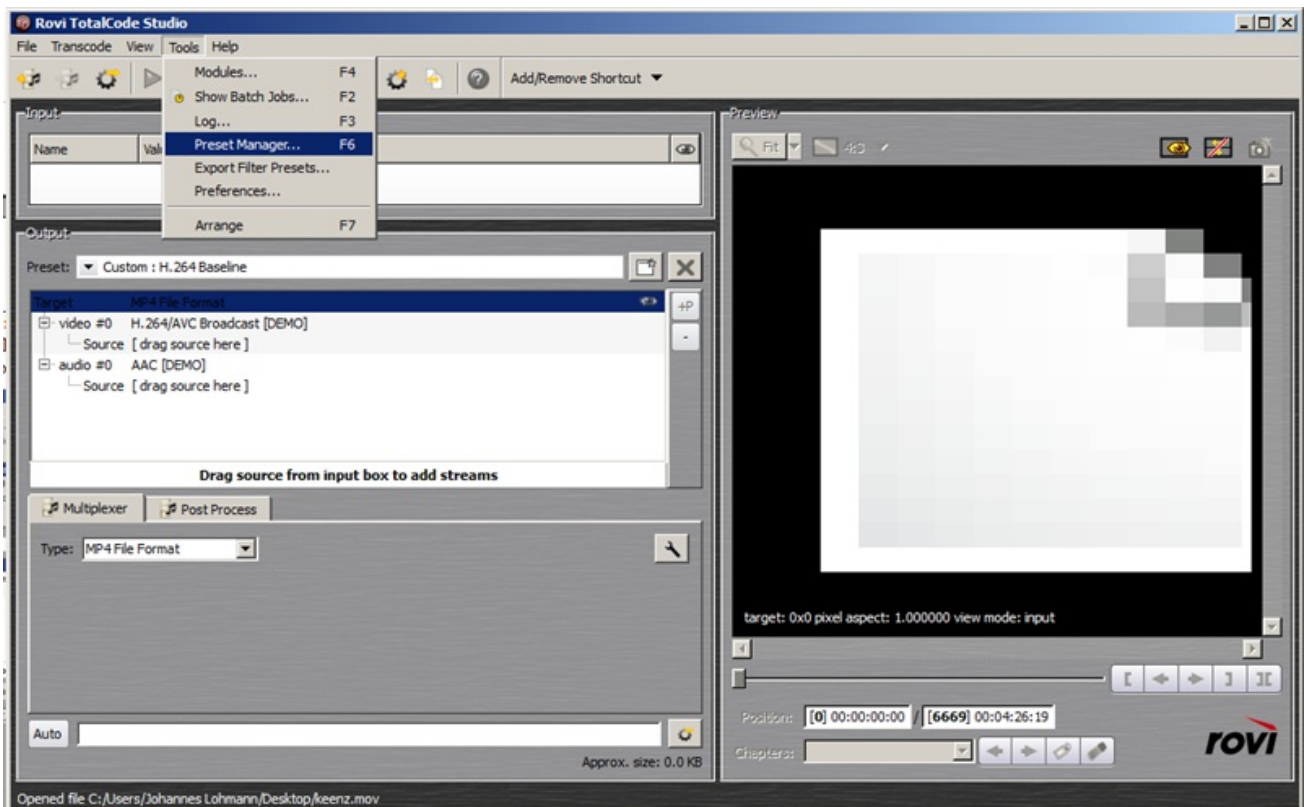
Stream Type: Program Stream

Use of the MA Presets in Rovi TotalCode Studio:

1. Start Rovi TotalCode Studio
2. Click on Tools / Preset Manager or Press F6 on your keyboard

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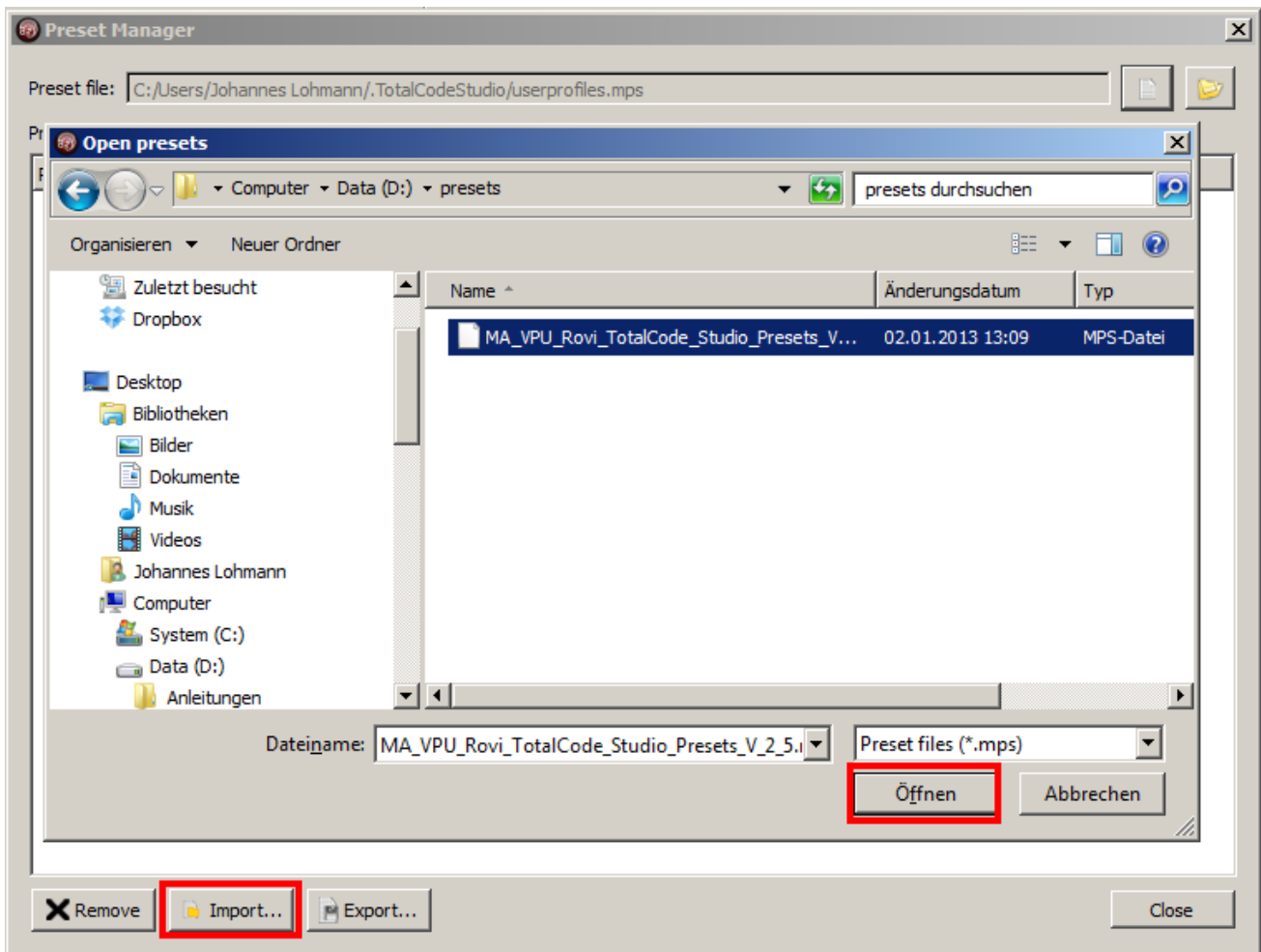
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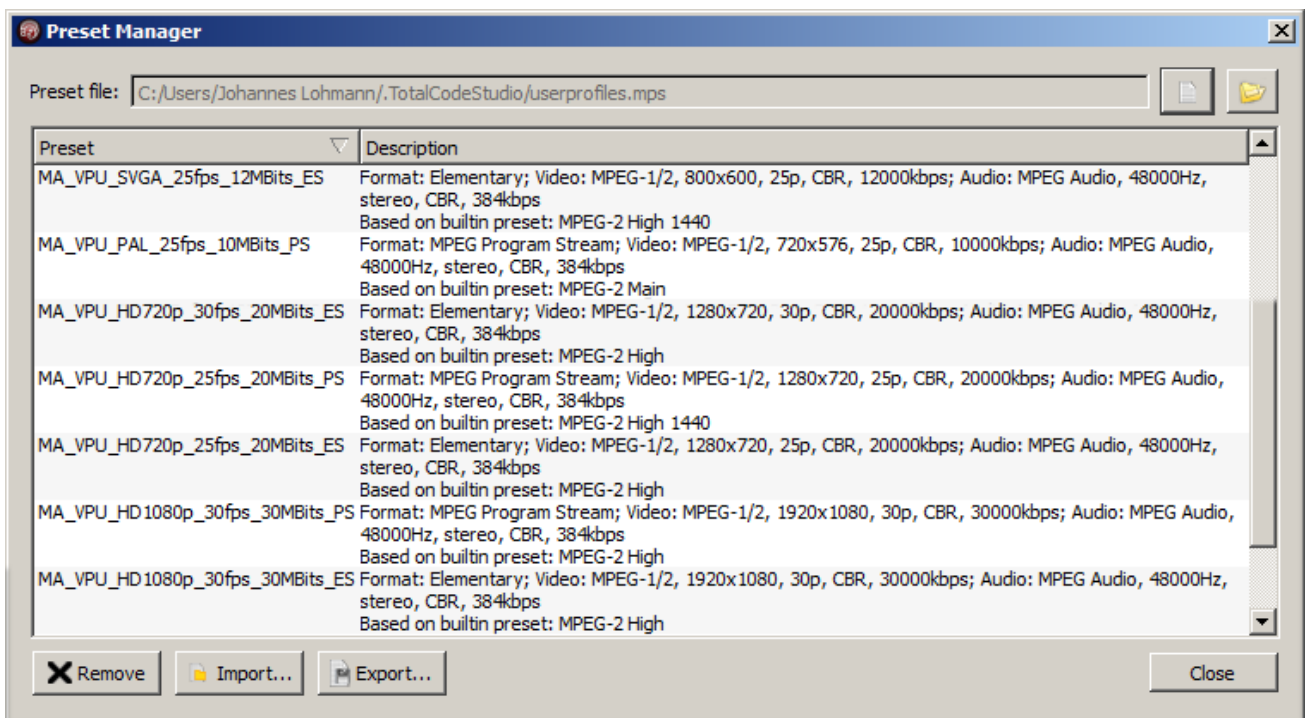
3. Import the file „MA_VPU_Rovi_TotalCode_Studio_Presets_V_2_5"

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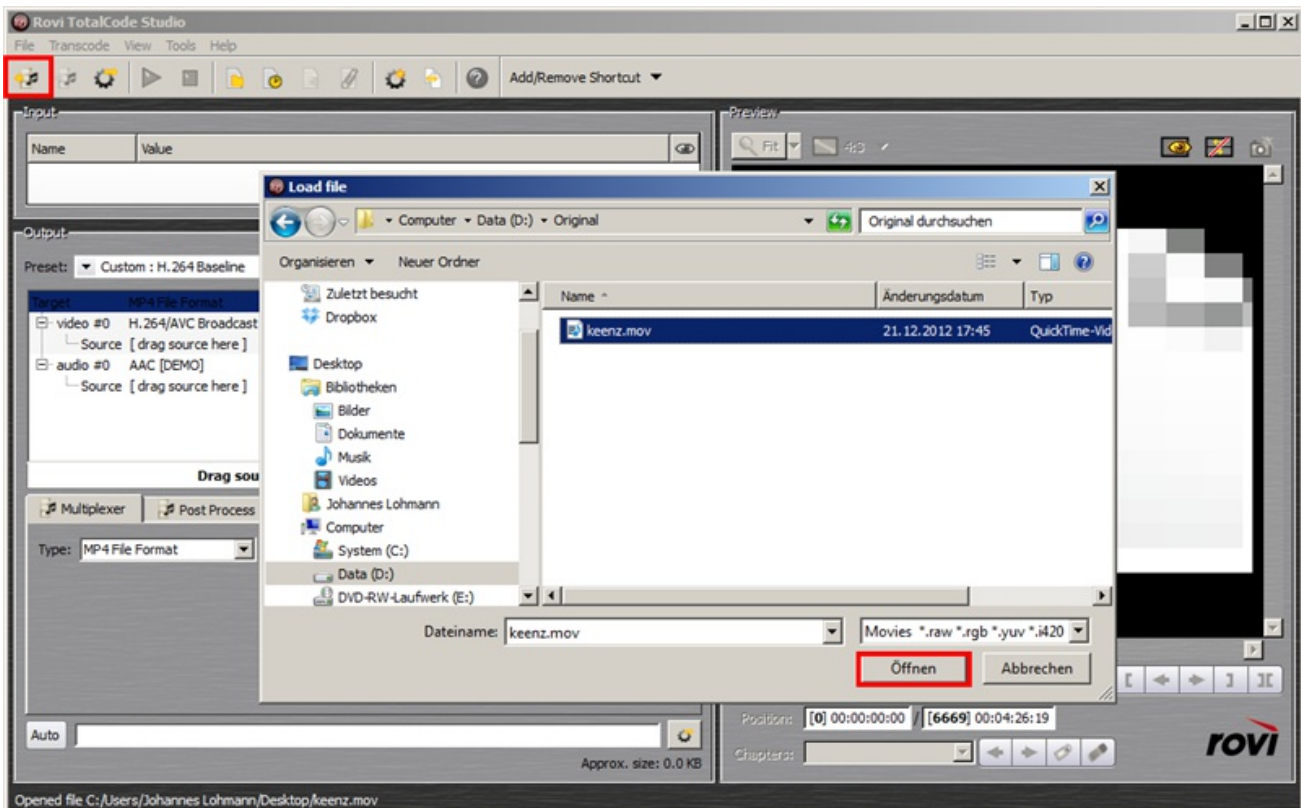
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4. All presets are now listed in the Preset Manager



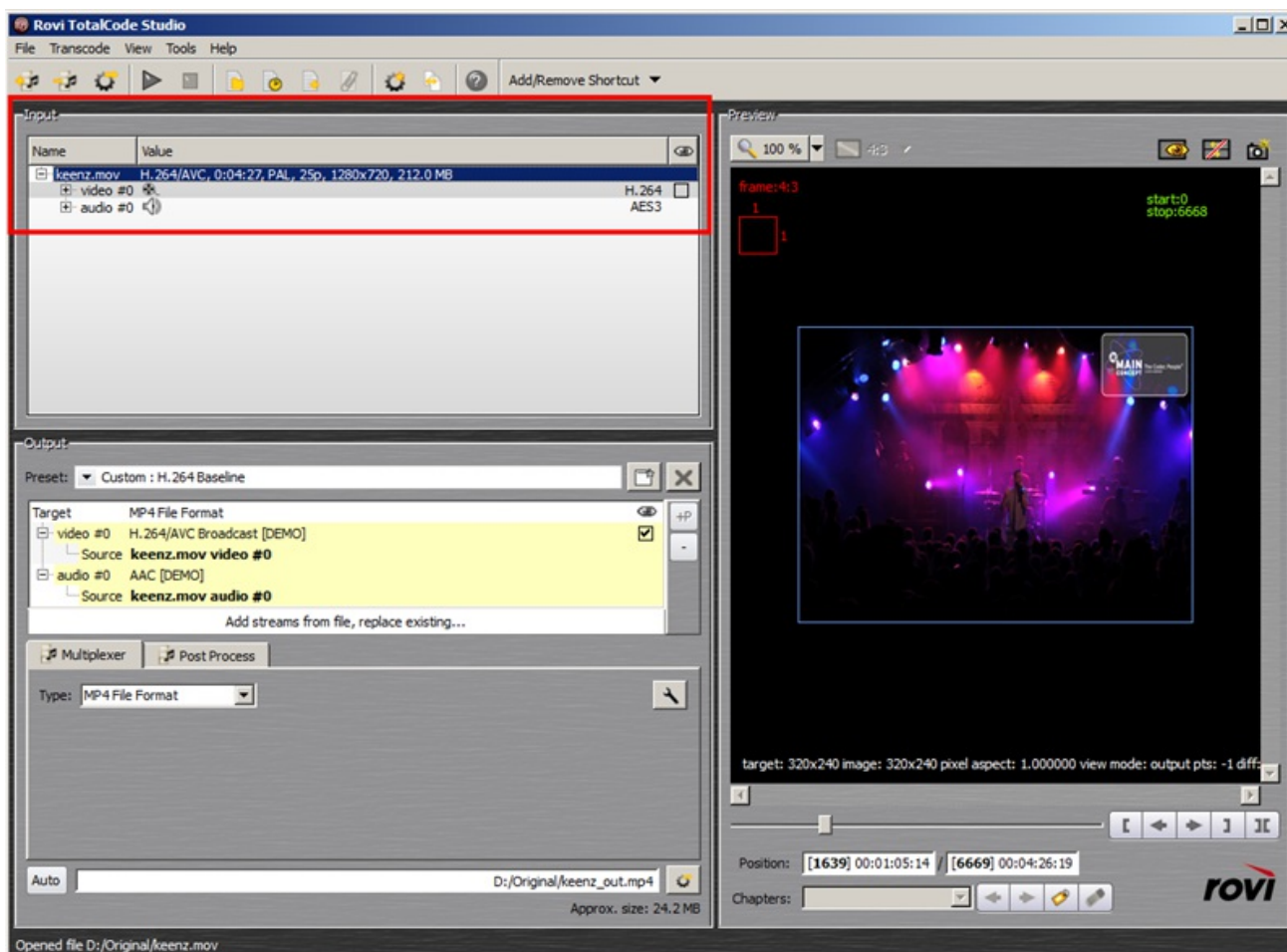
5. Open Media, load the video file you want to transcode from your hard drive



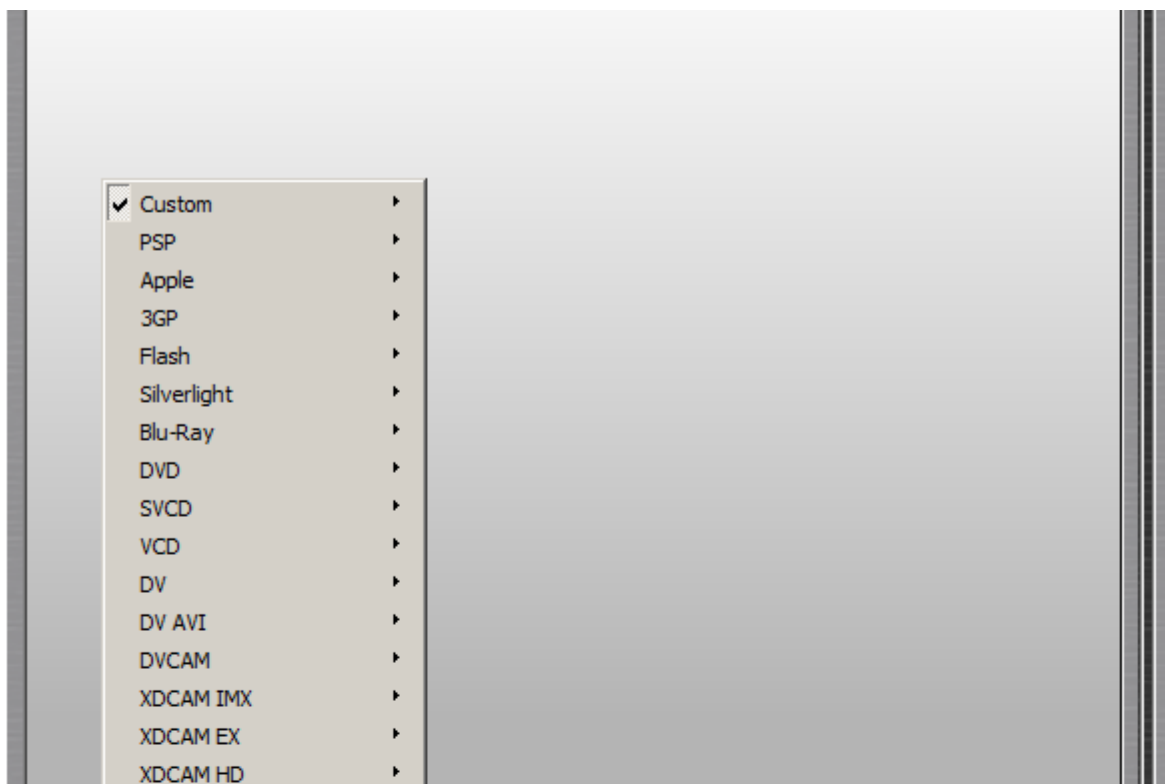
6. Drag the File Container of that file in the lower (output) part to assign it the encoder

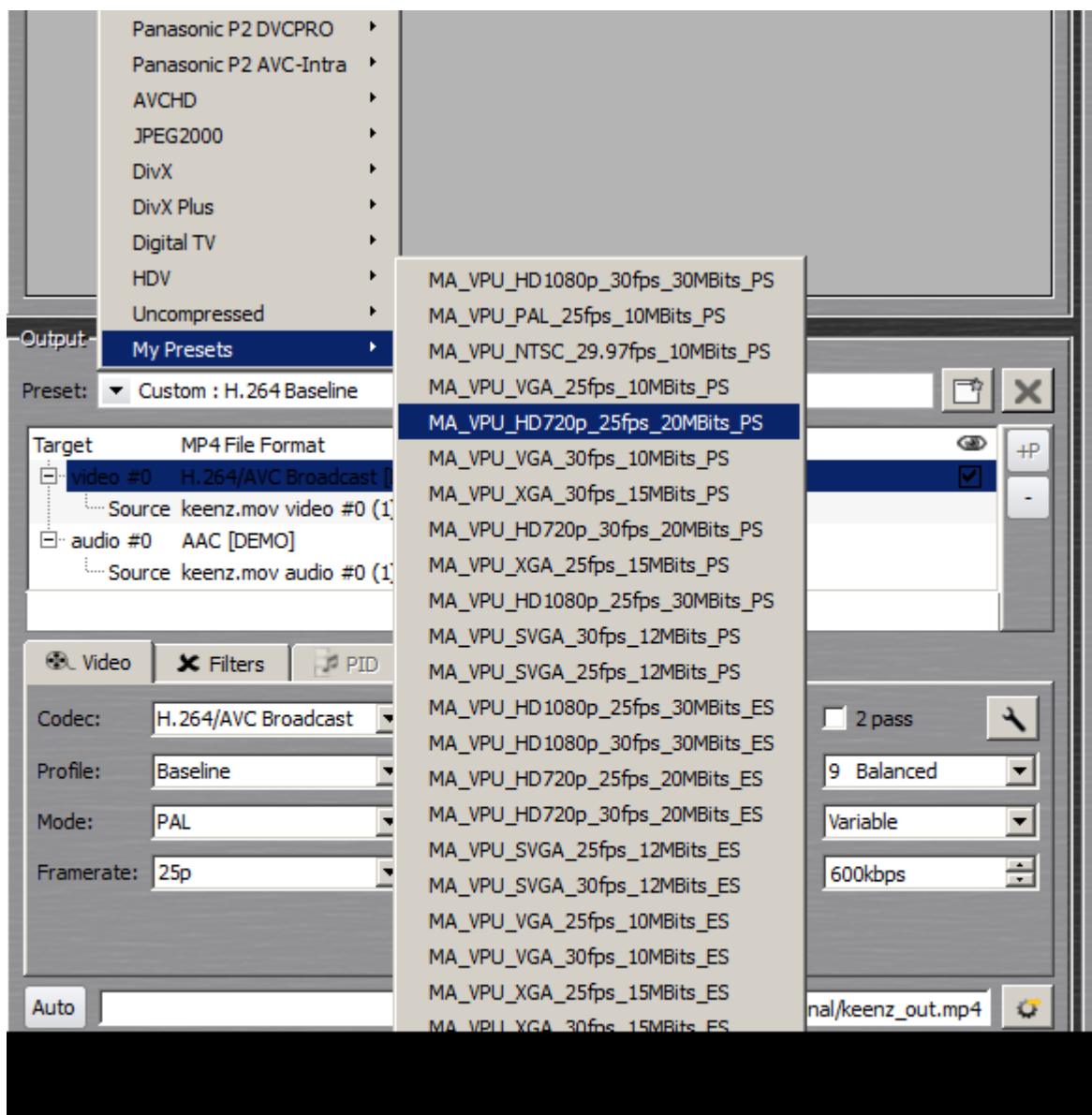
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7. Select the corresponding Preset that fits the original file properties



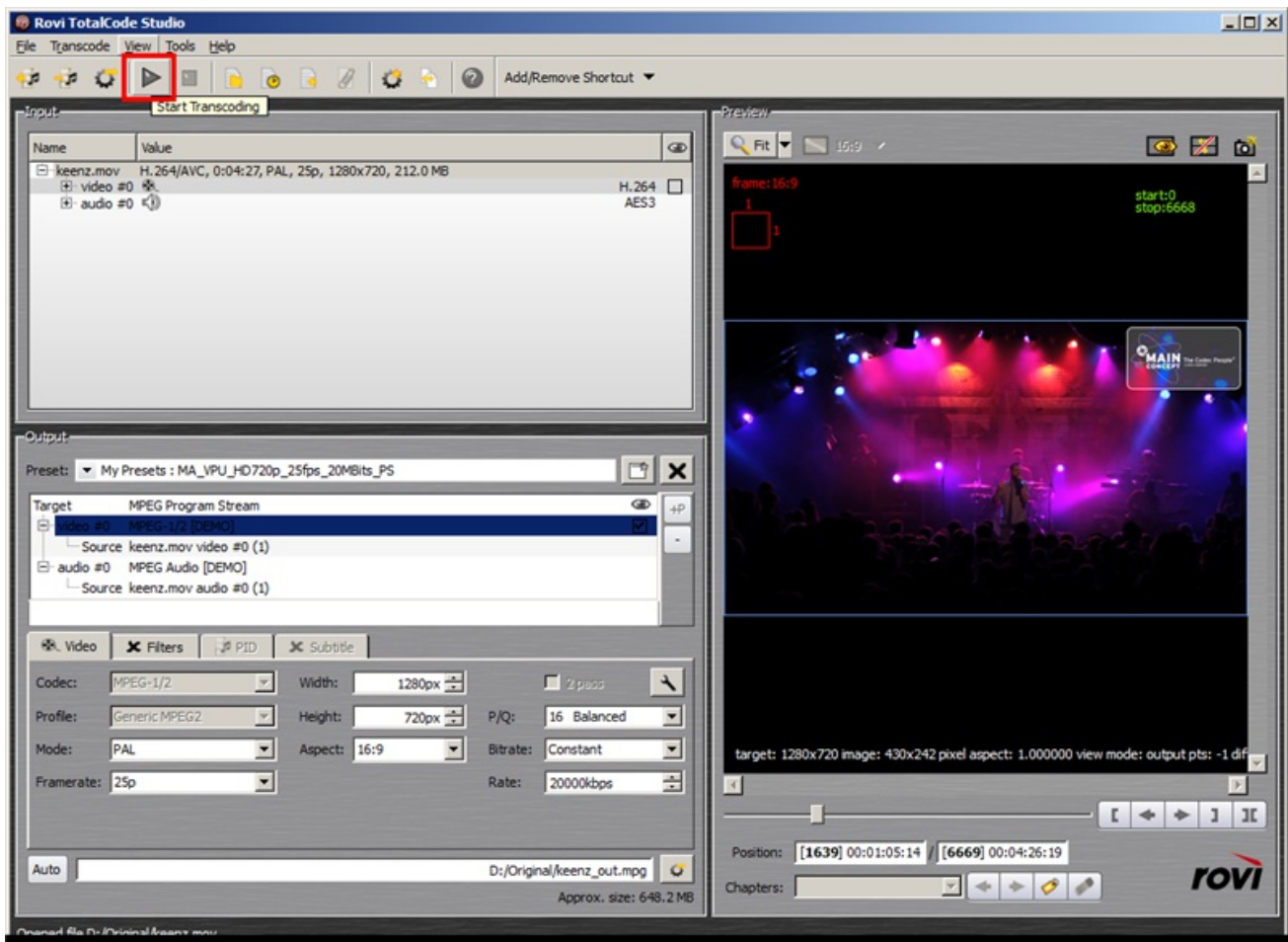


8. Check if the settings are corresponding to your input format and that they match your wanted output format. If necessary adjust the resolution or framerate

9. Set name and location of the Output File (transcoded clip)



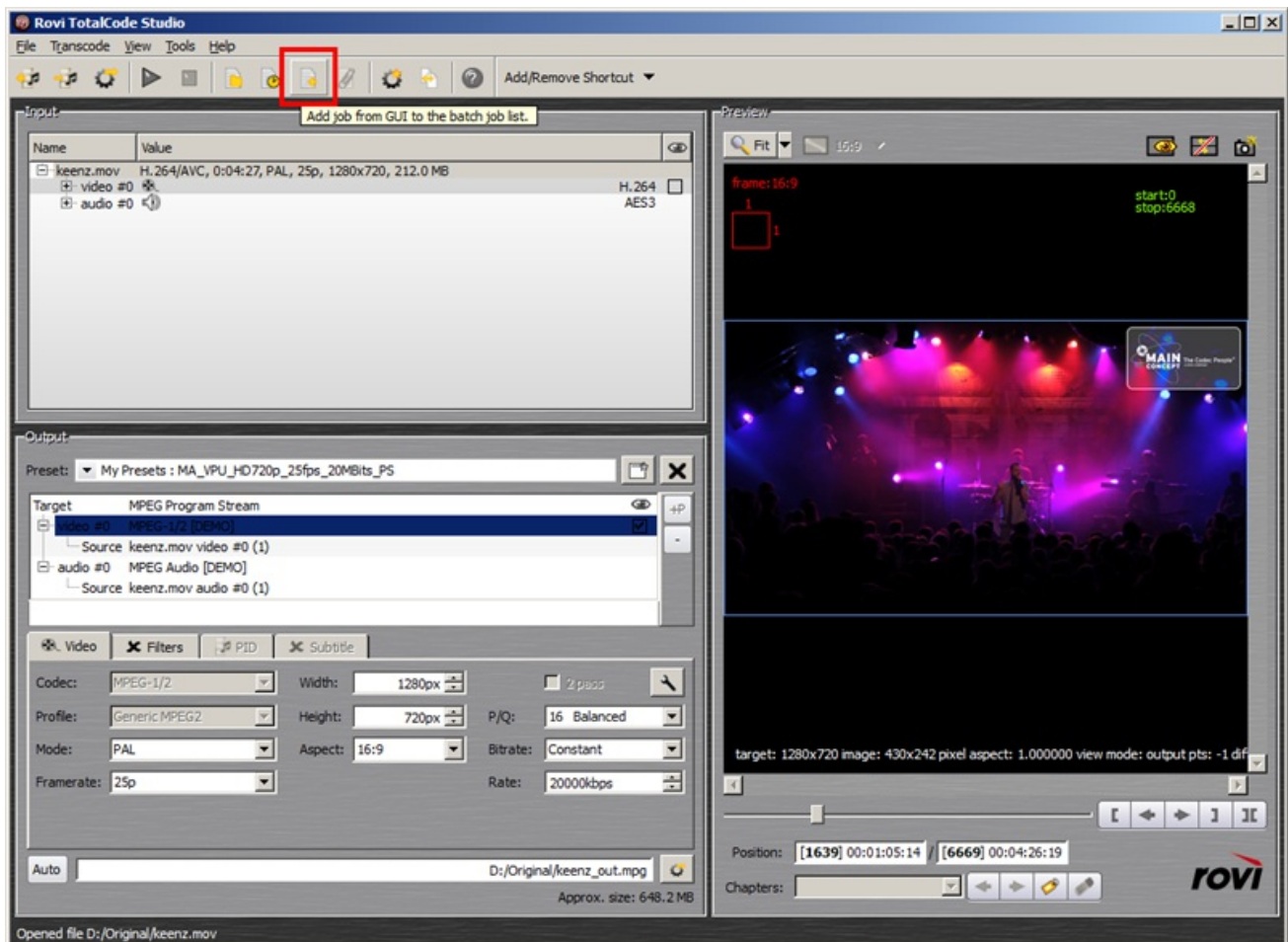
10. Start Transcoding by pressing the Play button



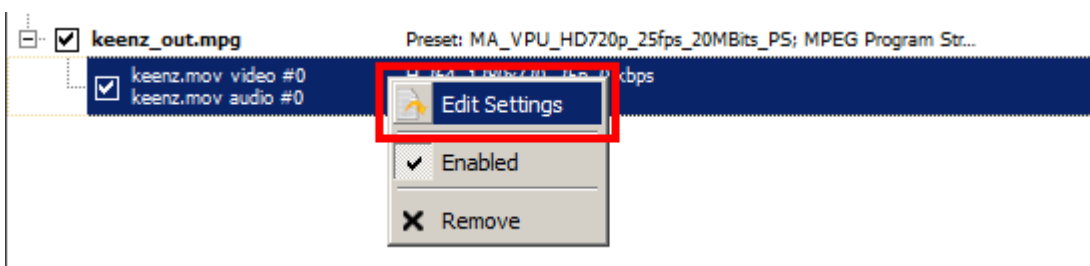
Rovi Totalcode Studio does allow several methods to automatically encode videos. This will be the batch converter and the watch folder. We will now go deeper into the batch converter. The watch folder is explained in the Totalcode Studio manual.

Batch conversion in Roi Total Code

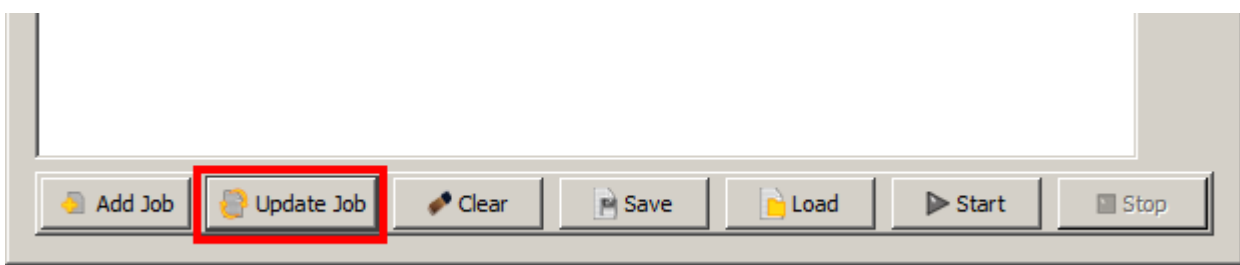
1. If you have already imported and assigned a video to be transcoded as described before, you can add this job to a queue. Simply press the „add to batch job list“ button



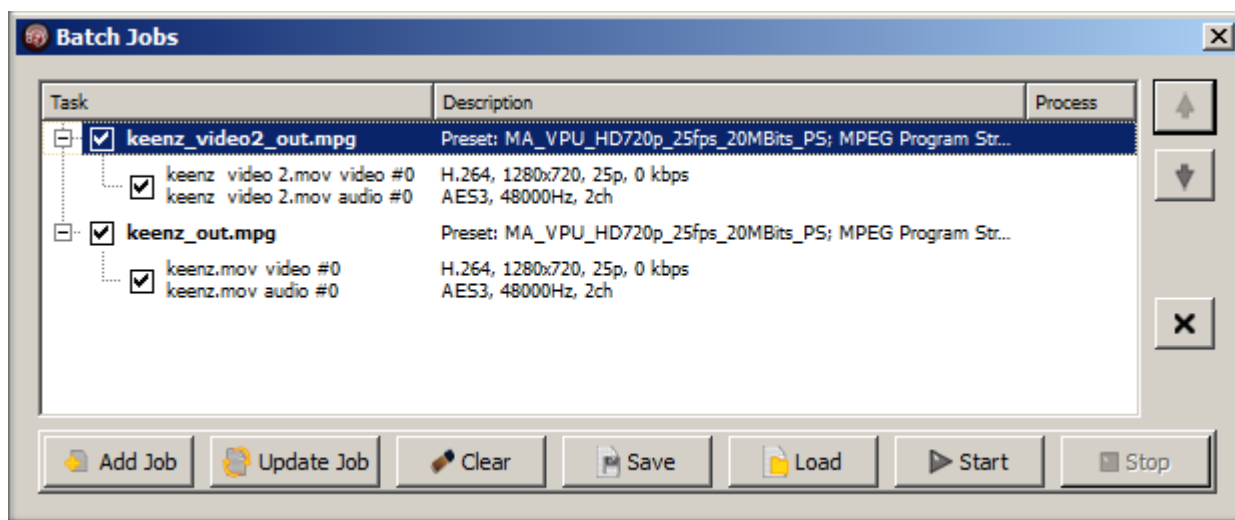
2. If needed, entries in the batch list can be selected and edited again in the main window of the application by using a right click on the entry and then selecting „Edit Settings “



3. When all settings are adjusted, use the function „Update Job“ in the Batch Window to update the batch list entry



4. When all files are set into the batch list, press the „Start“ button to activate the process



16.2. Hap Content Converter

Hap is a video codec for fast decompression on modern graphics hardware.

The Hap codec project is open-source, licensed under a [FreeBSD License](#). This project was originally written by [Tom Butterworth](#) and commissioned by [VIDVOX](#), 2012.

Instead of using the CPU to decode video frames, Hap passes compressed image data directly to the graphics card to perform hardware accelerated decompression of movies during playback. By shifting this burden from your CPU to the GPU, Hap makes it both possible to use more movies and work at higher resolutions than typical CPU-bound codecs.

There are three different Hap codecs to choose from:

- **Hap 1** offers the lowest data rates for playing back the most clips at a time
- **Hap Alpha** is similar to Hap 1 with support for transparency
- **Hap Q** offers improved image quality at a higher data rate

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VPU offers the possibility to convert content directly from many formats to Hap. Therefore the build in 'Hap Converter' is used:

The screenshot shows the 'Hap Converter' window with two tabs: 'Options & Browser' and 'Jobqueue'. The 'Options & Browser' tab is active, displaying 'Selected Content State' and 'Hap Conversion Options'.

Selected Content State:

- Item Count: 4
- Filename: Multiselection
- Content Type: Video Clip
- Graph Type: Mpeg
- Format: (empty)
- Resolution: (empty)
- Length [s]: (empty)
- FpS: (empty)

Hap Conversion Options:

- Buttons: Autoconvert new Content, Delete Source after Conversion, Compress, Overwrite
- Format: Auto (dropdown)
- Change Resolution: (button)
- Keep Ratio: (button)
- Width: 1920
- Height: 1080
- Start Conversion: (button)

File List:

Filename	Date
..	
MA_VPU_Content_Logo_720x576@25.mpg	01/27/16
MA_VPU_Content_Logo_1280x720@25fps.mpg	01/27/16
MA_VPU_Content_Logo_1920x1080@25fps.mpg	01/27/16
MA_VPU_Test_Logo_720x480@30.mpg	01/27/16
MA_VPU_Test_Logo_1280x720@30.mpg	01/27/16
MA_VPU_Test_Logo_1920x1080@30.mpg	01/27/16

The upper part describes the settings of the Hap converter.

Workflow:

- Browse to the source directory
- Select the files to be converted to Hap codec in the lower part. Multiselection is possible
- Press 'Start conversion' button
- You can also convert video clips that are part of your show. Select the channel sets at the content editor and press the 'Start conversion' button.

Hap Conversion Options:

Autoconvert new Content

If new content is added it always will be converted into Hap codec.

Hap Converter Jobqueue:

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Compress

Compress the Hap format internal with dynamic bit rate. If compress is 'off' you get a constant bit rate but larger files.

Delete Source after Conversion

The source files will be deleted after the successfully conversion into Hap format.

Overwrite

Overwrites an already existing item

Format

Auto

Auto

Hap 1

Hap Alpha

Hap Q

Select the codec type:

- **Auto** converts a non Hap clip to Hap 1. If a Hap clip inside an avi-container is selected, the format of the Hap clip (e.g. Hap Q) will maintained unchanged.

- **Hap 1** offers the lowest data rates for playing back the most clips at a time

- **Hap Alpha** is similar to Hap with support for transparency

- **Hap Q** offers improved image quality at a higher data rate

Change Resolution

Keep Ratio

Width

1920

Height

1080

You can change the resolution of the converted video. To keep the aspect ratio select the 'Keep Ratio' button and enter either the width or height.

Note: Be aware that if you have changed the resolution the original cannot be restored!

By pressing this button the selected files are copied into the Jobque and the conversion process starts.

Start Conversion

Hap Converter

Options & Browser

Actual Job from Hap C

Filename

Path

Format

Length [h:m:s:ms]

Progress

Pending Convert Jobs

Pause

Idx	Filename
1	MA_VPU_Test
2	MA_VPU_Test
3	MA_VPU_Test

Clip / Image

- MA_VPU_Test_Lo
- MA_VPU_Test_Lo
- MA_VPU_Test_Lo
- MA_VPU_Content

17. Warnings

SEIZURE WARNING

Some people (about 1 in 4000) may have seizures or blackouts triggered by light flashes or patterns, such as while watching TV or playing video games, even if they have never had a seizure before.

Anyone who has had a seizure, loss of awareness, or other symptom linked to an epileptic condition should consult a doctor before working with the application.

Parents should look after their children while using the program. Stop working immediately and consult a doctor if you or your child has any of the following symptoms: **Convulsions, Eye or muscle twitching, Loss of awareness, Altered vision, Involuntary movements, Disorientation.**

TO REDUCE THE LIKELIHOOD OF A SEIZURE WHEN WORKING WITH THE PROGRAM:

1. Sit or stand as far from the screen as possible.
2. Use the smallest available screen.
3. Do not work if you are tired or need sleep.
4. Work in a well-lit room.
5. Take a 10 to 15 minute break every hour.

REPETITIVE MOTION INJURIES WARNING

Working with the application can make your muscles, joints or skin hurt after a few hours. Follow these instructions to avoid problems such as Tendonitis, Carpal Tunnel Syndrome or skin irritation:

Take a 10 to 15 minute break every hour, even if you don't think you need it.

If your hands, wrists or arms become tired or sore while working, stop and rest them for several hours before working again.

If you continue to have sore hands, wrists or arms during or after work, stop working and see a doctor.

18. Keyboard Shortcuts

View	Key	Function
Preview/Fullscreen	Alt + Enter	Fullscreen / Windowed Mode (only dongle users)
	Shift + Enter	GUI on/off (Graphical User Interface on / off)
	Shift + Mouse	Rotation of the selected objects
	Shift + Ctrl + Mouse	Rotation of the selected objects around their centre
Content Editor	Ctrl + X	Cut
	Ctrl + C	Copy
	Ctrl + V	Paste
	Del	Delete
Warper	Ctrl + Enter	Toggle Warper GUI
	Ctrl + Z	Undo
	Ctrl + Y	Redo
	Del	Delete faces
	M	Move
	R	Rotate
	S	Scale
	Shift or Ctrl	Increase or decrease the resolution while mouse movement
	U	UV Mode
	V	Edit Vertex
Pixel Mapper	Arrow Key	If a panel is selected in the Graphical View it can be moved
	Arrow Key + Ctrl	Move panel by 1/10 grid
	Ctrl + C	Copy
	Ctrl + V	Paste
	Right mouse in grid cell	Opens onscreen Keyboard if no real keyboard is connected
Startup	F 11 (# < 87) F12 (# >= 87)	Acronis software starts for backup purposes (Not for dongle users of former grand MA video)
All	Print	Take a screenshot

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19. Supplement MA Lighting

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19.1. Intended use

The MA VPU (Video Processing Unit) is an element of the MA system family. Intended use is output of audio and video via DVI, Art-Net or sACN. Three different versions of the MA VPU are available to suit all needs: MA VPU plus, MA VPU basic and MA VPU light.

With a huge amount of functions, features and effects together with any console of the grandMA family these will be the most innovative tool available to control visual effects independent of the type of fixtures needing control.



Video processing unit

Manufacturer:

MA Lighting Technology GmbH

Dachdeckerstraße 16

D - 97297 Waldbüttelbrunn

Germany

19.2. Data

VPU	
plus	Dimensions: 485 x 211 x 627 mm / 19.1 x 8.3 x 24.7 inch 5 Height Units / 5 HE (for rack installation)
+	
basic	Weight: 15,0 kg / 33 lbs + 0,8kg / 1.7 lbs screen protector (only for transport)
light	Dimensions: 19" / 483mm (Front cover) respectively. 15.9" / 403mm (only the casing) x 3.5" / 88,1mm (2 Rack units / Rack mount space) x 16.4" / 416mm (incl. handle)
	Weight: 6,1 kg (13.5 pounds) + screen protector (only for transport)

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Voltage:

230 V ~ 50Hz

120 V ~ 60 Hz (USA, Canada)

No switching necessary!

Cable type:

Only adequately protected cables may be used (min. Ø 3 x 1,0mm²)

(Power supply cable and connector not included ex works)

Socket type Power In:

PowerCon (blue) by NEUTRIK AG, Liechtenstein

Socket type Power Out: (only VPU plus + VPU basic)

PowerCon (grey) by NEUTRIK AG, Liechtenstein

ATTENTION!



Important:

The total current power consumption of the units connected in series must not exceed the maximum of the power source!

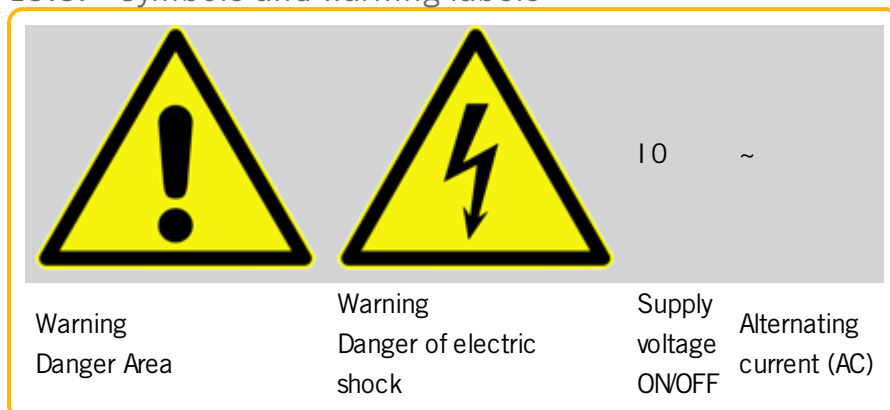
Rated Power Consumption:

VPU plus: max. 400 VA

VPU basic: max. 300 VA

VPU light: max. 200 VA

19.3. Symbols and warning labels



19.4. LIMITATIONS

The screens of grandMA2 series and other units of the new generation are subject to conditions of failure class 2. Following items are acceptable and no reason to worry:

ITEMS:	ACCEPTABLE COUNTS:
Permanent bright dots	max 2 (minimum distance between bright dots \geq 15mm)
2 dots adjacent permanent bright	max 1
Permanent dark dots	max 5 (minimum distance between dark dots \geq 15mm)
2 dots adjacent permanent dark	max 1
Total bright and dark dots	max 5

19.5. Transport

Please be aware of the weight of the product. Be careful when moving it; otherwise you may injure your back or other parts of your body.

Video processing unit (VPU plus + basic) approx. 15 kg (+ 0,8 kg transport protector)

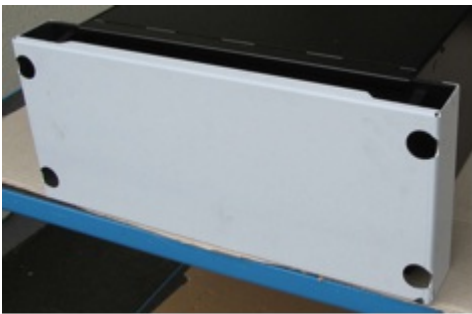
Video processing unit (VPU light) approx. 6,1 kg / 13.5 pounds

Secure all covers prior to transport. Remove all cables on the back cover and the USB connectors on the front panel.

Handles on the products are designed exclusively for personnel to hold or carry the product. It is therefore not permissible to use handles for fastening the product to or on means of transport such as cranes, fork lifts, wagons, etc. The user is responsible for securely fastening the products to or on the means of transport and for observing the safety regulations of the manufacturer of the means of transport. Noncompliance can result in personal injury or material damage.

Use original MA-Case for transport and storage or comparable transport device.

If the front of the VPU cannot be protected with a transport case, install the protection cover.



VPU plus with protection cover

Do not place the unit on surfaces, vehicles, cabinets or tables that for reasons of weight or stability are unsuitable for this purpose. Do not twist the body.



Check the apparatus after transport before installation! If body of the apparatus is damaged (bend or broken), monitor is broken or connectors are damaged do not connect the apparatus to power! Call our hotline for technical support!

19.6. General Safety Instructions

Read all the instructions in the user's manual, especially the safety requirements see [Safety requirements](#)

Follow all instructions. Keep the user's manual for later use.

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Follow all cautions and warnings indicated on the unit.

Disconnect the mains plug before cleaning the unit; don't use any liquid or spray cleanser. Clean with a dry cloth.

Do not use the unit near water. Do not expose it to a humid environment. Do not spill any liquid over the unit.

Unplug this apparatus during lightning storms or when unused for long periods of time.

Do not block or cover any ventilation slots in the housing - they guarantee the reliable functioning of the unit and protect it against overheating. Do not install the unit into a frame unless sufficient ventilation is guaranteed. Install in accordance with the manufacturer's instructions.

Do not insert any objects through the slots of the unit, as these could get in contact with live parts or could cause short circuits. This may cause a fire and an electric shock.

Do not place the unit on unstable surfaces. It may fall and get damaged.

Do not place any objects on the power cord. Protect it from being walked on or pinched particularly at plugs and the point where they exit from the apparatus.

If using an extension cord, make sure the rated output of all units connected in aggregate does not exceed the maximum rated output of the extension cord. The rated output of the units plugged into the socket should in aggregate not exceed 10 amperes.

If the power cord or the mains plug is damaged, let a qualified technician replace it immediately.

Only use power cords which are marked as safety-proof.

All service work should be exclusively performed by qualified service technicians.

Do not use any high-power walkie-talkies or cellular phones near the unit.

The unit is provided with a safety plug. This plug can only be used with safety sockets. These precautions should by all means be followed. If the plug should not fit into a given socket (e.g. the case with old sockets), the socket should be replaced by an electrician.

Do not ignore the safety purpose of the grounding-type plug. A grounding type plug has two blades and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

As with all industrially manufactured goods, the use of substances that induce an allergic reaction such as aluminium cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties), consult a physician immediately to determine the cause.

Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped. Besides others, you run the risk of suffering an electric shock.

If one of the following conditions occurs, please disconnect the mains plug and call your dealer or technical support!

Power cord or mains plug is damaged or worn.

Liquid penetrated the unit.

The unit was exposed to rain or high ambient humidity.

The unit does not function properly, even when following all the instructions in the manual. Only manipulate the controls as stated in the manual, wrong settings on the controls may damage the unit.

The unit fell and the housing was damaged.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE

19.7. IMPORTANT SAFETY INSTRUCTIONS

Read these instructions.

Keep these instructions.

Heed all warnings.

Do not use this apparatus near water.

Clean only with dry cloth.

Do not block any ventilation openings.

Do not install near any heat sources such as radiators, heat registers, stoves or other apparatus (including amplifiers) that produce heat.

Protect the power cord (not included) from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exist from the apparatus.

Only use attachments / accessories specified by the manufacturer.

When a cart is used, use caution when moving the cart / apparatus combination to avoid injury from tip-over.

Unplug this apparatus during lightning storms or when used for long period of time.

Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally or has been dropped.

19.8. Electric shock warning on the rear of the grandMA

The unit should be serviced by qualified personnel only, as live parts may be exposed when opening and/or removing coverings; besides others, you run the risk of suffering an electric shock.



19.9. Safety and Environment

Operating Limits



Temperature: 0°C - 30°C / 32°F - 86°F (recommended 10°C - 25°C / 50°F - 77°F, due to extreme processing power) Deeper temperature can cause failure of the displays, higher temperature can overcharge the cooling system of the apparatus and can destroy hardware components.

Humidity: Operation: 20% - 80% relative humidity (no condensation)

Storage: 10% - 80% relative humidity (no condensation)

Environment

Follow all the IMPORTANT SAFETY INSTRUCTIONS.

Use the apparatus only within the environment operating limits.

Use the apparatus only indoor.

Air must be free of dust and hazardous and explosive substances.

Avoid vibrating support, and extreme loud environment.

This apparatus is not protected against splash water. Do not use this apparatus near water.

Do not use the apparatus in rain or moisture.

19.10. Quickstart Connect VPU plus



Back panel of a MA VPU Plus

1 = **3 x DVI OUT**

2 = **Mains switch ON / OFF** (In standby mode - switch on "I", the AC power voltage is present within the instrument, even if the apparatus is switched off by the push button on the front)

3 = **Mains Input** (blue) 120 / 230 V, 50/60 Hz no switching of voltage necessary (Cable not included ex works)

4 = **Mains Output** (grey) 120 / 230 V, 50/60 Hz no switching of voltage necessary (Cable not included ex works)

5 = **2 x Ethernet** (for connecting MA-consoles, grandMA onPC)

6 = **SDI In 1 + 2** (option)

7 = **2 x USB 3.0** + 2 more USB 2.0 at the front panel and 1 more USB 2.0 at the back panel

8 = **Audio OUT** left / right

9 = **eSATA** - port for connecting external drive

Use only cable with max length 0,5 m!

Do not disconnect drive when at work!

19.11. Quickstart Connect VPU light



- **2x DVI OUT and 1x VGA OUT**
- **2x Ethernet** (for connecting MA-consoles, grandMA onPC)
- **2x 3.0 USB** e.g. mouse, keyboard, storage device + **2 x USB 2.0** at the front panel
- **SPDIF** Digital audio output
- **Audio OUT (balanced)** Left/Right Ground On/Off
- **eSATA** port for connecting extern drive. Use only cable with max length 0,5 m! Do not disconnect drive when at work!
- **Mains switch ON / OFF** (In standby mode – switch on “I”, the AC power voltage is present within the instrument, even if the apparatus switched off by the push button on the front)
- **Mains Input (blue)** 120 / 230 V, 50/60 Hz no switching of voltage necessary (Cable and connector not included ex works)

19.12. Switching the apparatus On/Off



Caution: Do not power down during booting.

Such a switch-off may lead to corruption of the solid state disk files.

Power connector



AC power switch on the rear panel (1)

Position I = ON

In the I position, the instrument is in standby mode
or in operation, depending on the position of the ON/STANDBY key at the front panel.

Note:

The AC power switch may remain ON continuously.

Switching to OFF is only required when the instrument must be completely removed from the AC power source.

Position 0 = OFF

The 0 position implies an all-pole disconnection of the instrument from the AC power source.

Standby switch



ON/STANDBY

button on the front panel (2)

The ON/STANDBY switch activates two different operating Modes:

Operation ON -

First push on ON/STANDBY - button

The apparatus starts booting.

STANDBY -

Second push on ON/STANDBY - button

The apparatus switch to standby - mode



Caution:

In standby mode, the AC power voltage is present within the apparatus

Switching On the Instrument

In order to switch on the apparatus, set the power switch on the rear panel to position I. Set the apparatus to operating mode by pressing the ON/STANDBY button on the front panel.

Switching Off the Instrument

In order to switch off the apparatus, tap **Shutdown** at the internal display of a MA VPU Plus or go to **File** **Exit** at the GUI of the MA VPU. In this standby mode, the AC power voltage is present within the instrument. For longer non use switch the power switch to "0"

Cleaning

The VPU demands only minor attention. Clean the surface only with dry soft cloth and look for proper condition of ventilation. Do not use any liquid cleaner or compressed air.

19.13. Maintenance

Electric shock warning: The unit should be serviced by qualified personnel only, as live parts may be exposed when opening and/or removing coverings; besides others, you run the risk of suffering an electric shock.

19.14. Conformity

Declaration of Conformity according to directives 2004 / 108 / EG

Manufacturer's name: MA Lighting Technology GmbH

Manufacturer's address:

Dachdeckerstraße 16

D-97297 Waldbüttelbrunn

Germany

declares that the product

Product category: Control unit

Name of product: Video Processing Unit (VPU)

complies with the following product specifications:

Safety: EN60065, EN60950-1

EMV (EMC):

EN55103-1 (E1)

EN55103-2 (E2)

Additional information: DMX512, Ethernet, USB, Malink, DVI, LTC, Audio IN, Midi and analogue inputs must be shielded and the shielding must be connected to the earthing resp. to the housing of the corresponding plug.

Waldbüttelbrunn, September 6th 2013

Dipl. Ing. Michael Adenau

A handwritten signature in black ink, appearing to read 'M. Adenau'.

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