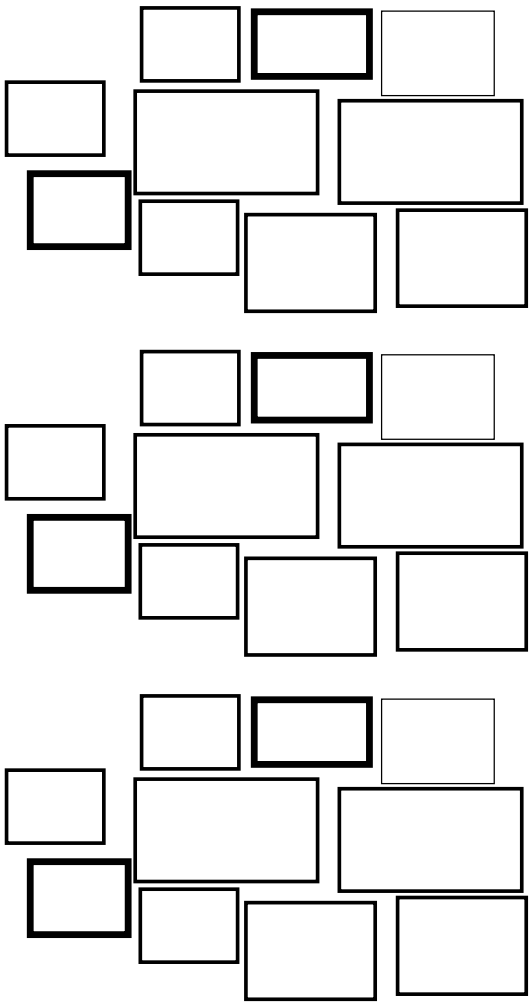
V-Match

V-Match is an exclusive solution to enlarge video across multiple displays, featuring basic video wall controller functions. V-Match is the only product on the market that allows the user to select just a part of a video signal and enlarge it across multiple displays as well as to combine different displays, like projectors, LCD TVs, monitors, LED panels, of different screen sizes and video formats, into the same setup to create an individually shaped video wall. As a hardware solution, V-Match offers robust and stable video wall control for 24/7 use in control rooms and digital signage.

V-Match allows the user to configure and switch multiple presets for a wide range of video effects. It can mix signals from different sources and zoom in into videos to enlarge the zoomed part across the video wall, or across parts of the setup.

HETEC V-Match is developed and manufactured in Germany.



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Example Setups ..... Fehler! Textmarke nicht definiert.

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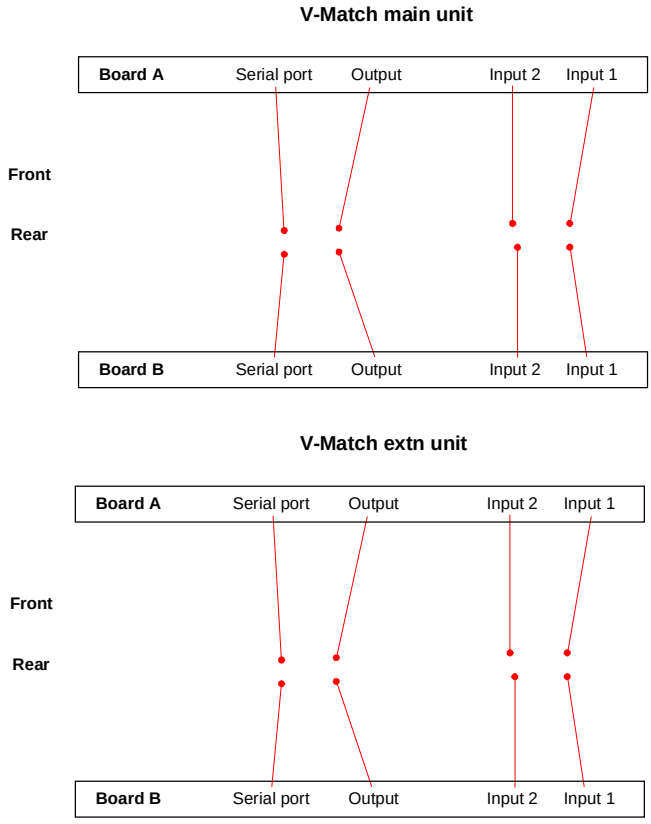
TODO: Alle Querverweise sind blau gekennzeichnet und müssen noch mit korrekten Abschnitts-/ Bild-/ Beispielnummern sowie Seitenzahlen versehen werden.
TODO: save
TODO: >12 presets
TODO: Einheiten (units und centimeter oder so was, du kannst Dich sicher erinnern) an alles schreiben

Introduction

V-Match can display signals from any video source with DVI or VGA output.

- PCs
- Media Players with DVI, VGA or HDMI output
- DVD players with HDMI output, using an HDMI-to-DVI adapter cable (HDCP not supported)
- DVD players or VCRs with RGB output, using an RGB-to-VGA adapter cable
- DVD players, TV receivers, VCRs, or video game consoles with SCART (EURO-AV) or composite output, using a SCART or composite converter box
- HD/SD-SDI signals used in professional video production, using an SDI-to-DVI converter



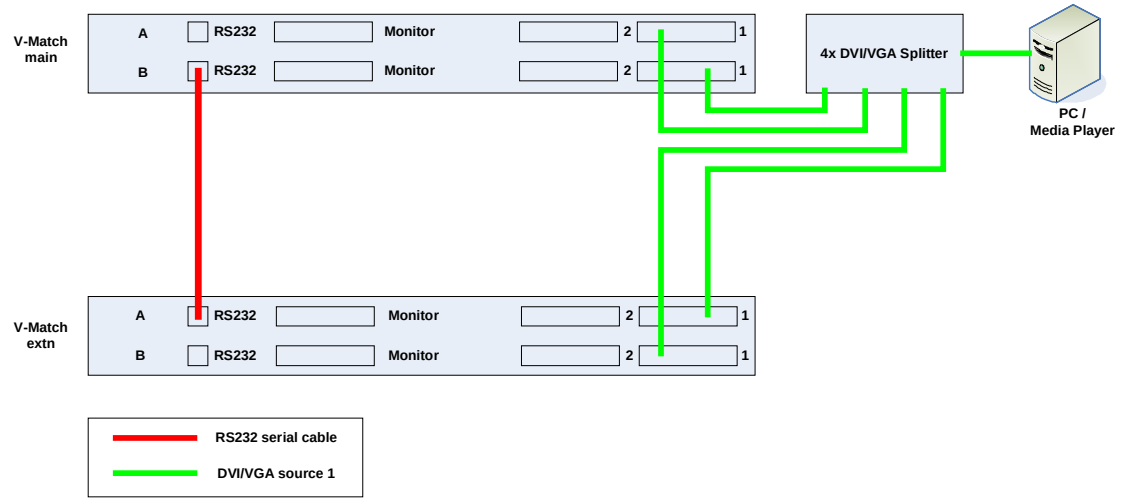
Every V-Match unit has two video boards, labeled **A** and **B**. Each video board features two video inputs (for source 1 and source 2) and one video output (to connect to one display). Each video output shows one part of the full image. One V-Match unit provides video output for two displays. To show an image from a video

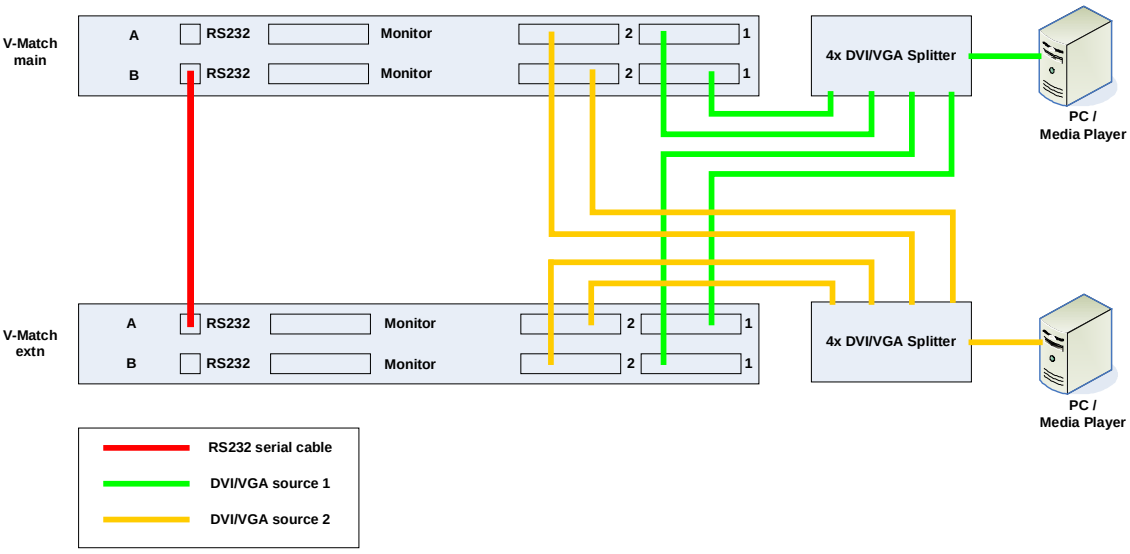
source, each V-Match unit needs to be supplied with the input channel’s video signal. DVI/VGA splitters are used to provide the video signal to all V-Match units.

V-Match is modular and can be flexibly adapted to any installation size. The number of V-Match units required depends on the number of displays in the video wall. A V-Match unit can supply two displays with a video signal. Thus, each V-Match system consists of one main unit, and additional extn units to increase the capacity to the desired video wall size (2 screens per V-Match unit).

Installation

1 or 2 video sources





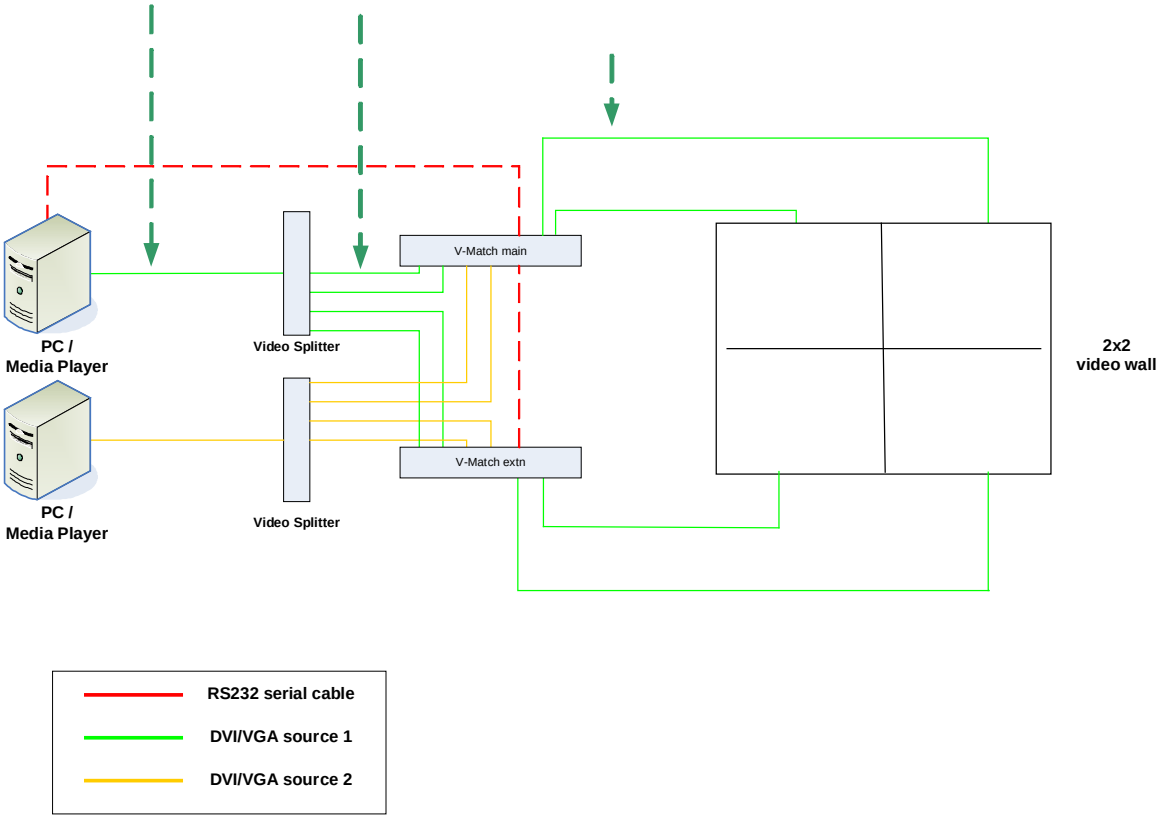
Install the V-Match units as shown in diagram(s) XXX.

Connect all V-Match units with the enclosed short serial cables. Connect the lower serial port (board B) of the main unit to the upper serial port (board A) of the first extn unit. When installing a V-Match system with more than one extn unit, connect all the units by connecting the “B” serial port of one unit to the “A” port of the next.

Connect the first video source to the DVI/VGA splitter, and connect the splitter's outputs to the channel 1 inputs (labeled "1") on all V-Match units. If you want to use two video sources, connect the second video source in the same way to the channel 2 inputs via a second DVI/VGA splitter.

Connect the monitor outputs to the displays.

Example 1 shows a video wall setup with 2x2 displays with two connected video sources. Two V-Match units are used to show four partial images of the full image on the four screens.



Example 1: A basic 2x2 video wall

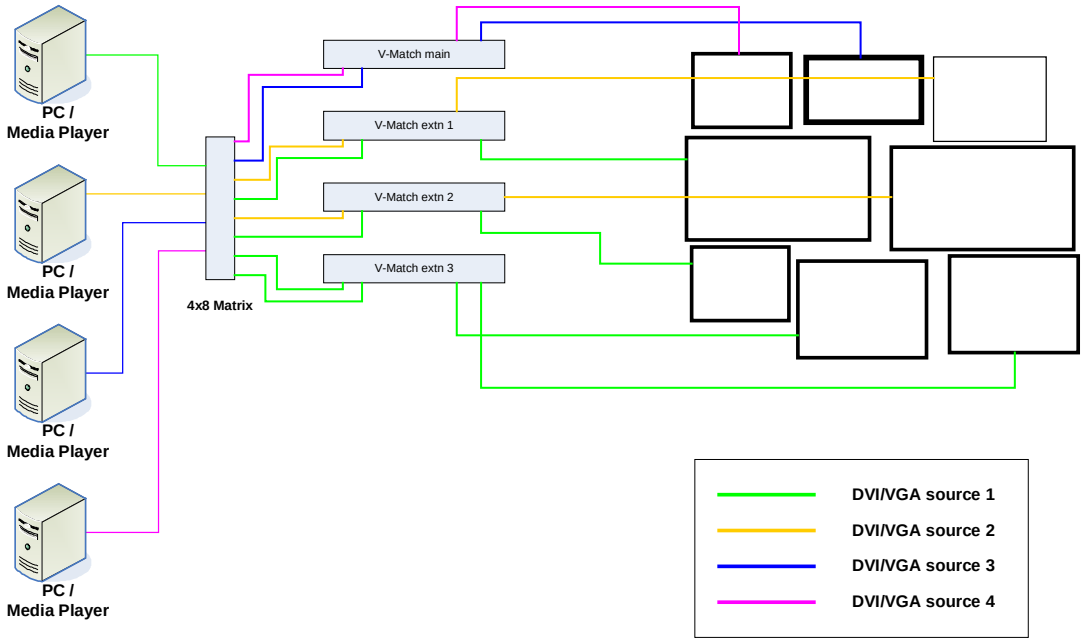
The V-Match main unit provides the video signal for the first two displays (starting from the top left of the video wall). The next displays are connected to the extn units. The following examples show the arrangements of V-Match units and boards for a 2x2 and a 3x3 video wall.

main-A	main-B
extn-A	extn-B

main-A	main-B	extn 1-A
extn 1-B	extn 2-A	extn 2-B
extn 3-A	extn 3-B	extn 4-A

3 or more video sources – video matrix setup

To connect more than two video sources to the V-Match system, you can use a video matrix. For example, to connect four video sources, you can use a 4x8 matrix, as shown in the next example.



Example 2: Using a video matrix for more input channels

The video matrix connects the four video sources to the V-Match units. The matrix is connected to the channel 1 inputs on all 8 boards of the V-Match system. The channel 2 inputs are not connected, and channel switching is performed using the video matrix. Please see Example X.1 in section xxx "Examples" for details of presets in this setup.

In this example, you can also connect a fifth video source to the channel 2 inputs of the V-Match system to add a fifth input.

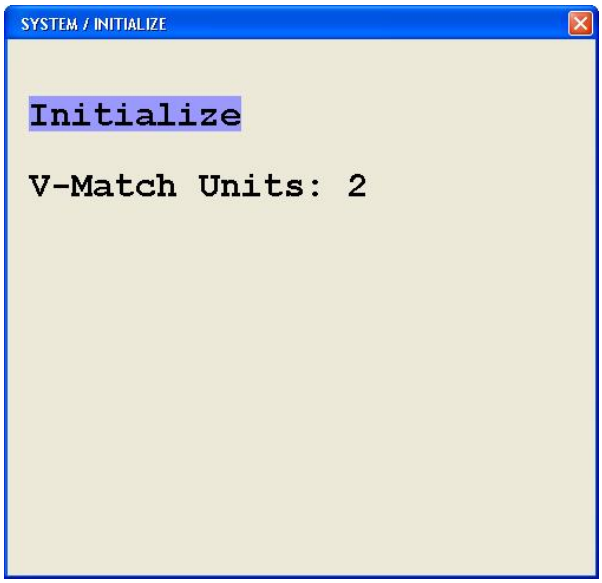
As you can see from the diagram, using a video matrix makes DVI/VGA splitters unnecessary.

Setup

After connecting the units as described in section “Installation”, the system is ready for operation. When switching on the V-Match installation, please make sure to switch on the video splitters before the video sources are switched on, to enable the video sources to read the V-Match units’ EDID (display information) data.

Initialization

As the first step after installing the V-Match units, initialize the system. This step is necessary to initialize the communication between the V-Match units in the system.



To initialize the system, open the OSD menu by holding the SELECT and EXIT buttons on the front panel of the V-Match main unit. Enter the SYSTEM menu, by pressing the SELECT, then enter the INITIALIZE sub-menu. Press SELECT to initialize the system. The system will then detect the units connected, and initialize the communication between units. After a few seconds, the menu will display the number of detected V-Match units. If the number displayed does not match the number of units in your system, verify that all units are connected and switched on, and try again.

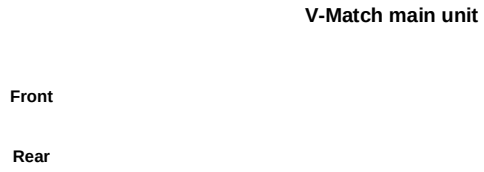
For help on how to operate the OSD menus, please refer to section Controlling the on-screen display (OSD) using front panel buttons.

Operation

There are several ways to control the V-Match system:

front panel buttons (V-Match main unit)	activate presets use OSD to configure **basic** presets and change settings
V-Match Control program (external PC)	activate presets configure **free** presets
ConfDev configuration tool (external PC)	use OSD to configure **basic** presets and change settings
serial connection (third-party interface for external control devices)	activate presets

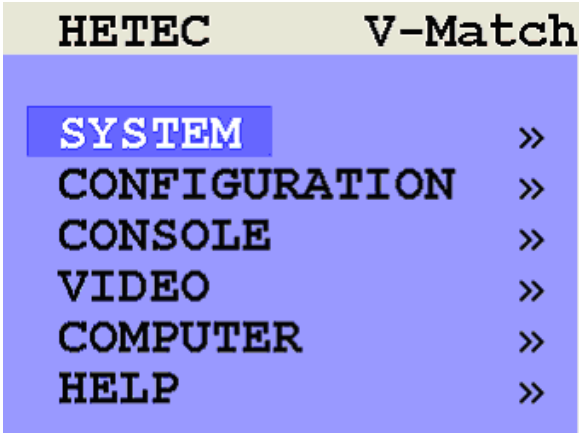
Operation using front panel buttons



The V-Match main unit has six front panel buttons, labeled 1-4, F1, and F2. Using the front panel buttons, you can activate presets, and open the OSD to configure basic presets and change settings.

Controlling the on-screen display (OSD) using front panel buttons

The V-Match main unit features an on-screen display which allows you to edit presets, output resolution, gap width and other configuration options.



To open the OSD, hold the SELECT and EXIT button for approximately three seconds until the OSD opens on the display connected to board A of the main unit. Alternatively, if there is no display connected, you can access the OSD with the ConfDev tool over the serial interface using a PC. Please refer to the ConfDev manual for a description of how to use the ConfDev tool.

When the OSD is open, front panel buttons perform OSD-specific functions, as signified by the labels below the buttons.

(down arrow) (up arrow)	navigate up/down in the menus
+ -	change selected value
SELECT	enter a menu confirm an action
EXIT	leave a menu close OSD

Activating presets using front panel buttons

The buttons 1-4 switch to presets 1-4, while the buttons F1 and F2 activate a sub-preset of the current preset.

Sub-presets can be used to change a detail of a particular preset, such as the channel, but they can also be defined entirely independent of the main presets. When sub-presets are used as independent presets, the total number of presets accessible from the front panel buttons is 12. To define more than 12 presets, use the V-Match Control program instead of the front buttons.

Other methods of operation

Using the **V-Match Control** program, you can configure **free** presets, and activate presets. Please refer to Using the Control Program for details on how to use the V-Match Control program.

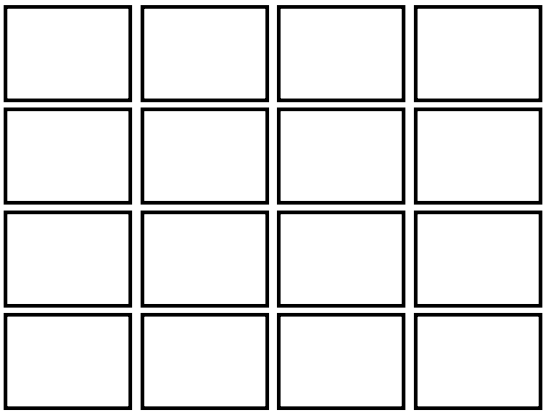
The **ConfDev** tool allows you to open and control the OSD from an external PC. This is useful if there is no display connected to the V-Match main unit, or if you do not have access to the main unit's front panel. For a description of the ConfDev tool, please refer to the ConfDev manual.

Third party devices that are able to send serial commands over RS-232 such as room controls can also be used to activate presets of a V-Match system. See section ??? for instructions on configuration and serial commands.

Preset Types

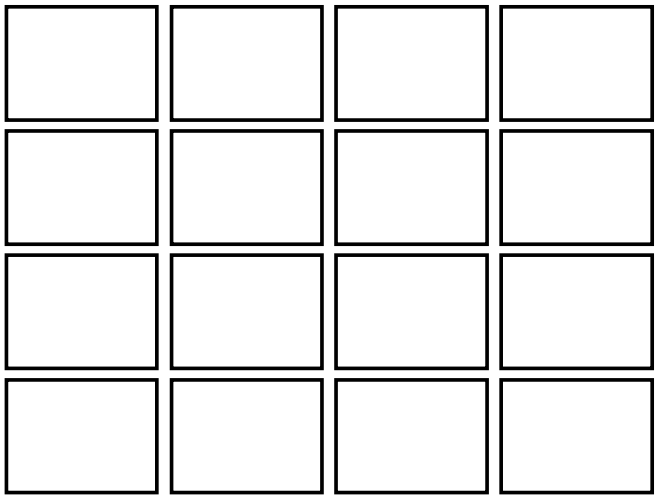
V-Match offers two types of presets, **basic** and **free**.

Basic presets are used for video wall setups where displays of the same model are arranged in a regular grid. Basic presets can be specified quickly using only the V-Match's OSD.



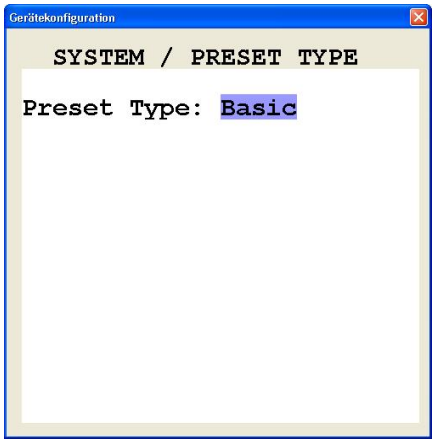
Free presets offer the greatest flexibility for a video wall setup. Using free presets, you can create a video wall allowing you to freely position displays and even have displays overlap. You can mix any kind of displays, for example, flat panel displays, CRTs, and beamers. To create free presets, you need to use the V-Match Control program.

Basic Presets



Basic presets are used for video wall setups with displays of the same model arranged in a regular grid, where all horizontal gaps between displays are equal. The same applies for vertical gaps. The width of the gaps (horizontal and vertical) can be individually defined. Larger gaps between displays result in a larger total size of the video wall.

To use basic presets, set the preset type in the V-Match OSD menu to “Basic” in SYSTEM->PRESET TYPE.



To define a basic preset, set the following parameters for each screen.

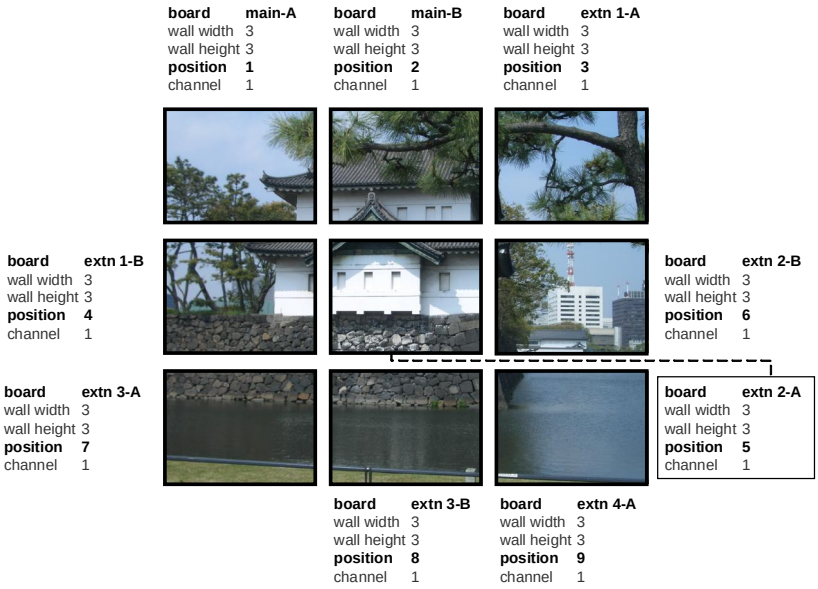
channel	the input channel this display shows

wall size	the width and height of the video wall
position	position of the display in the video wall

Example

For a 3x3 wall, set the following values to show channel 1 enlarged across all displays:

Wall Size:	*3x3*
Position:	*1-9 (depending on position in wall)*
Channel:	*1*



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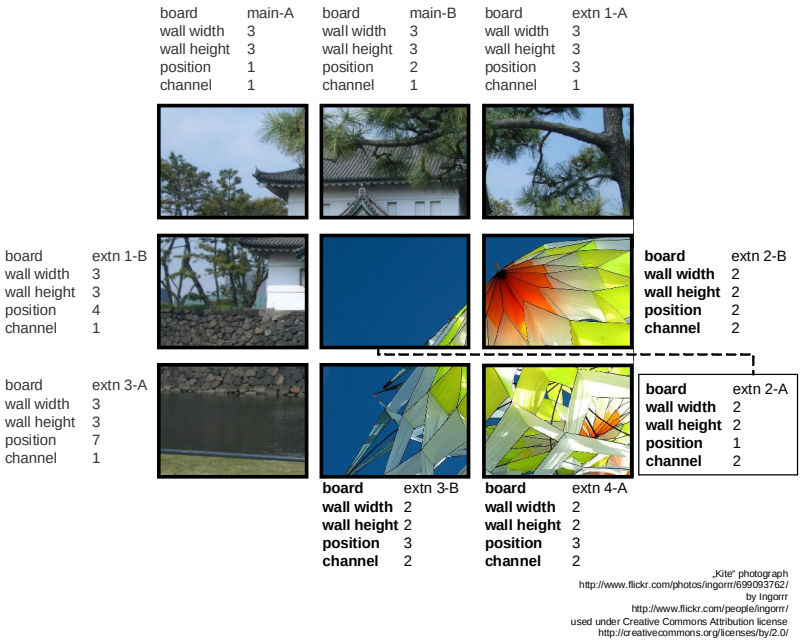
Creating advanced video wall setups

Mixed wall sizes / mixed channels

You can leverage the flexibility of this system to create more varied setups by mixing the wall size and channel settings for different displays.



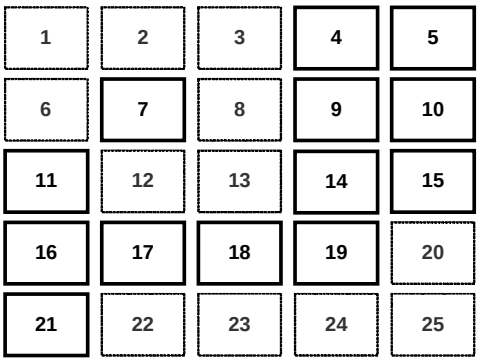
In this example, a 3x3 – wall is showing channel 1, with a smaller picture of channel 2 inset into the bottom right corner. This is achieved using the settings from the previous example, and modifying the values for the screens in the 2x2 segment on the bottom right as follows:

Wall Size:	*2x2*
Position:	*1-4 (depending on position in wall)*
Channel:	*2*

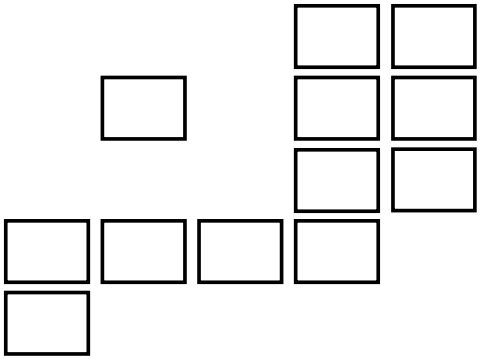
The values for the remaining 5 screens are still values for a 3x3 video wall, and are unchanged from the previous example.

Eye-catching video wall designs

In each preset, the settings for each display can be defined separately. Taking advantage of this fact, you can create interesting setups that are more than simply rectangular video walls.

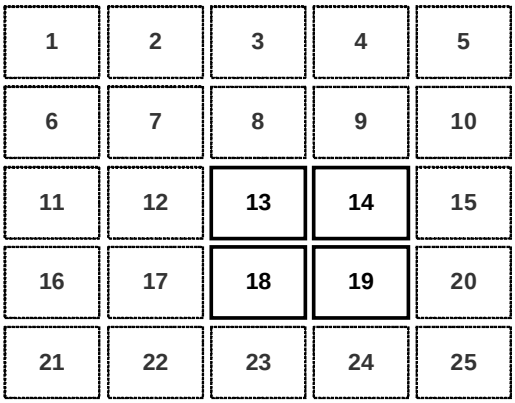


The video wall size defines a grid over the input image. By only selecting some of the possible display positions (shown with bold lines in Picture 23), and omitting other displays (shown with dashed lines), you can create eye-catching display setups.

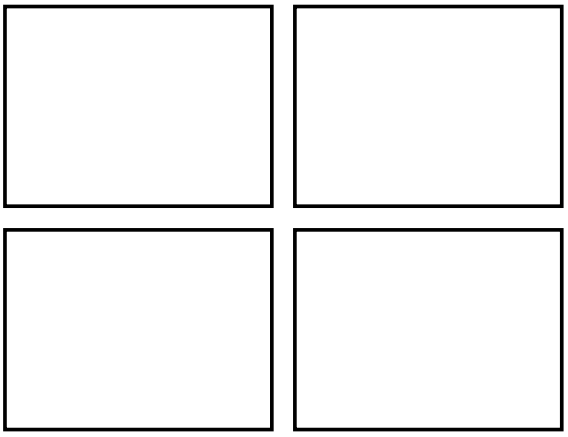


Zoom in

By setting the wall size higher than the size of your actual video wall, you can achieve a zoom effect.



The input image, with a (virtual) 5x5 – grid of displays



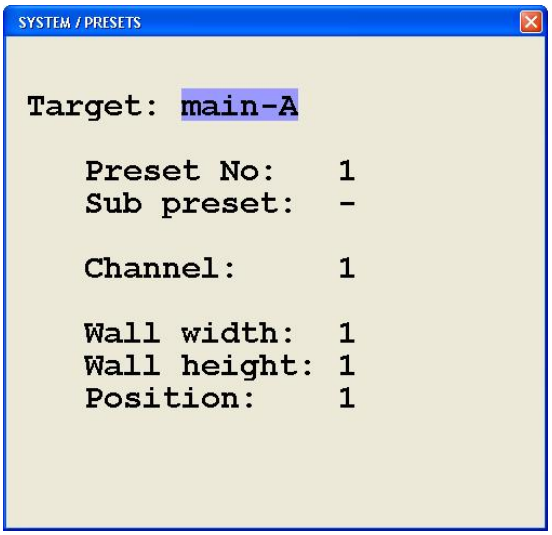
TODO: 9,8,13,14 rausstechen

A 2x2 section of the input image. The screen positions are 13, 14, 18, and 19.

Section XX “Examples” contains more example setups that show what can be accomplished using basic presets.

Setting presets

To set the values that define a preset, open the OSD and navigate to SYSTEM->PRESETS.



The menu allows you to set the following values

Target	target unit and board (i.e. the display)

Preset and Sub-Preset	preset to edit (select from preset 1-4 and optional sub-preset F1 or F2)
Channel	input channel to display
Wall width Wall height	The width and height of the video wall. please see the Note on page xyz
Position	position of the display in the wall

For each preset, use this menu to set the values for each display in the video wall individually.

Note
The “wall width” and “wall height” values specify the way the input image is divided into screen-sized sections. They do not necessarily match the width and height of your video wall setup. For example, setting width and height to 1 on a V-Match unit will result in that unit showing the full input image. Example 2 shows a mixed setup using video wall sizes of 3x3 and 2x2 together to create a picture-in-picture effect. In the Examples section, there are more examples detailing the possibilities of mixed preset configurations.

Gap width

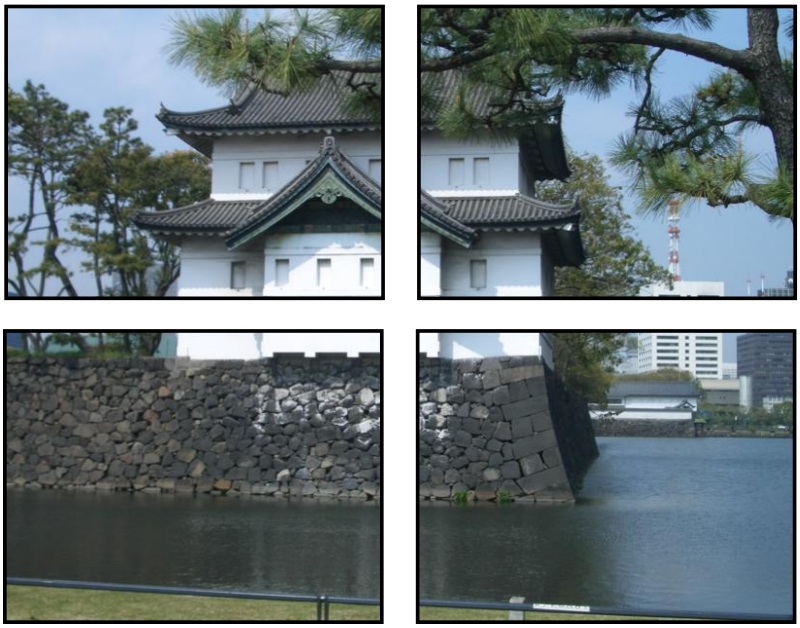
When assembling a video wall, there is usually a gap between the visible portions of the different displays, created by the frames around the displays, as well as the space between one display and the next.

V-Match is able to compensate for gaps by removing the areas of the input image covered by the gaps, preventing unnatural jumps from one display to the next. To compensate for gaps, set the gap width in the OSD menu. Please note that compensating for gaps will hide some parts of the input image. If you need to show the input image's entire contents, leave the gap width at 0.

You can take advantage of gaps to increase the total size of your video wall. Simply move your displays further apart, and increase the value for gap width. The V-Match system will compensate for the larger gaps, and the image will still be completely natural and distortion-free.

TODO:Bild mit Gesicht

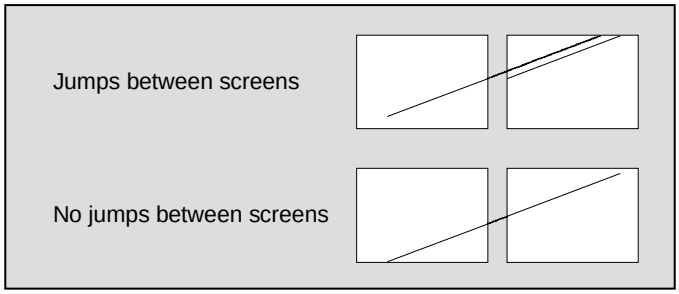
The input image



**Without gap compensation, the entire input image is visible,
but shows jumps between screens (note the slanted roof in the top row)
and distortions (note the tower appears larger than in the input image)**

With gap compensation, the image looks natural, and all proportions are preserved

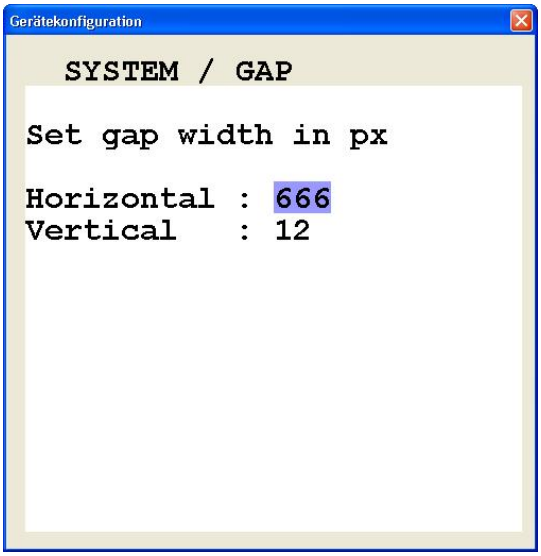
Moving the screens further apart and increasing the gap will result in a larger video wall



compensating for gaps between screens

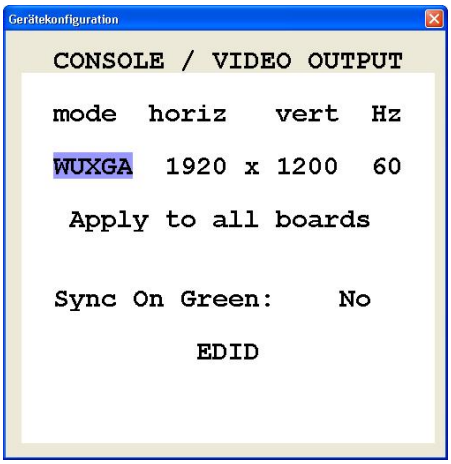
Setting gap width

To set the gap width, open the OSD. Enter the SYSTEM submenu, and open the GAP submenu. In this menu, you can set the vertical and horizontal gap width (in pixels). After you are finished, use the exit button to leave the menus, and close the OSD.



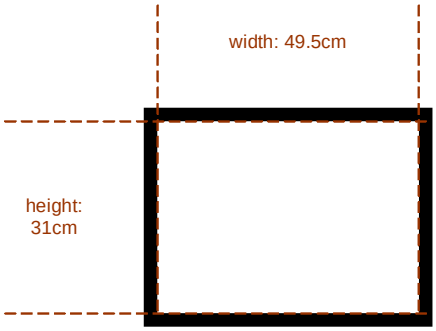
Calculating gap width

To calculate the gap width, first check the output resolution of the V-Match. You can find the output resolution in the V-Match OSD menu under CONSOLE->VIDEO OUTPUT.



As an example, assume the output video mode is WUXGA (1920x1200). This means the horizontal resolution is 1920 and the vertical resolution is 1200.

Then, measure the visible width of the actual output image of your display. Divide the output resolution by the width to get the pixel density, that is, the number of pixels per centimeter on your screen.



hier hätte ich lieber einen echten Monitor fotografiert, aber das war mir zu viel Aufwand

For example, your screen is 49.5cm wide, and 31cm high. Thus, we get a horizontal pixel density of

$$\frac{1920\,px}{49.5cm} = 38.79\frac{px}{cm}$$

and a vertical pixel density of

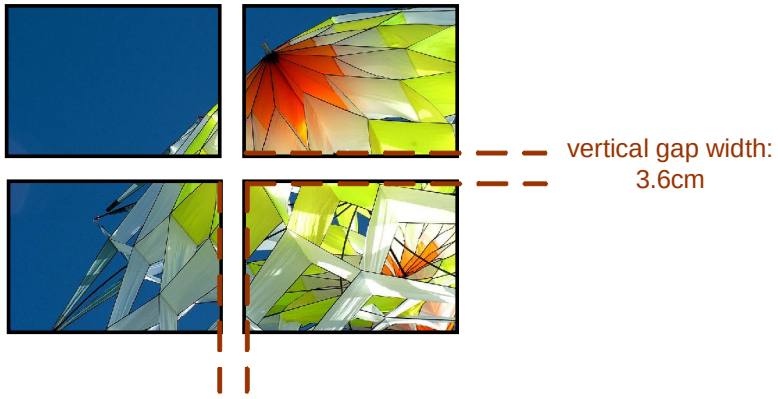
$$\frac{1200\,px}{31cm} = 38.71\frac{px}{cm}$$

The values for horizontal and vertical pixel density are usually equal. In the example, the deviation is due to small errors of measurement. Since the calculation is only used to get

an approximate value for the gap width, you can use the same value for horizontal and vertical pixel density if they are similar. You can fine-tune the gap width later.

In the example, the horizontal and vertical pixel density values are very close to each other, so rounding up, the pixel density is 39 pixels per centimeter both horizontally and vertically.

Next, measure the gap between the image on one screen and the image on the next screen. Multiply that gap width by the pixel density from the previous step to obtain the gap width in pixels.



In this example, the gap between the edges of the visible image is 4cm wide horizontally, and the vertical gap is 3.6cm wide. Thus, the gap widths are

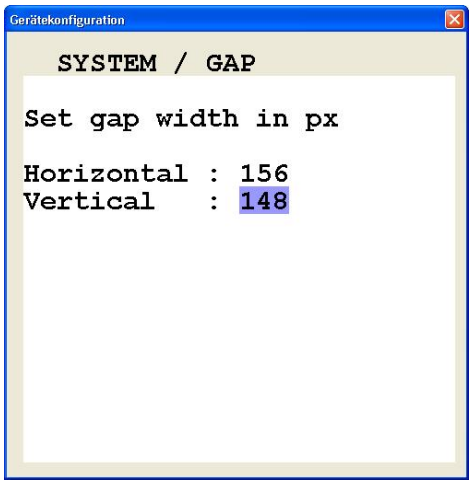
$$39\frac{px}{cm}\cdot 4cm = 156\,px$$

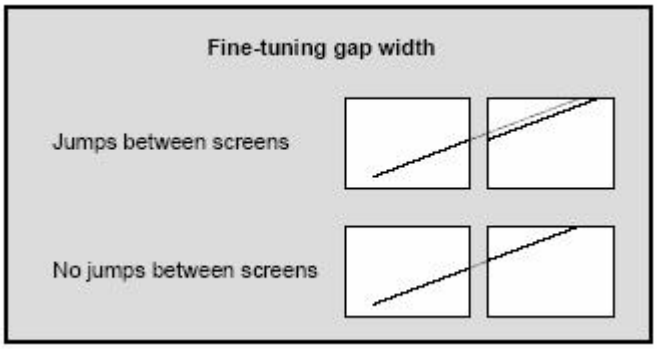
for a horizontal gap of 156 pixels, and

$$39\frac{px}{cm}\cdot 3.8cm = 148.2\,px$$

vertical gap, rounded to 148 pixels.

Set these values in the gap menu. To verify and fine-tune your settings, you can use a picture with diagonal lines, and choose a preset that enlarges the input image so that the diagonal lines cross the boundaries between displays. You can then adjust the gap settings until the lines appear straight, and without jumps. Use a ruler or other straight object to check if the lines are perfectly aligned.


Gerätekonfiguration
SYSTEM / GAP
Set gap width in px
Horizontal : 156
Vertical : 148


Fine-tuning gap width
Jumps between screens
No jumps between screens

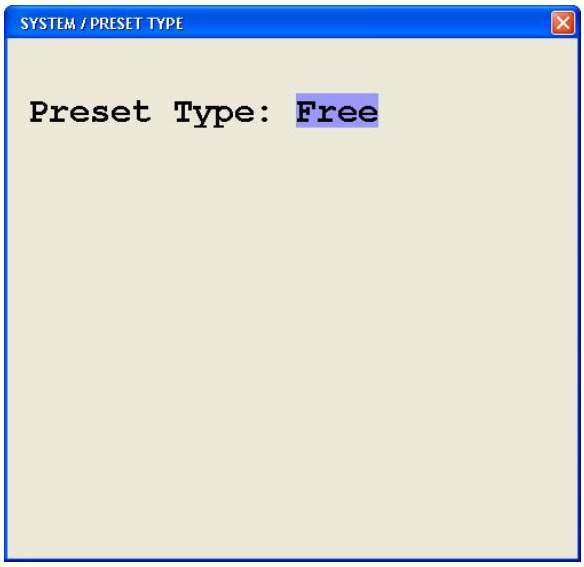
Free Presets

Free presets offer the greatest flexibility for a video wall setup. To define a free preset, for each display, the exact section of the input image is specified. You can create a video wall using a mixed display setup with any kind of display, for example, flat panel displays, CRTs, LED panels, LCD TVs, and beamers of any screen size, resolution and aspect ratio, digital as well as analog.

In addition to mixing different displays, V-Match allows arranging displays freely to create individually shaped video walls including overlapping displays.

Overlapping displays

To use free presets, set the preset type in the V-Match OSD menu to “Free” in SYSTEM->PRESET TYPE.



Use the V-Match Control program to control and configure free presets. Please see the next section, Using the Control Program for a description of the V-Match Control program.

Using the Control Program

Installation

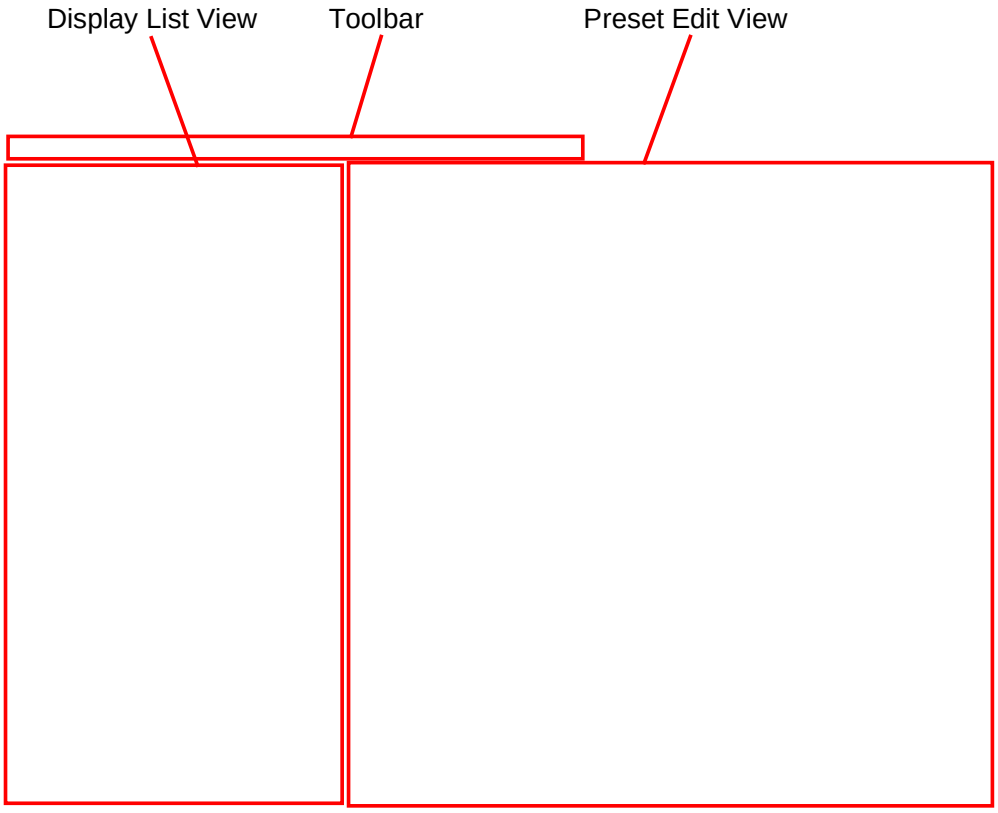
A windows PC is required, to run the V-Match Control program.

To install, copy the folder “Control Program” from the enclosed CD to your hard disk. To run the program, open the file “VMatchControl.exe”.

Setup

Connect the enclosed serial cable to the upper RS-232 port on the V-Match main unit. Connect the cable to a serial port of your computer. You can choose the COM port in the Control Program under “File->Settings...”

The user interface



The tool bar

Using the **Preset** drop down menu in the tool bar, you can choose which preset to edit. When you choose a preset, the edit view and display list view will show that preset, and the preset will also be activated on the V-Match system and be visible on the video wall.

The **Channel** drop down allows you to choose which channel to display in the edit view. This setting only controls the view shown in the control program. It has no effect on the V-Match units. To change which channel a V-Match unit displays, use the **Edit** window (described in section 3.3 The Preset Editor)

Connection status

The V-Match Control program can be used to control a V-Match system connected to the PC the program is running on. It can also be used without a V-Match system to configure the presets. If the program is connected to a V-Match system, changes in presets take effect immediately. If the program is not connected, changes in presets are stored on the PC, and are transferred automatically to the V-Match system as soon as the program is connected.

You can choose whether the V-Match Control program should automatically attempt to connect when you start it. To control this setting, Choose File->Settings... from the main menu, and check the checkbox next to “Connect to V-Match at startup”.

The connect/disconnect buttons allow you to connect to or disconnect from the V-Match system.

disconnect **connect**

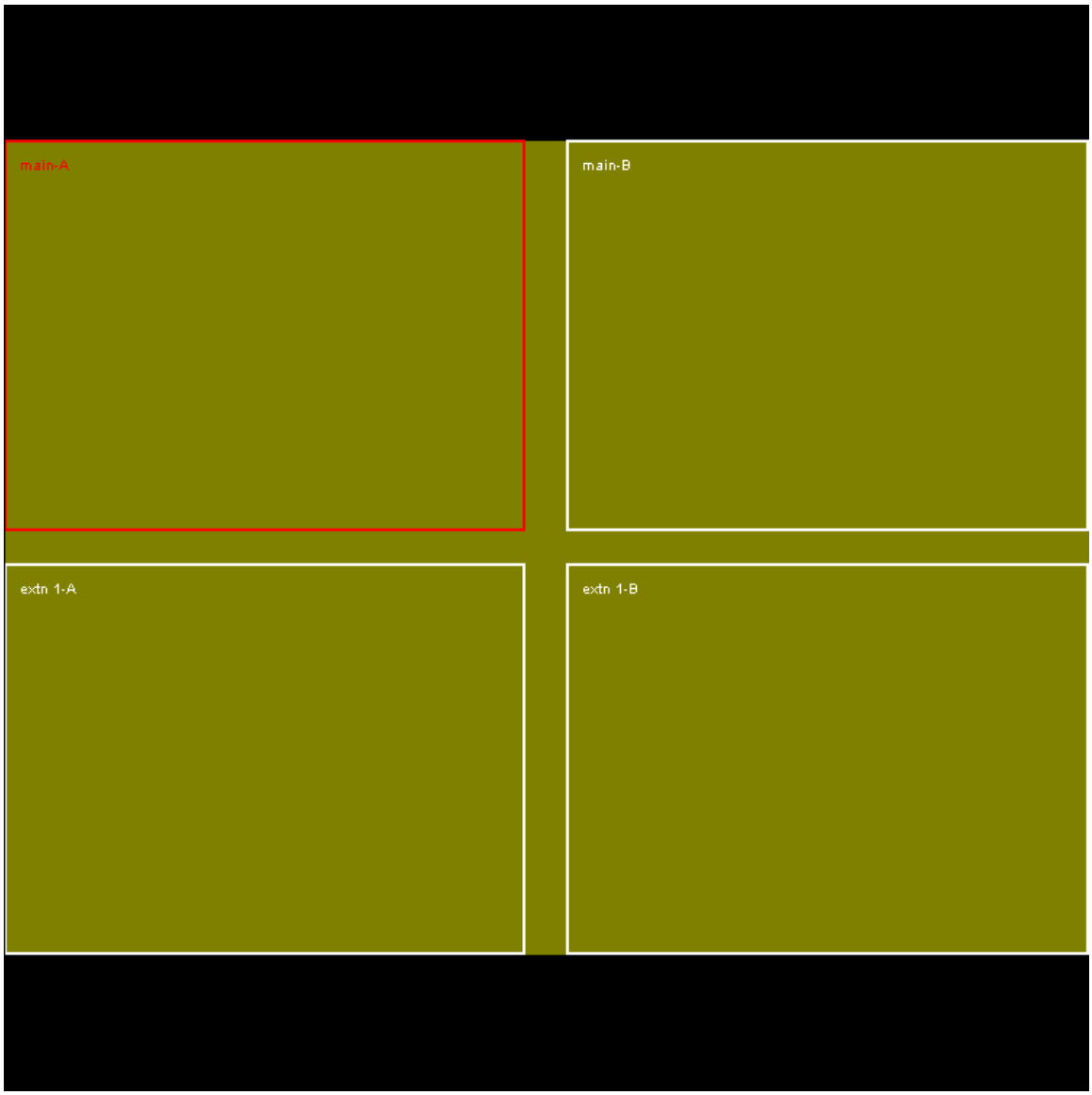
The connection status buttons indicate whether the V-Match Control program is currently connected to the V-Match system.

The Display List

Device	Ratio	Input Channel	Position	Size
main-A	as display	1	0x1250	4800x3600
main-B	as display	1	5200x1250	4800x3600
extn 1-A	as display	1	0x5150	4800x3600
extn 1-B	as display	1	5200x5150	4800x3600

The Display List shows all displays, and the settings for the displays defined in the current preset. Left-clicking on a screen selects that screen. Right-clicking on a screen opens a context menu which allows you to change the aspect ratio, input channel, and other properties of that screen (see 3.3 The Preset Editor).

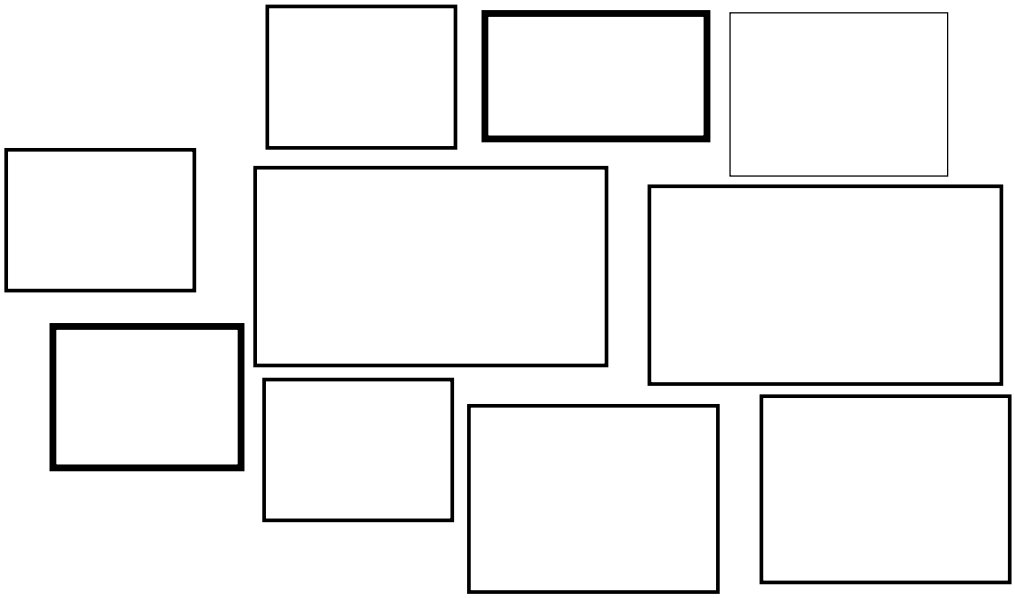
The Preset Edit View



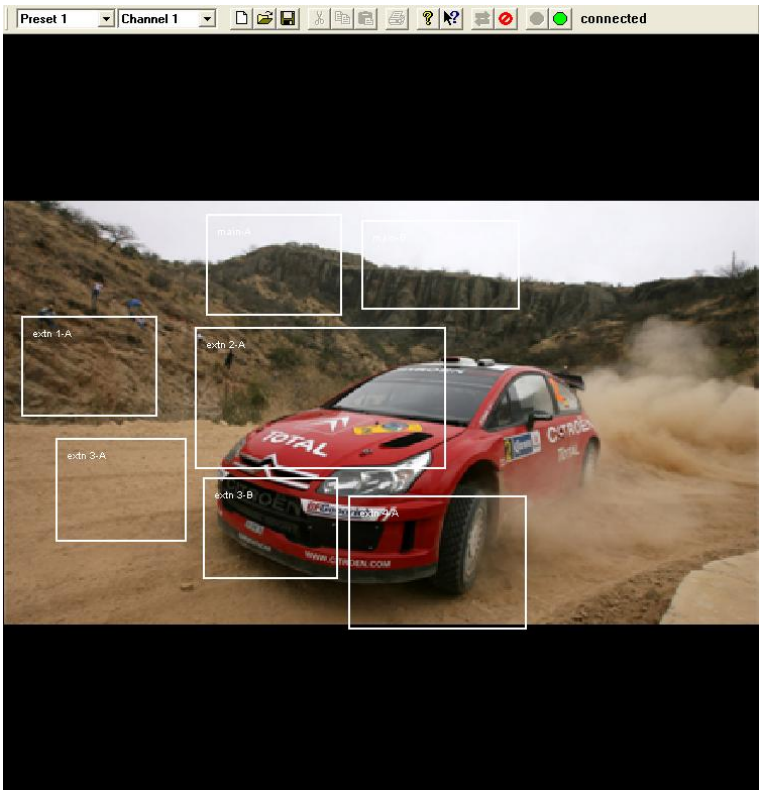
Preset Edit View

The Preset Edit View displays one input channel at a time. You can switch the displayed input channel with the Channel drop down menu. In the Preset Edit View, the displays are shown as rectangles, with the display name in the upper left corner. Display names show the V-Match unit and board the display is connected to.

If you want to use both input channels in the same preset, use the Channel drop down to switch between the views of the two channels. Set the sizes for all displays showing input channel 1 in channel 1, and all displays showing the second channel in channel 2.



A preset with two channels



Channel 1

Channel 2

The Preset Edit View lets you change the position and size of the section of the input image each screen displays. Use the mouse to drag and resize the sections. Changing position and size this way, you can quickly configure presets to achieve an approximation of the preset you want to create.

Right click on a screen (in the Display List or the Preset View) to open the following context menu.

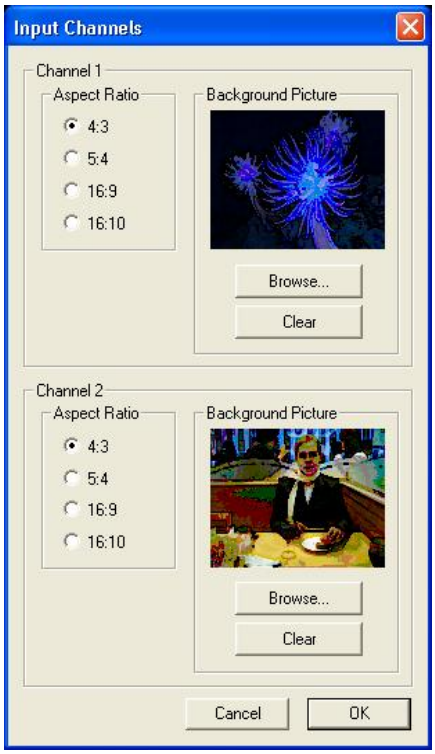
In the context menu, you can add or remove screens, open the Edit window, and choose the input channel the display shows. Please see section Editing display parameters for a description of the Edit window.

After you have created an approximation of your preset using the Preset Edit View, fine tune each preset by following the next steps.

Input channel settings

First, configure the settings for the input channels according to your video sources.

To change input channel settings, go to “Video->Input Channels...” in the main menu.



In this menu, you can choose the input aspect ratio, and change the picture that is displayed as a background image.

Setting the correct aspect ratio ensures distortion-free display on your video wall. Four aspect ratios are commonly used:

4:3	640 x 480 800 x 600 1024 x 768 1280 x 960 1600 x 1200
5:4	1280 x 1024
16:9	1366 x 768 HDTV(1920 x 1080)

16:10	1680 x 1050 1920 x 1200

Common aspect ratios and resolutions

Set the input aspect ratio according to the resolution of your video sources.

A background image that shows the content you wish to display on the video wall will make creating presets more comfortable by giving you a realistic preview in the Preset Edit View. We suggest you import a frame from your video, or a screenshot of the computer you want to show on the video wall.

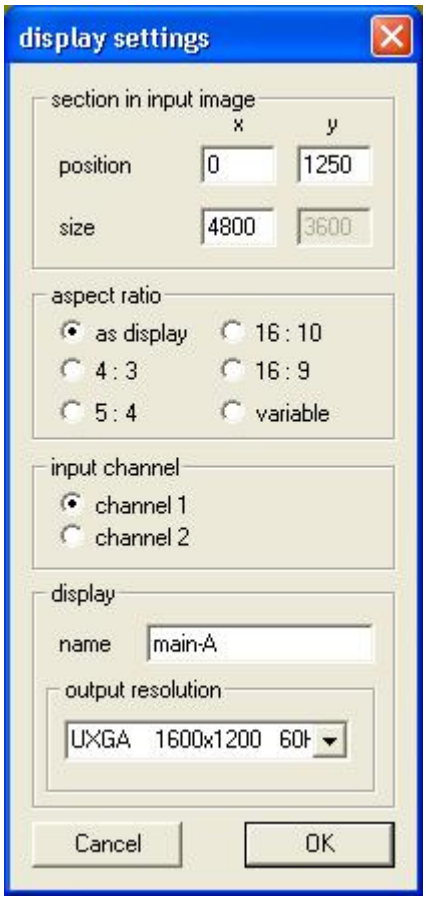
The background image must be a Bitmap file (with extension ".bmp").

After configuring the input channels, set the values for your displays.

Editing display parameters

For each output screen connected to the system, there are a number of parameters that control what is displayed on the screen. These settings can have different values from preset to preset.

Use the Edit window to control these settings. The item **Edit...** in the context menu of the displays opens the Edit Window.

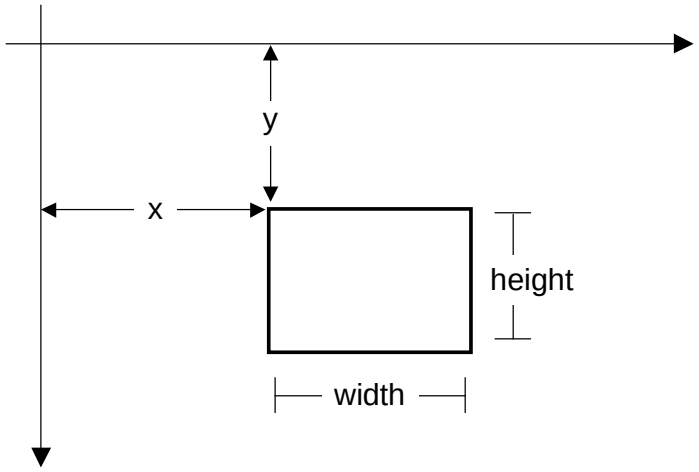


The following settings can be chosen per preset for each display:

position	position and size of the section of the input image this display shows
size	
aspect ratio	optional; a fixed aspect ratio which the program will maintain. This prevents distortions of the image by ensuring the section from the input image always has the correct aspect ratio.
input channel	which input channel to display
output resolution	the output resolution

Position in input image

Specifies the part of the input image to display on the screen. Obtaining these values involves some calculations, which are described in section Position and size.



Aspect ratio

This setting controls the way the V-Match Control program allows screens to be resized. If a fixed aspect ratio is chosen, the program always maintains that ratio. For a more detailed discussion of aspect ratios, see section Aspect ratio (page 38)

Output video mode

This setting controls the output video mode, i.e. resolution and refresh rate of one display. For each display in your setup, you can choose a different video mode.

Note
Since a display does not change from preset to preset, setting the output resolution of a display affects that display **across all presets**.

In the Edit window, you can specify the section of the input signal to be displayed by the screen. You can also change the aspect ratio and choose which channel to display. The settings in the boxes labeled “section in input image”, “aspect ratio”, and “input channel” apply to the active preset only (selected in the tool bar). The settings in the “display” box apply to the selected display across all presets.

Note
We recommend setting the output resolution to your display’s native resolution, and setting the aspect ratio to “as display”. This ensures that the displays will show distortion-free video as you move and resize them.

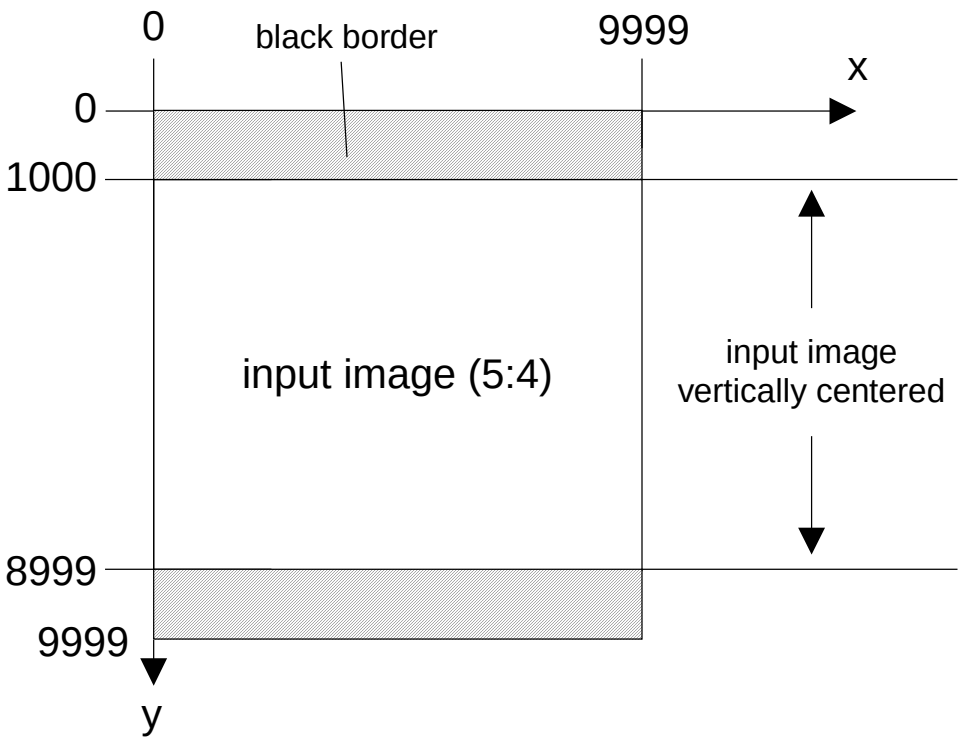
From the context menu, you can also set the channel and aspect ratio for a display, without having to use the Edit window.

Setting the correct aspect ratio for a display ensures that the output image will not be distorted on that display.

Position and size

Units

Size and position are specified in relative units. This means that the units do not directly correspond to pixel values. Rather, they are relative to the width of the input image. A width of 9999 is exactly as wide as the input image. Because displays are not quadratic, but rectangular, the height of the input image in units depends on the input video mode.



The input image is vertically centered in the coordinate system, which means that the visible portion of the image will begin at a y-value greater than 0. The exact value depends on the aspect ratio. This way, if the input video mode changes, the displays will remain centered on the input image.

aspect ratio	minimum x value	maximum x value	width	height	minimum y value	maximum y value
5:4	0	9,999	10,000	8,000	1,000	8,999
4:3	0	9,999	10,000	7,500	1,250	8,749
16:9	0	9,999	10,000	5625	2187	7,811
16:10	0	9,999	10,000	6250	1875	8,124

Note
The units are equal in the vertical and horizontal directions, and are relative to the **horizontal resolution**. For example, if the input signal has a resolution of 1920x1200, then a width of 9999 will be 1920 pixels (a height of 9999 will be also be 1920 pixels, resulting in black borders at the top and bottom of the image).

The simplest analogy for the units is to think about them as percentage values of the input signal width.

Note
The values for size and position specify the coordinates **of the section from the input image** a display shows. This means that reducing the width and height of a rectangle in the Edit View will cause the display to **zoom in** and show a smaller portion of the input image.

How To Set Up a Video Wall

To set up a video wall with a free setup, follow the steps below.

1. **Set input aspect ratio.**

   Find out the aspect ratio of input channels 1 and 2. Refer to section Input Channel Settings for a table of common resolutions and their aspect ratios.

   Go to “Video->Input Channels...” in the main menu. In the window, set the aspect ratios for the input channels.

2. **Set output resolution for each display.**

   Find out the native resolution for your displays.

   Open the Edit window from the context menu for each display, and set the output resolution to the native resolution of your display.

3. **Measure physical video wall size.**

   Measure the width and height of your video wall. Measure from the edge of the leftmost display to the edge of the rightmost display, and from the top edge of the topmost display to the bottom of the display at the bottom. When measuring, take care to measure only the **visible** section of the screens, that is, exclude the frames around the displays at the video wall’s edges.

   Calculate your video wall’s aspect ratio to help you define the section of the input

image you want to display on your video wall. Usually, the ratio will differ from the input aspect ratio.

Note:
Up to this point, the settings you have obtained apply to the video wall, and are the same for all presets you will create for that particular wall. Steps 4-8 apply to one particular preset. Repeat these steps for each preset you want to set up.

4. Define input image section to display

Choose the section of the input image to display. You can either choose to display a part of the input image, or to show as much of the input image as possible.

If you choose to display as much of the contents of the input image as possible, and the aspect ratio of your video wall differs from the aspect ratio of your input image, you have two choices for the section of the input image.

- show entire image, with black bars
- show the largest possible part of the input image, without black bars

Where the black bars appear depends on the relation of the video wall's aspect ratio to the input signal's aspect ratio. If your video wall is wider than the input image, the black bars will be on the left and right sides of the image. If your video wall is narrower than the input signal, the black bars will be on the top and bottom of the image.

Note:
We recommend leaving some space on the edges of your input image in this step. Later, your will have some reserve space left for fine-tuning the settings.

How to determine the size of the section to show, and how to convert the size into units is explained in detail in section

5. Calculate Units per Centimeter

by dividing video wall width by 9000

6. measure size for each display (hint: Our excellent testing from sales team has discovered that displays of the same type have the same size)

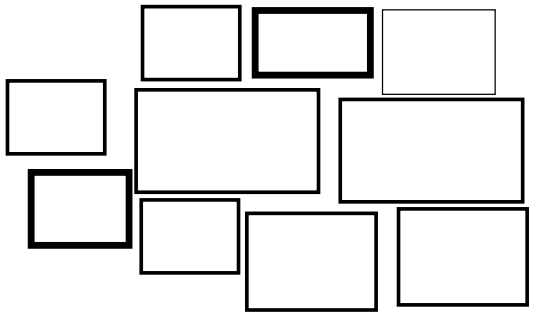
7. position
   a. calculate x-position by measuring from the left edge of the video wall and converting from cm to units
      Note: add offset
      enter into the x-field
   b. calculate y-position by measuring from the top edge of the video wall and converting from cm to units

Note: add offset
enter into the y-field

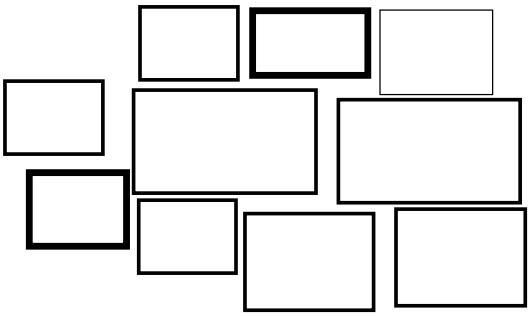
8. fine-tune
   a. Create a test image with a lot of diagonalines.
   b. Choose a display as starting point (we recommend the central display)
   c. fine tune all displays starting from the first display – adjust position (x/y coordinates)
   d. there is no d.

Example

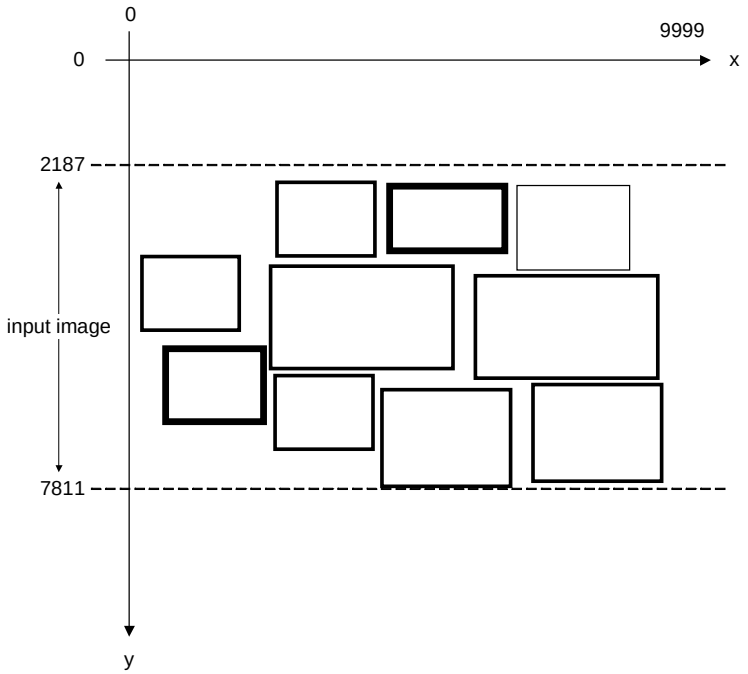
As an example, consider the video wall shown on the first page.



The image displayed on the video wall is composed of sections from the input image.

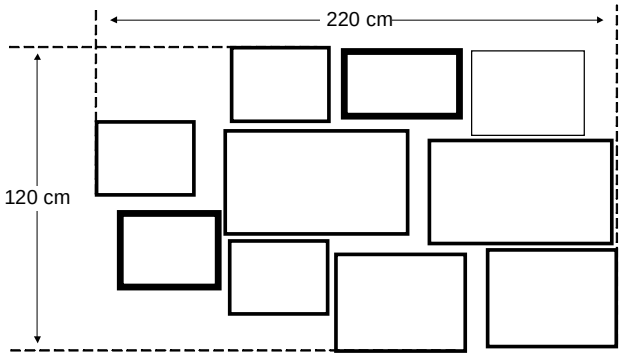


Since the coordinates are anchored to the input image, we get the following coordinate system. The input image is an HDTV signal, with a resolution of 1920x1080 and an aspect ratio of 16:9. Since the input image is centered vertically, the y-coordinate of the visible image is greater than 0, in our case, 2187.

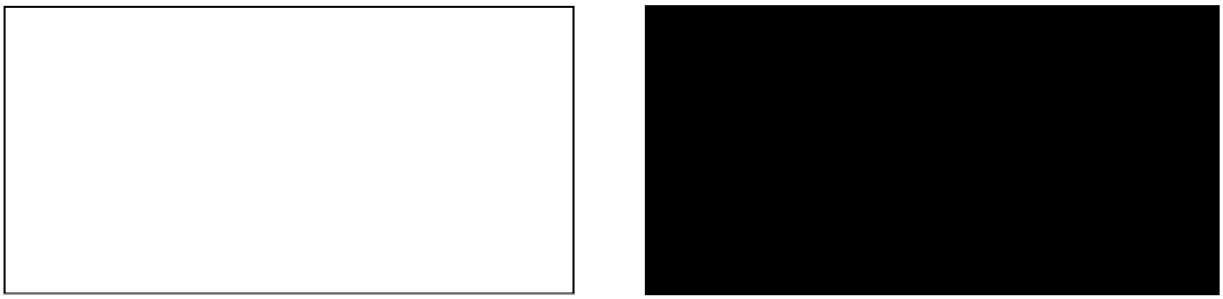


In this case, we chose to display not the whole input image, but to leave out some space at the top and sides. We know the input image is 1920x1080 pixels. To define the area to display, we first need to know the size of the video wall. More precisely, we need the aspect ratio of the video wall, because we can enlarge or reduce the section we want to display, but we have to respect the aspect ratio, or the picture will appear distorted.

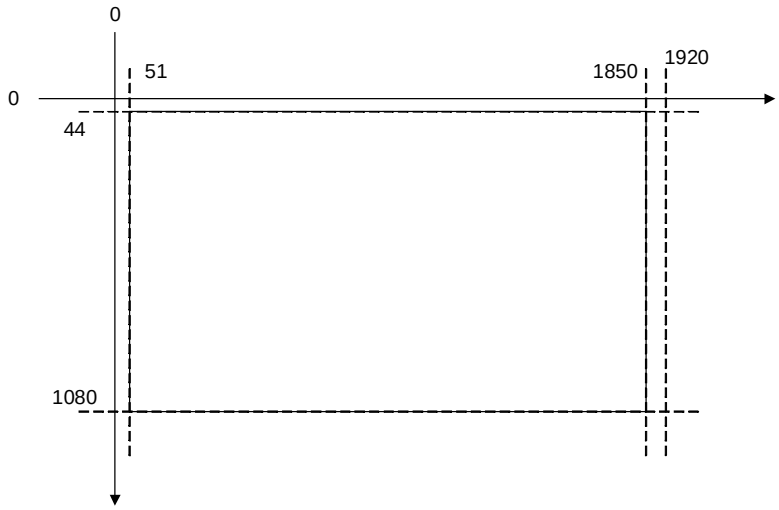
*We then measure the width and height of our video wall. We measure from the edge of the leftmost display to the edge of the rightmost display, and from the top edge of the topmost display to the bottom of the display at the bottom. When measuring, take care to measure only the **visible** section of the screens, that is, exclude the frames around the displays at the video wall's edges.*



The area shown by the monitor wall has an aspect ratio of 220cm : 120cm, which corresponds to an aspect ratio of 16.5:9. This means it is a little wider than our 16:9 input image. We have the choice of showing an image that is clipped at the top and/or bottom edges, or of showing the complete input image, with black bars at the sides. In this case, we chose to show only a portion of the input image (the racing car, and omit a part of the not-so-interesting scenery.



Picture 12: clipping left/right vs. black bars. Note that in the example for clipping, the portion to display was chosen a little lower than the center of the input image, to have all of the car visible.



The section of the input image in pixels

To calculate the portion of the input image we want to display on the video wall, we decide which section of the input image to show on the video wall. In pixels, this section is

x: 51 – 1850
y: 44 – 1080

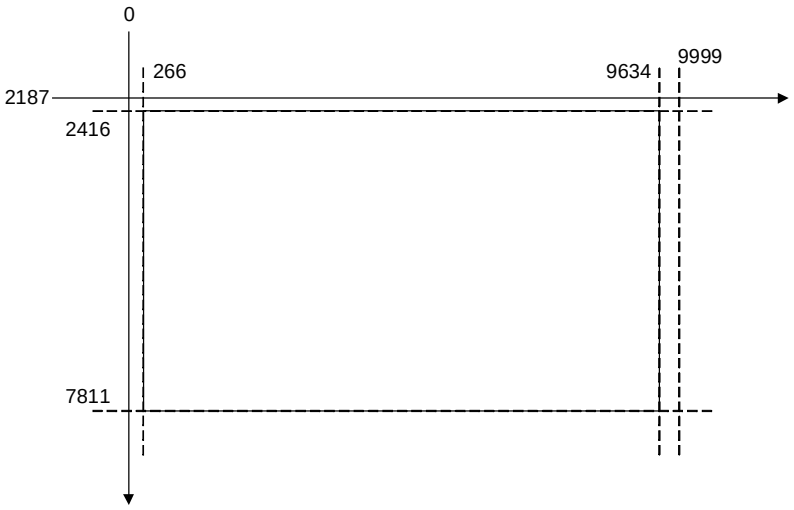
We convert these values to our 0-9999 coordinate system by first dividing by the width of the input image in pixels (1920), and then multiplying by the width of the coordinate system (9999).

$$\frac{51}{1920} \cdot 9999 = 265.598 \approx 266$$
$$\frac{1850}{1920} \cdot 9999 = 9634.453 \approx 9634$$

For the y-values, we also have to add the offset of 2187.

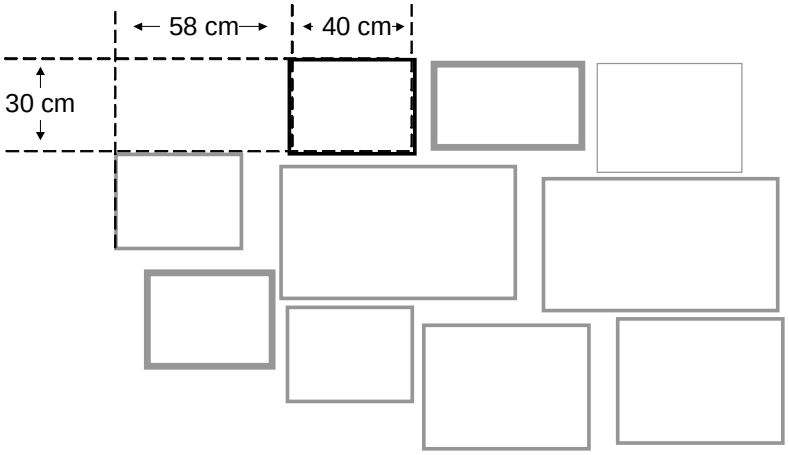
$$\frac{44}{1920} \cdot 9999 + 2187 = 2416.144 \approx 2416$$

$$\frac{1080}{1920} \cdot 9999 + 2187 = 7811.438 \approx 7811$$



The section of the input image converted to the coordinate system

To calculate the coordinates for a single screen, we need to measure the physical size of the screens in the video wall, and the gaps between the screens.



Taking the topmost display as an example, we measure the distance from the top (0, for the topmost display), from the leftmost display(58cm), and width (40cm) and height (30cm) of the display. Take care to always measure from the active part of the screen, not from the frame.

The total width of the video wall is 220cm, which corresponds to 9368 units in our section of the input image so we can transform the physical size into coordinates by dividing by the physical wall width (220cm), and multiplying by the wall width in the

coordinates (9368). Here, we again use the total width as the base to transform both height and width, and again we add the offset of 2187 to the y-coordinate.

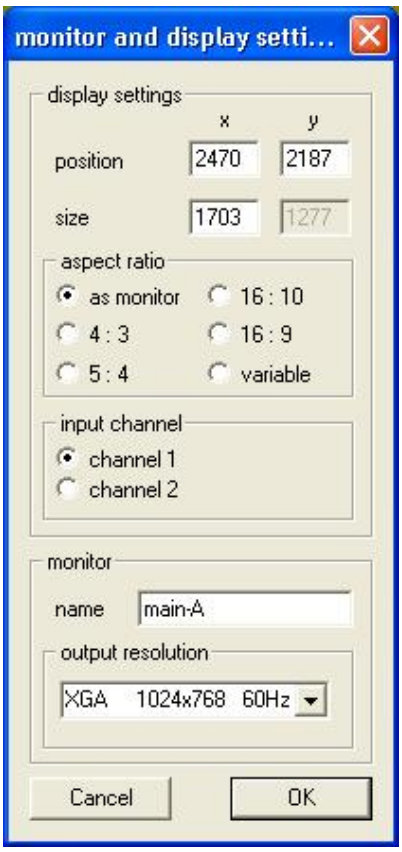
x-coordinate: $\frac{58cm}{220cm} \cdot 9368 = 2469.745 \approx 2470$

y-coordinate: $0cm + 2187 = 2187$

width: $\frac{40cm}{220cm} \cdot 9368 = 1703.273 \approx 1703$

We know the display's native resolution (XGA, 1024x768), so we do not need to calculate the height of the screen. When we enter the output resolution and set the aspect ratio to "as display", the program will automatically adjust the height of the section according to the width and aspect ratio.

We then set the values in the edit window.



Repeat these calculations for all displays.

The advantage of this system is that it is resolution-independent. A preset for a UXGA (1600x1200) input signal will work equally with input signals in XGA (1024x768),

SVGA(800x600), or VGA (640x480). Even if the input aspect ratio changes, the same preset will still result in a viewable image, although possibly with black borders at the top and bottom.

How to determine the input image section

When determining the dimensions of the input image section you width to display, the goal is to get measurements relative to the width and height of the input image. This is because the input coordinate system is relative to the input image, the total width of the input image being 9999U. If you want to only half of the width of the input image, your section of the input image will be 5000U wide.

Another thing to keep in mind when determining the section from the input image is that the width and height of the section need to have the same aspect ratio as your video wall, for the image to be displayed without distortion. This means that if you choose the width, the height of the section will be dictated by your video wall's aspect ratio. Conversely, you can choose the height first, but then the width will be fixed.

TODO: hier fehlt noch die Erklärung wie man dann die Breite nach der Höhe oder umgekehrt bestimmt

To choose the section of the input screen, you can open a screenshot from the input image in a graphical editor, and choose the section you want to display. Most editors will display the coordinates of the selection in pixels. Take the pixel values for x- and y-position, width and height of the selection and the width and height of the total image.

Then, calculate what portion of the total width of the image your coordinates represent: divide the total width by the coordinate value.

Example Setups

Reference: The OSD, Settings, and All the Rest

OSD Menu(s)

Scope of Supply

v-match main:
kabel
kabel
kabel
CD with

- V-Match Control program
- ConfDev configuration tool

V-Match Manual (this document what you are reading right now)
ConfDev manual