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User manual for:
Digital 3D viewer for panel mount
Model 18-04-D55-x





The contents are subject to changes without giving notice. February 2025, version 1.3

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1. Introduction

With the release of this model of viewer, fall 2018, 3D viewing has grown to a wide range of experience systems like VR, AR, XR, autostereoscopic displays and holographic presentation systems.
The purpose of this viewer is to present photographic and video content in 3D in high quality crisp and sharp.
Besides the ability to present images on a full HD LCD, a higher standard of resolution became more relevant.
To be able to easily switch between resolution LCD set or exchange broken parts, the viewer was also improved and maintenance becomes easier.

This viewer is a good balance between optics and the resolution of the display screen to present a high quality, sharp and optically comfortable show of 3D content. The objective was to design a visitor tolerant viewing system and reach people of all ages to experience your well prepared and high quality 3D images or video's. The viewer actually behaves like a monitor and able to connected to any source having the ability to customize the video output resolution. The application for this viewer is to build it into walls, panels or other custom build constructions.

1.1 Acknowledgements

Ken Thompson for creating the open source presentation tool Pi-presents.
http://pipresents.wordpress.com
The Raspberry pi foundation for creating such a small and very useful source for the viewer: http://www.raspberrypi.org

- January 2019, updated LCD timing settings.
- March 2022, updated warning to add grounding to the viewer enclosure
- February 2025, update with additional landscape oriented QHD LCD set.

2. Installation

The 3D digital viewer can be used to present a slide show or video. For exhibit designers, the viewer could be used as a stand-alone object or as ‘support’ to explain a scene or object close to the viewer.
Because of the small size of the viewer, in most situations only the lens barrels are visible, the visitor should not overlook viewer and miss the presentation!

When looking through the viewer, you get the best experience when there is nothing that is irritating or inhibits a clear view. Things that might irritate are bright spot lights pointing on the viewer causing the light to be reflected in your eyes. Or flashing lights close to the lenses. A black (cinema like) surrounding gives the best impression.

2.1 The viewer

The viewer housing is constructed in such a way it gives the most freedom to integrate it in almost every situation.

Integrating the viewer in your situation:

- Using the front panel plate is the easiest way to build the viewer in a wall or panel.
- For your custom application, you can replace the front plate for your own front cover. Steps in the side of the lens barrels allow to lock up your front plate between the barrels and the housing of the viewer.

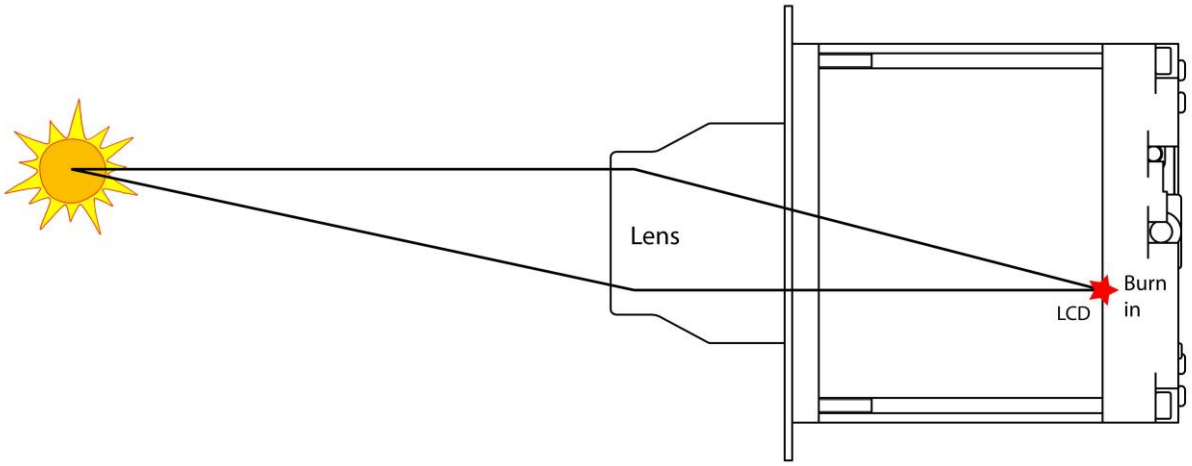
Initially the viewer is supplied with the lens barrels locked up in their screw thread by hand. So you can remove the lens barrels with some force. This allows you to remove the front plate for whatever reason.

Model number of the viewer only:
18-04-D55-xxx
Year(18) of design – type panel viewer (**04**) – **D**igital **5.5**” – Focal length xxx **80, 100 or 120**

The LCD panels have their own identification:
18-04-D55**X**
The X stands for **A,B,C or D** and explained in chapter 3.3 *Digital Video input specifications (timing)*.

2.2 Attention! take the following directions seriously

- **Avoid sunlight to enter into the viewer** through the lenses. The lenses act like burning glasses and the sun will damage the LCD inside. When mounting the viewer in a panel, check that the sun would never be able to point to the lenses at any time of the day!



- As long as the viewer is NOT build in on its final presentation location, **cover the lenses** to avoid accidentally burn-in of the LCD (point mentioned above). As well as protection against scratching the lenses.

- The lenses are not fixed tight in the viewer housing to allow you to exchange the front plate for any reason, until you finish the build-in preparation. **Secure the lenses with the hexagon screws** on the edge of the housing, to prevent unscrewing the lenses by visitors.

- The HDMI cable and USB cable are fragile connectors. The internal connectors of the LCD controller are mounted securely but allow limited force on the plug perpendicular to the insert of the plug. So always pull out the plug in-line with the connector. **Use the cord relieve** facility to avoid unnecessary damage.



- Do not use the viewer in high humidity or outdoor environments.

- The inside LCD and connectors are fragile parts, applying force to it might damage the functionality. If there is no reason to remove the rear covers of the viewer, do not remove them.

- Ground the metal of the viewer enclosure. Static discharges can damage the LCD when the viewer is not grounded.



2.3 Content source

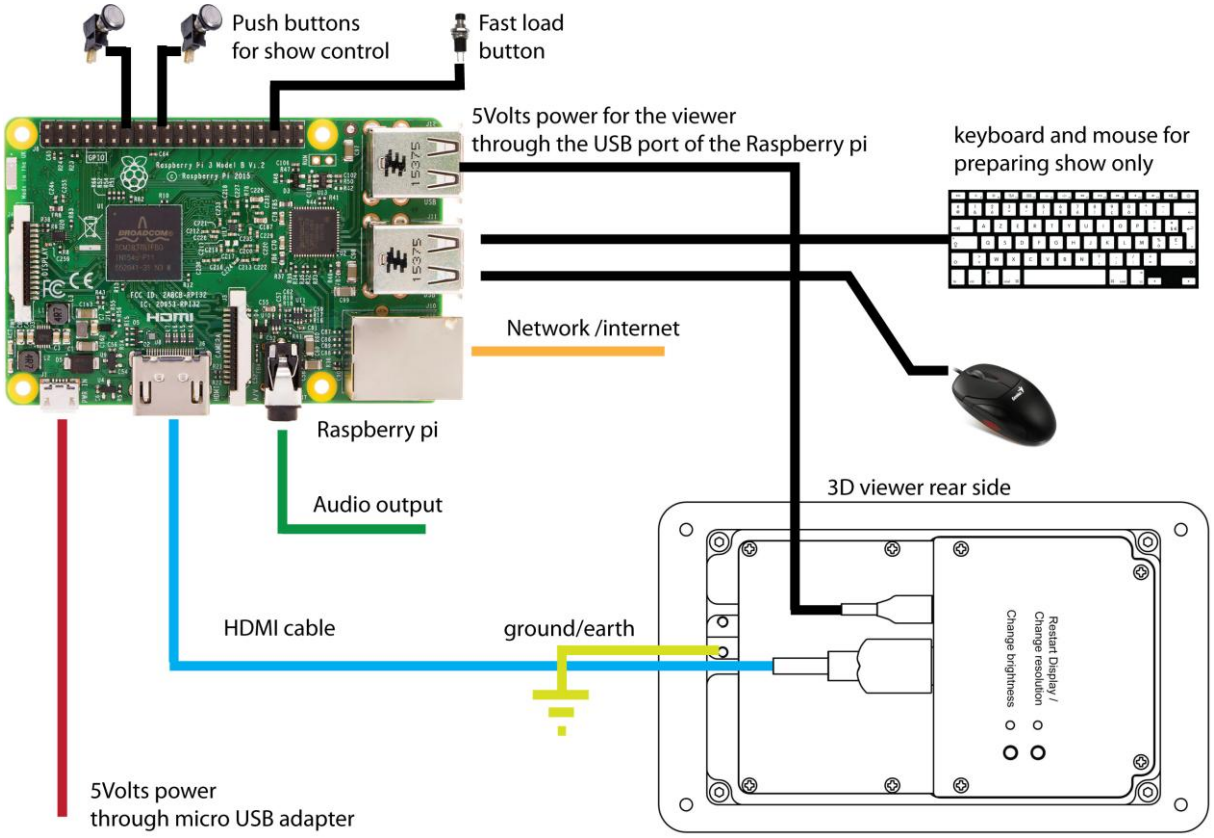
The viewer is built around a smart phone LCD display having the resolution that varies depending on the type of LCD panel you ordered.

The choice of a content sources, cancels out devices which are unable to deliver this the native resolutions that the LCD requires! So check chapter 3.2 for video input requirements. Computer systems having a more advanced video processing output (separate video cards or graphic processors) are often automatically able to address portrait oriented LCD's trough the EDID information.
Simple small single board computers, depending on the operating system, require more knowledge to configure the vertical display.
Be aware that there are a number of professional multimedia players having fixed output resolutions to select from, they do not match with portrait displays!

Using a single board computer like the Raspberry pi

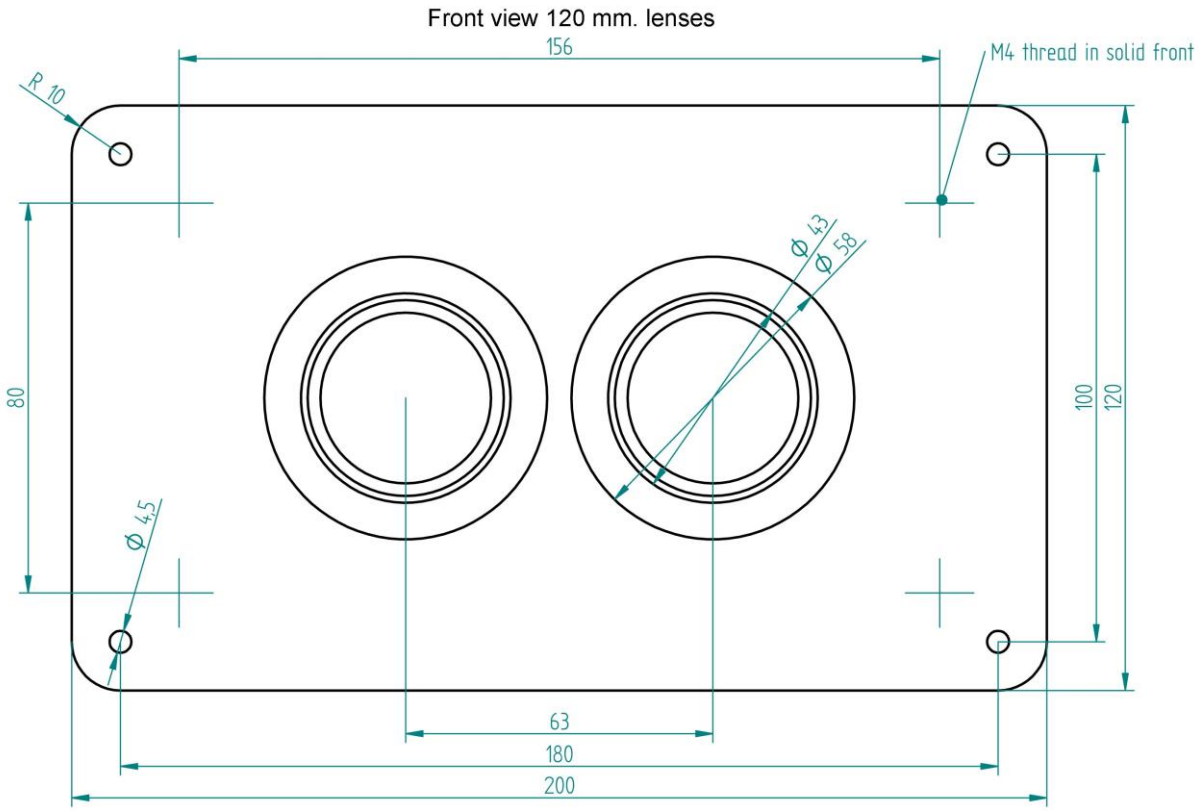
De Wijs offers a simple solution as content source; the Raspberry pi. The choice for this device has several reasons:

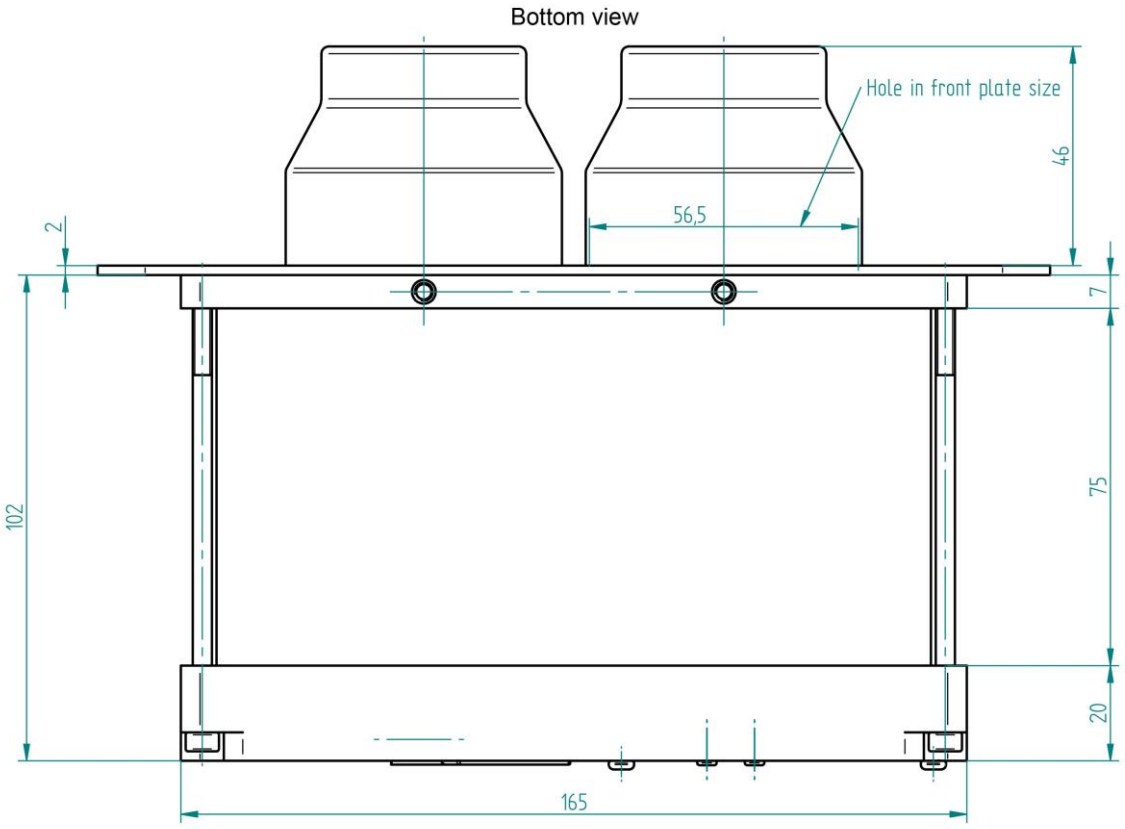
- affordable and very good available.
- The graphical output can be set to the required LCD configuration of the 3D viewer up to QHD resolution.
- The General Purpose IO header on this board allows push buttons to control a slide show or start a video.
- Open source software that can be adapted for your application.
  We use Pi-presents that gives a good solution for an interactive slide show with acceptable performance.

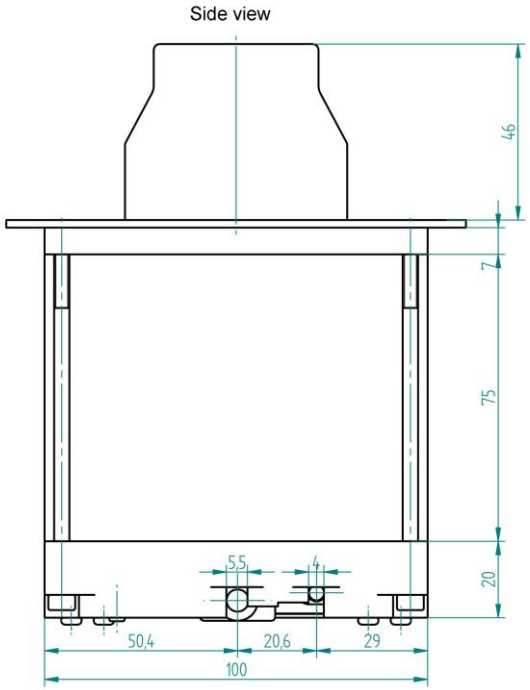


3 Technical data

3.1 Physical dimensions (120 mm. lens version)







When you consider to make your own front plate. You need to make 2 holes side by side for the lenses. Heart to heart distance is 63 mm. and diameter of 56.5 mm.
Fixing the lens barrels into the housing again, will lock up your panel in the rim of the lens barrels.

Do NOT de-assemble the long M4 bolts that hold the whole viewer together. You might scratch the matt painted image splitter or LCD.

The viewer can carry 2 types of lenses. Both fit in the housing of the viewer. Only the length of the barrel is different:

- 100 mm. achromatic, 33 mm. diameter. This lens magnifies 2.5x and is a good choice for viewing video content, having a 4:3 aspect ratio. The most upper and lower part of the LCD is less good visible for glasses wearers when using the full height of the LCD.
- 120 mm. achromatic, 37 mm. diameter. This lens magnifies 2.1x and allows all visitors to see the full size of the LCD into the corners without image distortion. Pixels are hard to see. It is a good choice for viewing square or landscape still images.

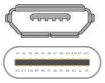


It is strong recommended to use the cable relieve at the edge of the viewer!

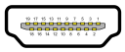
3.2 Connectivity specifications

The viewer has 1 power connector; through USB

Micro USB connector: 5 Volts dc.
Or USB-C connector: 5 Volts dc.
Power consumption; 500mA at 5 Volts dc. 2,5 Watts



Digital video input through the HDMI connector type A, 1.4
Edid version 1.3. Maximum cable length 1.5 metres.
When connected to Display Port, an active converter to HDMI might be needed!



An additional 3.5 mm. audio jack allows sound to pass through HDMI for those controllers that have one.



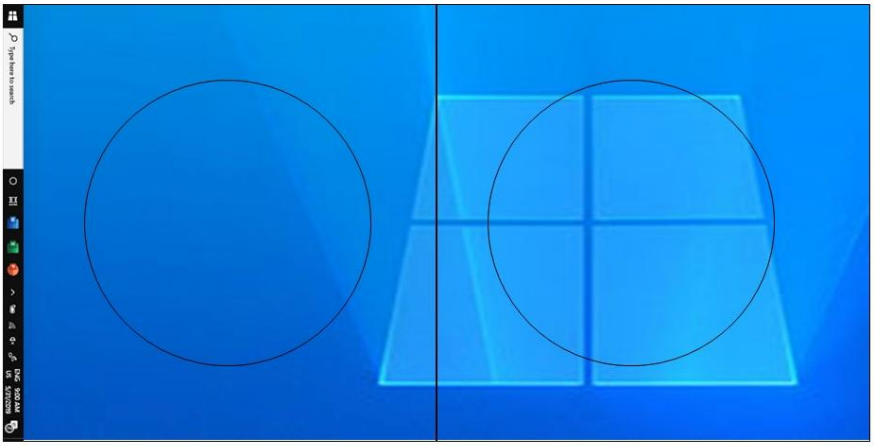
Connect the metal enclosure of the viewer to electrical ground / earth to discharge any static electricity

It is recommended to secure the cables with the screws on the edge of the viewer as cable relieve facility.

Native display orientation

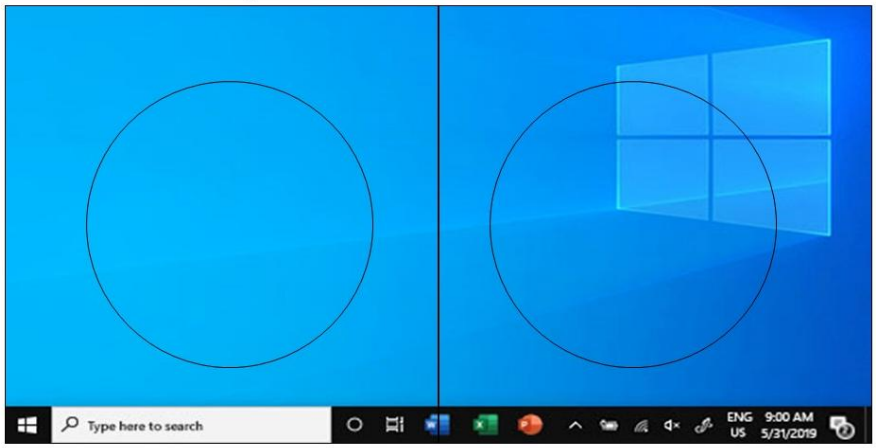
The display panels used in the 3D digital viewer are also used in known brands of smartphones and VR glasses. These displays are produced for that particular purpose and are often orientation in portrait mode. The HDMI controller inside the 3D viewer is not able to rotate to map a landscape oriented HDMI signal to portrait, so the connected media player should be able to re-map the HDMI signal to portrait. Except those LCD sets fit with a rotation option. The 5.5” smartphone display’s are natively produced in portrait orientation, see below as example.

Native appearance of the 5.5” smartphone display connected to a Windows computer
The circles are standing for the viewer lenses



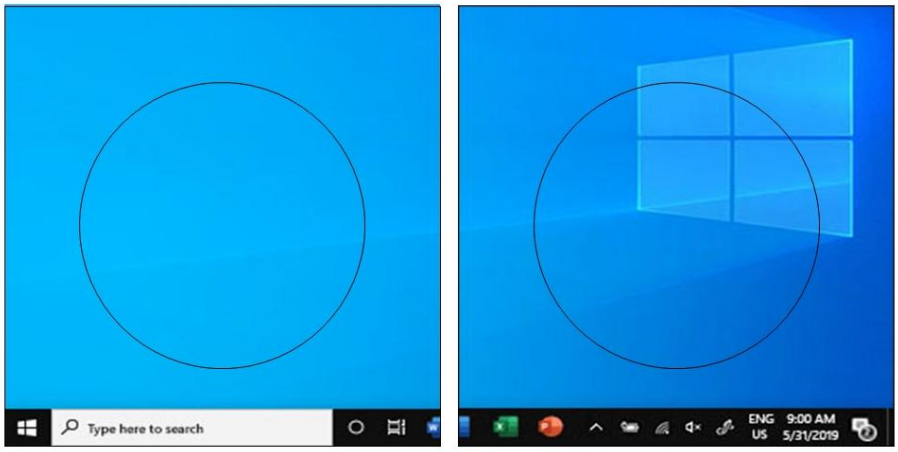
In, for example, Windows, you can rotate the desktop environment, see below

Rotated desktop in the Windows operating system of the 5.5” smartphone display.
The circles are standing for the viewer lenses



Rotating a desktop inside any operating system requires enough graphical memory to do that. The Raspberry pi 2 and 3 are able to rotate only the Full HD resolution. However the dual LCD configuration is already horizontal oriented and does not require to rotate, see below. The HDMI controller in the viewer splits the video in half for each display panel.

Native appearance of the dual LCD set in the viewer connected to a Windows computer.
The circles are standing for the viewer lenses



3.3 Digital video input specifications (timing)

The viewer's rear frame is designed to be able to exchange an internal sub- LCD carrier. Such a carrier can hold a specific LCD panel measuring 5.5" diagonal or 120 mm. width. Bellow an example for the 1440x2560 LCD.



Bellow the list of released LCD sets.
18-04-D55A 1080x1920 pixels. HD
18-04-D55B 1440x2560 pixels. QHD
18-04-D55BR 2560x1440 pixels QHD
18-04-D55C 2880x1440 pixels. Double LCD
18-04-D55D 2160x3840 pixels. UHD
Modern desktop PC's are able to detect the right settings for these LCD's, you do not need to set complicated parameters.

Use the DVI digital output or HDMI, or Display port with <u>active</u> converter to HDMI.

However if you prefer to work with the Raspberry pi or other Linux based computers, you need the timing settings of each panel. They are listed below.
For the full config.txt content for the Raspberry pi we refer to the configuration manual of the Raspberry pi for this viewer and LCD sets.

Deu to the ongoing development of the Raspberry pi series as well as the used operating systems, the syntaxes of the config.txt differs for each type.

Be sure that the Colour space of the player is running in RGB mode! <u>not</u> YUV.
YUV colour space causes a greenish appearance of the presented image.

1. Model 18-04-D55A Full HD

Resolution: horizontal x vertical = 1080x1920 pixels at 60 Hz. 8 bits colour depth.
Size: 5.5”, model LS055T1SX01

The timing parameters are as following:					
	Active	Front Porch	Sync width	Back Porch	horizontal
Active	field 1080x1920 pixels	60	10	35	Pixels (total 1185)
Front Porch	4	Hsync and vsync negative			
Sync Width	4				
Back Porch	2				
veritical	Lines (total 1930)				
Xconfig timing: Modeline "1080x1920" 137.22 1080 1140 1150 1185 1920 1924 1928 1930 -hsync -vsync					
String for Raspberry pi hdmi_timings=1080 0 60 10 35 1920 0 4 4 2 0 0 0 60 0 137220000 0					

2. Model 18-04-D55B QHD

Resolution: horizontal x vertical 1440x2560 pixels at 50Hz. 8 bit colour depth
Size: 5.5”, model LS055R1SX04

The timing parameters are as following:					
	Active	Front Porch	Sync width	Back Porch	horizontal
Active	field 1440x2560 pixels	70	35	45	Pixels (total 1590)
Front Porch	12	Hsync and vsync negative			
Sync Width	2				
Back Porch	2				
vertical	Lines (total 2576)				
Xconfig timing: Modeline "1440x2560" 204.792 1440 1510 1545 1590 2560 2572 2574 2576 -hsync -vsync					
String for Raspberry pi hdmi_timings=1440 0 70 35 45 2560 0 12 2 2 0 0 0 50 0 204792000 0					

3. Model 18-04-D55BR QHD (90º rotation of input signal to landscape)

Resolution: horizontal x vertical 2560x1440 pixels at 60Hz. 8 bit colour depth
Size: 5.5”, model LS055R1SX04

The timing parameters are as following:					
	Active	Front Porch	Sync width	Back Porch	horizontal
Active	field 2560x1440 pixels	44	88	148	Pixels (total 2840)
Front Porch	4	Hsync positive and vsync negative			
Sync Width	5				
Back Porch	36				
vertical	Lines (total 1485)				
Xconfig timing: Modeline "2560x1440" 253.044 2560 2604 2692 2840 1440 1444 1449 1485 hsync -vsync					
String for Raspberry pi hdmi_timings=2560 1 44 88 148 1440 0 4 5 36 0 0 0 60 0 253044000 0 This controller is able to switch between vertical and rotated landscape orientation input signal.					

Rotation turned off; LCD behaves as portrait monitor.

The timing parameters are as following:					
	Active	Front Porch	Sync width	Back Porch	horizontal
Active	field 1440x2560 pixels	100	20	100	Pixels (total 1660)
Front Porch	12	Hsync positive and vsync negative			
Sync Width	2				
Back Porch	2				
vertical	Lines (total 2576)				
Xconfig timing: Modeline "1440x2560" 256.570 1440 1540 1560 1660 2560 2572 2574 2576 hsync -vsync					
String for Raspberry pi hdmi_timings=1440 1 100 20 100 2560 0 12 2 2 0 0 0 60 0 256570000 0 This controller is able to switch between vertical and rotated landscape orientation input signal.					

4. Model 18-04-D55C

Resolution: horizontal x vertical 2880x1440 pixels. 8 bit colour depth
Size: 2x 2.9”, model LS029B3SX02
This Display set is able to change in resolution mode; clone mode and 3D mode (independent) using the ‘Restart Display / change resolution’ button.

The timing parameters are as following: 2880x1440 mode at 60Hz.					
	Active	Front Porch	Sync width	Back Porch	horizontal
Active	field 2880x1440 pixels	48	32	80	Pixels (total 3040)
Front Porch	8	Hsync and vsync negative			
Sync Width	2				
Back Porch	6				
vertical	Lines (total 1456)				
Xconfig timing: Modeline "2880x1440" 265.57440 2880 2928 2960 3040 1440 1448 1450 1456 -hsync -vsync					
String for Raspberry pi. hdmi_timings=2880 0 48 32 80 1440 0 8 2 6 0 0 0 60 0 265574400 0 No need to rotate the desktop orientation, already in landscape.					

The timing parameters are as following: 1440x1440 clone mode at 60Hz.					
	Active	Front Porch	Sync width	Back Porch	horizontal
Active	field 1440x1440 pixels	48	32	80	Pixels (total 1600)
Front Porch	8	Hsync and vsync negative			
Sync Width	2				
Back Porch	6				
vertical	Lines (total 1456)				
Xconfig timing: Modeline "1440x1440" 139.77600 1440 1488 1520 1600 1440 1448 1450 1456 -hsync -vsync					
String for Raspberry pi. hdmi_timings=1440 0 48 32 80 1440 0 8 2 6 0 0 0 60 0 139776000 0 No need to rotate the desktop orientation, already in landscape.					

5. Model 18-04-D55D UHD

Resolution: horizontal x vertical 2160x3840 pixels at 50Hz. 8 bit colour depth
Size: 5.5”, model H546UAN01.0
This UHD Display is able to change in resolution mode; HD, QHD and UHD, using the ‘Restart Display / change resolution’ button.

The timing parameters are as following: 1080x1920 mode, at 60 Hz.

	Active	Front Porch	Sync width	Back Porch	horizontal
Active	field 1080x1920 pixels	105	32	100	Pixels (total 1317)
Front Porch	12	Hsync and vsync negative			
Sync Width	2				
Back Porch	10				
vertical	Lines (total 1944)				

Xconfig timing:
Modeline "1080x1920" 153.614880 1080 1185 1217 1317 1920 1932 1934 1944 -hsync -vsync

String for Raspberry pi
hdmi_timings=1080 0 105 32 100 1920 0 12 2 10 0 0 0 60 0 153614880 0

The timing parameters are as following: 1440x2560 mode. at 50 Hz.

	Active	Front Porch	Sync width	Back Porch	horizontal
Active	field 1440x2560 pixels	105	32	100	Pixels (total 1677)
Front Porch	12	Hsync and vsync negative			
Sync Width	2				
Back Porch	11				
vertical	Lines (total 2585)				

Xconfig timing:
Modeline "1440x2560" 216,75225 1440 1545 1577 1677 2560 2572 2574 2585 -hsync -vsync

String for Raspberry pi.
hdmi_timings=1440 0 105 32 100 2560 0 12 2 11 0 0 0 50 0 216752250 0

The timing parameters are as following: 2160x3820 mode at 24 Hz.

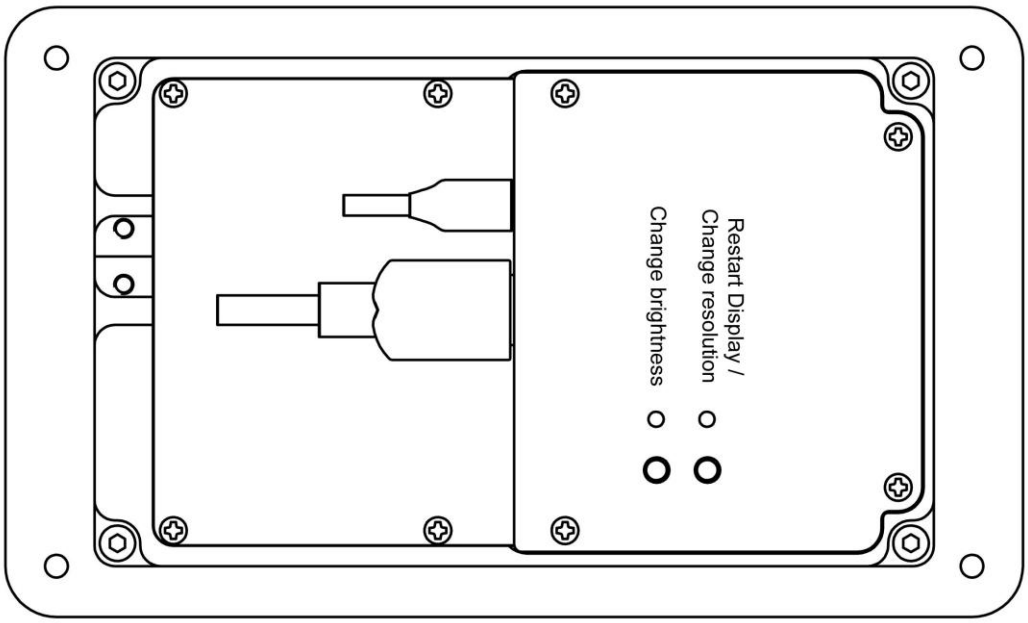
	Active	Front Porch	Sync width	Back Porch	horizontal
Active	field 2160x3840 pixels	105	8	100	Pixels (total 2373)
Front Porch	12	Hsync and vsync negative			
Sync Width	2				
Back Porch	10				
vertical	Lines (total 3864)				

Xconfig timing 30 Hz.:
Modeline "2160x3840" 277.860240 2160 2265 2297 2397 3840 3852 3854 3864 -hsync -vsync
Xconfig timing 24 Hz.:
Modeline "2160x3840" 220.062520 2160 2265 2273 2373 3840 3852 3854 3864 -hsync -vsync

String for Raspberry pi., 24 Hz.
hdmi_timings=2160 0 105 8 100 3864 0 12 2 10 0 0 0 24 0 220062520 0

3.5 Buttons and indicator LED explanation.

Explanation below applies to models:
18-04-D55A 1080x1920 pixels. HD
18-04-D55B 1440x2560 pixels. QHD
18-04-D55C 2880x1440 pixels. Double LCD
18-04-D55D 2160x3840 pixels. UHD



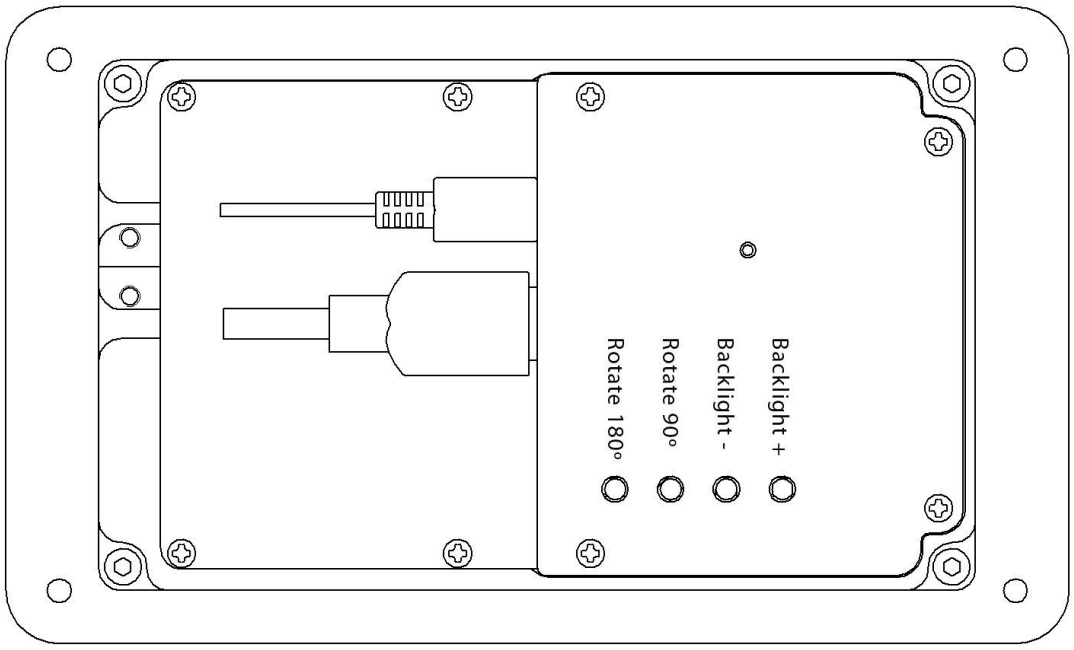
Power up:
When applying power to the viewer, the controller for the LCD starts up checks the input EDID data on the HDMI connector. When it is correct it will show video on the LCD. The bleu LED blinks fast and if the signal is correct, the green LED turns to steady green. If the HDMI signal does not match this inside display or the signal is temporally wrong, the bleu LED blinks slowly.

Restart button:
When pressing the restart button, the inside display controller restarts like power up. Pressing this button also switches the resolution on some display controllers. After each press, wait for 5 seconds to let the controller and the source (computer) to switch over (automatically). If one of them is not able to adapt to that resolution, the bleu LED blinks slowly.

Brightness button:
Pressing this button at the rear of the viewer changes the brightness of the backlight of the LCD in 5 steps. The brightness level is stored after setting. When power is turned on or connected again, the latest brightness level is restored.

To preserve the lifecycle of the LCD screen, it is good not to set the brightness of the LCD to maximum. Keep it to about 75%

Explanation below applies to models:
18-04-D55BR 2560x1440 pixels. QHD Rotable video input



Power up:
When applying power to the viewer, the controller for the LCD starts up checks the input EDID data on the HDMI connector. When it is correct it will show video on the LCD. The bleu LED blinks and if the signal is correct, it turns to steady bleu. If the HDMI signal does not match this inside display or the signal is temporally wrong, the bleu LED starts blinking.

Brightness buttons:
Pressing these buttons at the rear of the viewer changes the brightness of the backlight of the LCD in 5 steps.

Rotate 90º
The native display orientation is in portrait. Pressing this button will present the viewer as landscape oriented display towards the video source. Toggle this button and it will return to portrait again.

Rotate 180º
This button turns the image upside down inside the configured orientation. Toggle this button and it will return to the initial view.

All the above settings are stored and restored after restoring power.

To preserve the lifecycle of the LCD screen, it is good not to set the brightness of the LCD to maximum. Keep it to about 75%

3.6 Maintenance

Cleaning
The outside of the viewer can be cleaned with regular cleaning liquids, not too aggressive or polishing. The lenses are not water tight. Clean the lenses with a soft cloth.

Dust visible on the LCD
Turn on the viewer to see the dust particles.
Take the lens barrels out of the front of the viewer.
You can blow with compressed cleaned (oil free) air, not higher than 2 bars, inside the housing of the viewer towards the LCD. Not too deep and avoid touching the sides to prevent scratches on the inside walls.
You can use a brush or soft cloth to wipe resistant particles away. There is no glass cover on the LCD! Do not apply too much pressure / force on it.
When re- assembling the lens barrels in the front, it might happen new particles drop on the LCD. You can repeat the above steps until the result is satisfying.

Miss alignment of the image splitter.
Between the left and right image on the LCD runs a thin metal plate from the LCD to your nose / between the eyes. This avoids the left or right eye to see parts of the image of the other side. The position of this splitter is accurate but might be, for some reason be out of alignment, you might see a very small piece of image of the other side (left or right).
To resolve do the following:
For whatever source you have, there is a test image that looks like this:



- Set your source to show the above image in the viewer.
- Look through the lenses and see the direction and amount of miss alignment of the splitter (metal plate).
- Now unscrew both lenses out of the housing. Be sure the hexagon screws at the side of the lenses are unlocked.
- With your fingers you can push the splitter (through the lens holes) to the left or right to get the splitter aligned. You actually bend the plate a little.
- Check with the lenses if the alignment is right or repeat the previous step.
- Clean the interior of the viewer with low pressure compressed air.
- Re-assemble the lens barrels to the viewer and the alignment is finished.